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Article

ASSESSING the Polarization of Climate Phenomena Based On Long-Term Precipitation and Temperature Sequences

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Abstract: The article presents an analysis of monthly precipitation totals based on the GPCC database, and monthly mean temperatures (NOAA data) for 377 catchments distributed across the globe. The analysis included 110-year data sequences from 1901 to 2010 calculated from grid data with a spatial resolution of 0.5°x 0.5° longitude and latitude. Long-term sequences of precipitation and temperature were used to assess the polarization of climatic phenomena. The noticeable impact of polarization in the area of extreme changes in temperature and precipitation is related to anthropogenic factors such as greenhouse gas emissions, deforestation and pollution, which affect ecosystem functioning, biodiversity, water resources and economies. The paper demonstrates the existence of trends related to the polarization of temperature and precipitation phenomena. The measures of polarization used in science are discussed. A simple measure of polarization was proposed and applied to both long-term sequences of monthly precipitation totals and monthly mean temperature. Due to the nature of the proposed polarization measure, other characteristics of the precipitation and temperature sequences are also presented as background for the discussion of the polarization index. The paper presents, for a selection of several hundred catchments from around the world, analyses of the assessment of precipitation and temperature trends using non-parametric tests. The trend analyses use Mann -Kendall tests at the 5% significance level. A Pettitt test was used to determine the trend change point for precipitation and temperature data. The whole is supported by rich graphical analyses and the results are presented tabularly.

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1. Introduction

Analysis of historical observations of climate variables indicates anthropogenic climate change [1–3]. Numerous studies at various spatial scales have considered the impact of projected changes in the climate system on hydrology and water resources [1,3–6]. Freshwater availability is the second most responsive environmental variable to climate change after air temperaturę [1,7–10]. The timeliness of temporal and spatial characteristics of precipitation and temperature, despite the many papers that have been written and analyses performed [11–18] especially in recent decades is increasing due to the documentation of theses of the impact of human activities on regional climatic factors [19–21]. Computational capabilities and complex analyses performed on long series of measurements are attracting interest [8,22,23] also as a result of the search for justification of theses of polarization of extreme phenomena [1,24–30]. The renewed interest in climatic factors including precipitation and temperature [13,31,32] is also due to accumulations of flood damage and periods of hydrological drought [33]. The study of changes in the amount of precipitation and temperature variability [5,9,14,34–36] depending on the observed period show changes in statistical trends and allow us to assess the form of the directions of these changes occurring [32,37–39]. The results of the evaluation of precipitation trends and temperature trends provide an opportunity to indicate the moment of trend change and determine the form of this trend. Given the importance of the variability of climate factors on water resources, an important research element is the use of statistical techniques

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[4] , [40] that allow the detection of changes and trends [2,38] in such characteristics as data of monthly precipitation totals and average monthly temperature, among others.

The Intergovernmental Panel on Climate Change (IPCC) predicts that increased greenhouse gas emissions following the industrialization of the world, due to large-scale burning of fossil fuels, human interference and land use change, will increase global temperatures [3,10,41,42]. The Intergovernmental Panel on Climate Change [43] noted that natural forces and human activities contribute significantly to changing climate patterns, i.e., increasing land and ocean surface temperatures, changing spatial and temporal precipitation patterns, increasing the frequency of extreme events, sea level rise and intensifying El Niño [3,4,31,34]. An average increase in global temperature of 0.6°C from 1901 to 2001 indicates that the Earth has been warming over the past many decades [43]. Changes in trends of precipitation and temperature can be observed and evaluated on the basis of anomalous values. The change in trends of various climatic variables can be quantified through the use of global circulation models (GCMs) or, for example, through the use of statistical models that recognize the timing of the trend change and its magnitude [8] . Polarization of climatic phenomena has been demonstrated [35], who found increasing trends mainly in flood climaxes in German river basins, which was attributed to climate change. In addition, seasonal analyses showed that these changes were greater in winter than in summer. Climate variability has a significant impact on flow values, which are sensitive to both precipitation and temperature. Many other studies have documented that human and economic activities can play an important role in reducing flow values directly related to precipitation. Many researchers have investigated the existence of a change point in the observed time series. Rapid changes, both in mean and variance, can be related to both climate (e.g., shifts in climate regimes, and anthropogenic effects (e.g., construction of dams and reservoir systems, changes in land use/land cover and agricultural practices, relocation of measurement points) [44,45]. Statistical analyses must be interpreted in conjunction with observed physical [3,7,46], social and economic phenomena [3,14,19,47]. Precipitation and temperature are very important climatic parameters because their changes can affect living conditions. Therefore, predicting temporal trends of precipitation and temperature is very useful in social and urban planning [48].

The world's rivers carry 40% of precipitation as runoff from the land and 95% of sediment to the oceans, linking the atmosphere, hydrosphere and biosphere [49,50]. Precipitation and temperature are among the main factors, along with evaporation, affecting the polarization of runoff. In this work, long-term sequences of precipitation and temperature are analyzed, which is also directly related to evaporation [51]. The analyses performed provide a basis for determining directions for the creation of decision-making tools to control extreme drought and flood events, as well as for assessing and preventing ecological damage in threatened regions [52].

In assessing the polarization of climate phenomena, there are strong relationships between precipitation amounts and temperature [34,52,53]. An increase in global temperature can lead to an increase in water vapor in the atmosphere, which in turn can increase precipitation. In the case of lower temperatures, the opposite can occur, i.e. a decrease in precipitation. In extreme cases, such as prolonged droughts or floods, changes in temperature and precipitation can lead to catastrophic consequences, such as crop loss or property damage [1,45,54]. Proper monitoring of precipitation and temperature is crucial to understanding climate change and assessing the polarization of climate phenomena [55]. Long-term data series make it possible to identify trends in temperature and precipitation and to determine whether a particular location is experiencing polarization changes. In addition, analyzing the interrelationship between precipitation and temperature allows us to understand the magnitude of atmospheric phenomena, such as El Niño and La Niña cycles [56], which affect the global climate. An increase in temperature can affect the occurrence of intense precipitation, and a decrease in precipitation can lead to extreme heat waves [45]. It is also important to analyze precipitation amounts and temperature in the context of other climate phenomena, as interactions between these phenomena affect the ultimate effects of climate polarization [57]. Relationships between precipitation and temperature magnitudes are important for assessing the polarization of climate phenomena. Knowledge of these relationships is essential for understanding the impact of climate change on the environment, economy and society, as well as for taking action to reduce the negative effects of climate change.

2. Data accepted for analysis

The great interest in analyzing long precipitation sequences stems from the need to assess climate change and its impacts at all spatial scales. This demand has led to the initiation and support of many research and monitoring programs conducted by international organizations. In this context, the Global Precipitation Climatology Center (GPCC) was established on behalf of the World Meteorological Organization (WMO) in 1989. This institution is supported and operated by the Deutscher Wetterdienst (DWD, Germany's National Meteorological Service) as a German contribution to the World Climate Research Program (WCRP). The main objective of the GPCC is the global analysis of monthly precipitation on the Earth's surface based on "in situ" precipitation station data [31,58]. An equally important institution is NOAA (National Oceanic and Atmospheric Administration) the US government agency for the study of the atmosphere, oceans and climate. It conducts research and monitoring of climate change, including collecting, processing, analyzing, updating and making available long-term precipitation and temperature sequences [59,60].

The goal of the aforementioned institutions is to meet users' requirements for the accuracy of the data and analysis results made available, as well as the timeliness and availability of the product. Among the various types of GPCC and NOAA products, gridded sets of long-term precipitation and temperature data, among others, are made available [58,59]. These data are not made available in real time. This paper relies on grid data of monthly precipitation totals from the GPCC products made available and grid data of monthly mean temperatures from NOAA products. The data correspond to a spatial resolution of 0.5°x 0.5°, and are consistent in spatial and temporal extent. Products from both the GPCCC and NOAA are made available via the Internet.

NOAA (National Oceanic and Atmospheric Administration) and GPCC (Global Precipitation Climatology Center) are two institutions that provide the opportunity, based on the long-term data made available, to perform analysis and evaluation of the polarization of climatic phenomena, precipitation and temperatures. NOAA is engaged in research and monitoring of the atmosphere, oceans and climate around the world. NOAA collects data from various sources such as satellites, ocean buoys, aircraft and weather stations to assess the state of the climate and predict changes. The GPCC is involved in assessing precipitation around the world. GPCC uses a variety of data sources, such as weather stations, radar and satellites, to develop global precipitation maps. The two institutions use their knowledge and data to assess changes in climate phenomena, including precipitation and temperatures around the world, and predict how they will change in the future. They are also working with other climate institutions to increase understanding of the climate and to help make decisions about climate change.This paper examines global trends in monthly precipitation totals and monthly mean temperatures from the area of 377 river basins distributed over all continents. Assuming 509.9 10^6 square kilometers of land area, 12.76% of the land area is included in the analysis. Table 1 shows the areas covered by the analysis.

Table 1. Areas covered by the analysis.

Region	Continent	Lands area	Area catchment	Coverage of the continents
WMO		106 km2	106 km2	%
2	Asia	44.3	20.3	45.86%
1	Africa	30.3	8.43	27.83%
4	North America	24.2	13.0	53.87%
3	South America	17.8	12.6	70.57%
	Antarctica	13.1	0.0	0.00%
6	Europe	10.5	6.7	64.10%
5	Australia and Oceania	8.5	1.1	13.07%

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Lands together	148.7	65.1	43.77%
Earth, total	509.9	65.1	12.76%

GPCC data, rainfall totals by month from 1901 to 2010, calculated from grid data with a spatial resolution of 0.5°x 0.5° longitude and latitude, were converted to catchment areas. In this way, a sequence of monthly precipitation was obtained, which became the subject of the analyses presented in this article. GIS interpolation mechanisms were used in the spatial analysis of data preparation. The calculated values of the sequences were subjected to a simple statistical analysis, determining the basic statistics: the minimum and maximum value, the mean, the standard deviation of the sample and the value of the coefficient of variation. The data were analyzed in monthly cross sections as well as calendar years. Analyses of monthly precipitation covered the years 1901 to 2010.

NOAA monthly mean temperature data, from 1901 to 2010, calculated from grid data with a spatial resolution of 0.5°x 0.5° longitude and latitude, were converted to catchment areas. In this way, sequences of monthly average temperatures were obtained, which became the subject of the analyses presented in this article. GIS interpolation mechanisms were used in the spatial analysis of data preparation. The calculated values of the sequences were subjected to a simple statistical analysis, determining the basic statistics: the minimum and maximum value, the mean, the standard deviation of the sample and the value of the coefficient of variation. The data were analyzed in monthly as well as calendar year cross sections. Analyses of temperature data covered the years 1901 to 2010.

4. Polarization of precipitation and temperature phenomena

The occurrence of temporal variability and extreme events in air temperature and precipitation is usually assessed by analyzing a set of indicators that define variability and extreme conditions [39]. The common understanding of an extreme event is based on the assumption that a "normal" condition exists. In the context of the common understanding of an extreme event, polarization can be interpreted as a change in the nature of the occurrence of extremes, with extreme events - droughts, floods, extreme temperatures and precipitation - becoming more frequent, and the "normal" state becoming less frequent. Polarization of extreme events can result from a variety of factors, including human activities and climate change, which can affect precipitation cycles, the intensity of extreme events and temperature conditions. In this way, polarization can be seen as a process in which climate characteristics change and extreme events become more frequent, while the "normal" state becomes increasingly unstable. Polarization can have serious consequences for the functioning of ecosystems, the economy, and people's quality of life.

Analysis of the polarization of precipitation and temperature is essential because of their key role in the global energy and water cycles and their impact on climate change. Accurate knowledge of precipitation and temperature is particularly important for assessing the amount of available fresh water and managing water resources, which is essential for reducing the risk of floods and droughts. In addition, there is a growing body of scientific evidence confirming that human activities are influencing climate change, contributing to shorter periods of high-intensity precipitation and longer periods of high temperature and low precipitation. The polarization of extreme phenomena, such as floods and droughts, is increasingly evident and can be attributed to the unevenness and intensity of human activities. Therefore, studying polarization factors related to monthly precipitation and average monthly temperatures is key to understanding climate change at the regional level and developing strategies to manage water resources and reduce flood and drought risks.

This article analyzes long-term sequences of precipitation and temperature to assess the polarization of climate phenomena. The term "polarization" in terms of precipitation or temperature is used in climate science to describe the process by which certain areas of the planet become more extreme in terms of temperature or precipitation. This can lead to significant changes in the local environment, including changes in the distribution of plant and animal species, changes in weather patterns and changes in sea level [61]. Long-term sequences of precipitation and temperature are an essential tool for studying polarization in climate. These sequences provide a detailed record of an area's climate over many years, allowing the identification of trends and patterns in the data. By analyzing these sequences, it is possible to identify areas where the climate is becoming more polarized and track changes over time. One of the key advantages of using long-term precipitation and temperature sequences is that they provide a high degree of accuracy and precision. The time series are created using advanced measurement techniques, such as data from satellites and weather stations, and are subject to rigorous quality control measures [27,58,62]. As a result, they provide a highly reliable record of climate data in a given area, enabling precise observations and measurements.

The impact of polarization can be observed in various areas of life on Earth: in ecosystems, economy, and infrastructure, in changes in the size and location of water resources. The impact of polarization on ecosystems in areas of extreme temperature and precipitation changes affects biodiversity and ecosystem functioning [61]. Polarization of climate factors can lead to changes in the distribution of plant and animal species [63,64], which can have negative consequences for entire ecosystems. The consequences of polarization for agriculture can affect crops and food production [17,36]. In some regions, climate polarization can lead to a decrease in the amount of available water resources, which in turn will affect agricultural production and the condition of industry. The consequences of polarization for infrastructure can affect roads, bridges, buildings, water and sewerage networks, and water management systems. In extreme cases, serious damage or destruction may occur. The variability and difficulties in predicting polarization - due to the complex and dynamic nature of climate [65], it is difficult to predict exactly what the consequences of polarization will be in a given region. In addition, climate variability means that some regions may experience polarization in different years, complicating the process of predicting and monitoring changes. The interaction between polarization and other climate phenomena can affect other climate phenomena such as hurricanes, tornadoes, or droughts. In this way, one phenomenon can strengthen or weaken others, complicating the process of understanding the scale of climate change. The impact of anthropogenic factors on the polarization of climate factors, among other things, can occur through the emission of greenhouse gases [17,42,52,57]. Anthropogenic climate change, or changes resulting from human activity, leave a lasting mark on physical and biological systems around the world. Such changes include glacier melting, decline in some animal populations, changes in bird migration, and premature flowering of plants [66]. Analyzing the relationship between human activity and polarization can help understand and mitigate the negative effects of climate change.

The polarization of climate phenomena refers to changes in the intensity and frequency of extreme weather events, such as droughts, floods, hurricanes, and hailstorms. NOAA and GPCC monitor these changes [58,67] to determine the factors that influence the polarization of climate phenomena, their effects, and how to reduce the negative consequences associated with these events. Assessing temperature variability is crucial for understanding climate change and its impact on ecosystems and humans. All of this information is essential for developing strategies and actions to manage changes, adapt, and minimize their negative effects. NOAA and GPCC are a key source of information for scientists, policymakers, and other stakeholders who make decisions about climate change.

It is predicted that global warming will lead to an increase in the frequency of extreme weather events [1]. Although there is no direct evidence linking the increased frequency of extreme events to climate change, the observed positive trend indicates an increased likelihood of droughts and flash floods. Furthermore, changes in land use such as urbanization, reduction of natural retention, and improper water management can strongly influence the number of extreme events. The need to adapt water management to factors influencing the formation of water resources and the generation of hazards requires a comprehensive study of the current state and forecasts regarding the number, intensity, and frequency of extreme events. Extreme events such as droughts and floods can be characterized by their severity, duration, intensity, time between occurrences, and other direct and indirect parameters. Such a complex multiparameter characterization of these extreme events prompts modelers to simplify the description of the phenomenon and focus on one dominant parameter that is significant for the task or to use multidimensional methods, commonly used for example in frequency analysis (FFA, DFA) and risk analysis (FRA, DRA) [9,11,35,57,68].

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5. The concept of polarization measure

The concept of measuring climate polarization is based on measuring the degree of diversity and variability of climate elements in a particular area. This measure is used to determine the level of polarization of climate elements in a given region. Polarization refers to extreme values of a parameter such as temperature, precipitation, humidity, etc., occurring in a specific area. A high level of polarization indicates significant differences between maximum and minimum values, which can lead to increased risk of extreme weather events. The measure of polarization can be determined based on different climatic parameters such as temperature, precipitation, humidity, atmospheric pressure, etc. It can be calculated on different spatial and temporal scales, for example, for the entire country over the course of a year, for a specific region over the course of a month, or for individual meteorological stations over the course of a day. Depending on the research purpose and data availability, the measure of polarization can be determined for different combinations of parameters. It is worth noting that a high level of polarization does not necessarily mean unfavorable climatic conditions. For example, in some regions, there are significant differences in temperature between summer and winter, which can have a positive impact on seasonal tourism. However, in other cases, high polarization can lead to serious problems such as droughts, floods, or storms. Therefore, the measure of polarization can be useful in identifying areas that require special attention when planning actions related to climate change adaptation.

Different approaches are possible for constructing measures of polarization in climate phenomena, depending on the type and scale of the analyzed data. One of the basic methods is to use probabilistic techniques based on classical theories of one- or multi-dimensional random variables with distributions built using copula functions [48,69,70]. Other, simpler methods are based on statistical characteristics [4,10,40,71]. A simple concept is to construct indicators measuring the degree of extremity that a phenomenon can take, for example, by measuring the dispersion relative to the long-term average. An example of such an indicator is the coefficient of variation. Another way to create a polarization indicator is to define it as the degree of extremity compared to the mean value, relative to variability measured by the dispersion measure [12,72,73]. Such indicators can be based on classical measures, such as variance, standard deviation, mean deviation, coefficient of variation, or on positional measures, such as range, quartile deviation, coefficient of variation [71].

Another method of constructing indicators is based on the idea of inequality [74,75], which can also be a measure of polarization. One such indicator is kurtosis, which is influenced by the intensity of extreme values and measures what happens in the "tails" of the distribution. Other types of indicators have their origins in economics and econometrics. An example is the Gini coefficient [73,76–79], which is constructed using the Lorenz curve, which describes the degree of concentration of a one-dimensional random variable with non-negative values [77]. The Gini coefficient ranges from a minimum value of zero when all values are equal, to a theoretical maximum of one in an infinite population where all but one element has a value of zero. In the context of climate change, the Gini coefficient can be used to measure inequality in exposure to climate change impacts such as droughts, floods, or sea level rise [57]. Higher Gini coefficient values indicate greater inequality in the occurrence of these phenomena.

Further methods of building indicators are based on the idea of unevenness [74,75], which can also be a measure of polarization. One such indicator is kurtosis, which is influenced by the intensity of extreme values, so it measures what is happening in the "tails" of the distribution. Other types of indicators are measures that have their genesis in economics and econometrics. An example is the Gini index [73,76–79] built using the Lorentz curve, which describes the degree of concentration of a one-dimensional distribution of a random variable with non-negative values [77]. The Gini index ranges from a minimum value of zero, when all values are equal, to a theoretical maximum of one in an infinite population in which every element except one has a magnitude of zero. In the context of climate change, the Gini index can be used to measure inequality in exposure to the effects of climate change, such as droughts, floods or sea level rise [57]. Higher values of the Gini index indicate greater inequality in the occurrence of these phenomena. Several other examples of measures can be cited, such as:

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- The concentration ratio [80], which determines the degree of concentration of values at one end of the distribution, similar to the Gini coefficient. However, it should be noted that the Gini coefficient may be less useful in analyzing asymmetric distributions, which means that other indicators such as the concentration ratio or Lorenz curve should be considered in such cases.
- The GMD (Gini Mean Difference) index [81] is an inequality measure used in statistical and econometric analysis to measure polarization or inequality in a sample distribution. Unlike the Gini coefficient, which measures unevenness, the GMD index allows for the analysis of unevenness in the distribution of any variable, such as income, age, weight, height, precipitation, or temperature. The GMD index ranges from zero to one, where zero indicates complete evenness in the distribution, and one indicates concentration of all values in one class. The higher the GMD index value, the greater the unevenness in the variable distribution.
- The Theil index [79,82] is a measure of inequality in the distribution of quantitative variables, based on the idea of information entropy, taking into account differences between groups of values in the distribution, similar to the Gini coefficient, but with a greater emphasis on extreme values.
- Lorenz indicator [74,77] - is an inequality indicator in a distribution, which is based on the Lorenz curve. It is often used to measure income inequality but can also be used to measure inequality in other quantitative variables, including climate change studies. Higher values of the Lorenz curve indicate greater inequality in the occurrence of climate change effects such as droughts, floods, or sea level rise, meaning that some regions or social groups are more vulnerable to the effects of climate change than others.
- Atkinson index [73] - is a measure of inequality in the distribution of quantitative variables, which is based on the idea of absolute deviations. It takes into account the differences between groups of values in the distribution, similar to the Gini index, but focuses more on average values than extreme values.
- Range - values calculated as max-min usually refer to the difference between the maximum and minimum values of a given variable in a given period of time. In the case of assessing the polarization of precipitation and temperature, max-min can be used as a measure of the amplitude of these variables in a given period.

In this study, two measures are adopted to evaluate the phenomenon of polarization, the first P_1 is built based on static statistics, the second P_2 is based on calculated trends.

The first measure is defined as follows:

$$P_1 = \frac{max - min}{\sigma}$$

$(max - min)$ - the amplitude of changes, range, the difference between the maximum and minimum value of a variable, is a measure characterizing the empirical range of variability of the analyzed feature, σ - standard deviation.

$Max - min$ values can be useful in identifying extreme climate conditions, such as periods of drought or heat waves, as well as periods of intense precipitation or extremely low temperatures. However, max-min as a single measure may be limited in its usefulness because it does not take into account other factors such as the length and intensity of the period, as well as other variables that affect weather conditions. Since it ignores all data except for two extreme values, it does not provide information about the diversity of individual feature values in the population. Therefore, along with max-min values, other measures such as mean values, standard deviations, or cumulative indices are typically used to obtain a more comprehensive and diverse view of climate variability. For example, max-min values can be calculated for individual months, seasons, or years, and then compared with mean values, standard deviations, or other measures to better understand climate variability over time and space.

The adopted measure, which is the ratio of the max-min values to the standard deviation σ, can be used as a measure to evaluate the polarization of precipitation and temperature. The $max - min$ values refer to the amplitude of changes of a given variable over a period of time, while the standard deviation σ refers to the degree of variability of these values around their mean. By applying this measure, we can see how large the amplitude of changes is in relation to the variability around the

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mean. Values of this measure greater than 1 suggest that the amplitude of changes is greater than the variability around the mean. If the variability is relatively low compared to the amplitude, it may indicate the occurrence of periods of extreme climatic conditions, such as periods of drought or heatwaves, as well as periods of intense rainfall or extremely low temperatures. However, the use of a single measure may be limited because it does not take into account other factors affecting climate variability. Therefore, it is worth using it together with other measures showing the character of climate variability. Note that the values of this measure for precipitation and temperature will always take a non-negative value.

The second form of adopted measures can be dynamic indicators showing the variability of the indicator over a longer period of time. The simplest indicators are based on the idea of a trend coefficient. The trend is a long-term feature, the general direction of changes over time in the value of a variable. The trend can indicate an increase, decrease, or stabilization of the variable over time. In time series analysis, the trend is one of the basic elements that help to forecast future values of the variable. The trend can be analyzed at different time scales, from short-term cycles to long-term trends [2]. Trend analysis is applied in many fields, such as economics, finance, meteorology, earth sciences, medicine, sociology, and marketing. In scientific research, trend analysis is often used to study changes in long-term time series, such as climate change, demographic changes, or evolution of species.

The second measure is defined as:

$$P_2 = \frac{trend(max - min)}{trend(\sigma)}$$

where $trend(max - min)$ is the trend of the amplitude of changes, range or difference between the maximum and minimum value of the variable - it is a measure characterizing the empirical range of variability of the studied feature, and $trend(\sigma)$ is the standard deviation.

The above measure can be interpreted as the ratio of the trend in variability of the amplitude to the trend in variability of the standard deviation. The trend in variability of the amplitude refers to the direction and speed of changes in the maximum and minimum values of a given variable over time, while the trend in variability of the standard deviation refers to the direction and speed of changes in the variability of the values of a given variable around their mean over time. Values of this measure greater than 1 suggest that the trend in the increase of amplitude changes is stronger than the trend in the increase of variability around the mean. This means that changes in the maximum and minimum values of a given variable are increasing faster than the variability around their mean, which may indicate the occurrence of extreme weather conditions. In the proposed measure, the trend of the ratio of the indicators was not calculated, but the trend of the numerator and denominator was separately maintained. Both measures are used to assess trends in data, but they differ in how they relate to data variability.

The measure $trend((max - min)/\sigma)$ evaluates the trend magnitude by the variability of the data - the amplitude normalized by the standard deviation. $Max - min$ changes are normalized by the standard deviation, which means that high changes in one direction can be balanced by changes in the opposite direction.

On the other hand, the measure $(trend(max - min))/(trend(\sigma))$ uses two indicators of data variability: the trend of the amplitude and the trend of the standard deviation. The use of the amplitude in this formula means that extreme values of the data are emphasized more than their overall variability. Therefore, if we are more interested in extreme values in the data, the adopted measure may be a better choice. However, if we want to obtain a more balanced assessment of the trend, taking into account the overall variability of the data, the measure $trend((max - min)/\sigma)$ may be more appropriate. It should be noted that the values of this measure for precipitation and temperature can be negative and positive. In the case of negative values, this means that the trends of polarization factors (amplitude and variability) will be opposite, in the case of a positive value, the trends of polarization factors will be consistent.

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6. Detecting a change point in the trend

Various methods can be applied to determine change points in a time series [83], [8,84–86]. In this analysis, the non-parametric Pettitt change point test [87] was used to detect the occurrence of changes. The Pettitt test is a non-parametric test for detecting sudden changes in a time sequence. It is used to detect the turning point where a sudden change, known as a "jump," occurs in the time series. The Pettitt test involves comparing the sum of ranks of two subsets of data, which are divided by a threshold value, to determine whether there is a statistically significant change in the time sequence. This test can be applied to analyze data with any distribution, and the test result is not dependent on the assumption of normality of the data. The result of the Pettitt test is a test statistic value, which is compared with the critical value for the level of significance to determine whether the null hypothesis of no sudden changes in the time sequence can be rejected.

The Pettitt test has been widely used to detect changes in observed climatic and hydrological time series [8,16,88,89]. The Pettitt test is also applicable to investigate an unknown change point by considering a sequence of random variables (X_1,X_2,...,X_T), which have a change point at τ. As a result, (X_1,X_2,...,X_τ) has a common distribution F_1 (·), but (X_(τ+1),X_(τ+2),...,X_T) has the same distribution as F_2 (·), where F_1 (·)≠F_2 (·). The null hypothesis H_0: no change (or τ=T); is tested against the alternative hypothesis H_1: change (or 1≤ τ <T); using the non-parametric statistic K_T = max|U_(t,T) |=max (K_(T+) ,K_(T-)) where:

The Pettitt test has been widely used to detect changes in observed climatic and hydrological time series [8,16,88,89]. The Pettitt test is also applicable to investigate an unknown change point by considering a sequence of random variables $(X_1, X_2, \ldots, X_T)$, which have a change point at τ. As a result $(X_1, X_2, \ldots, X_\tau)$ has a common distribution $F_1(\cdot)$, but $(X_{\tau+1}, X_{\tau+2}, \ldots, X_T)$ has the same distribution as $F_2(\cdot)$, where $F_1(\cdot) \neq F_2(\cdot)$.The null hypothesis H_0: no change (but $\tau = T$); is tested against the alternative hypothesis H_1: change (lub $1 \leq \tau < T$); using the non-parametric statistic $K_T = max|U_{t,T}| = max\ (K_{T+}, K_{T-})$ where:

$$U_{t,T} = \sum_{i=1}^{t} \sum_{j=t+1}^{T} sgn(X_t - X_j)$$

$$sgn(\theta) = \begin{bmatrix} 1 & \theta > 0 \\ 0 & \theta = 0 \\ -1 & \theta < 0 \end{bmatrix}$$

$K_{T+} = maxU_{t,T}$ for the downward shift and $K_{T-} = -minU_{t,T}$ or the upward shift [86]. The confidence level associated with K_{T+} lub K_{T-} is approximately determined by:

$$\rho = \exp\left(\frac{-6K_T{}^2}{T^3 + T^2}\right)$$

When p is smaller than the specified confidence level (for example, in this study, 0.95 was adopted), the null hypothesis is rejected. The approximate probability of significance for the change point is defined as:

$$P = 1 - \rho.$$

It is obvious that in the case of a significant change point, the series is segmented at the change point into two sub-time series.

The main aim of this study is to investigate the existence of change points in the time series of monthly sum precipitation and monthly average temperature characteristics. For time series showing a significant change point, the trend test will be applied to partial series, and if the change point is not significant, the trend test will be applied to the entire time series [8].

7. Trend test

To examine the trend in a given time series, the Mann-Kendall test can be applied. Originally, this test was used by Mann [90], and later Kendall in 1975 derived the distribution of the test statistic [86]. This test is independent of the type of distribution and we do not need to assume any specific

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form of the data distribution function [91]. This test was widely recommended by the World Meteorological Organization for public applications, and has been used in many scientific studies to assess trends in water resource data [2,8,86]. Therefore, the Mann-Kendall (MK) test has been recognized as an excellent tool for trend detection by other scholars in similar applications. It should also be noted that the MK test considers only the relative values of all elements in the series $X = \{x_1, x_2, \ldots, x_n\}$. for analysis. The test statistic for the MK test is given by:

$$S = \sum_{i=1}^{n-1} \sum_{j=i+1}^{n} sgn(x_j - x_i)$$

where x_j, x_i are the consecutive values of the data, and n is the number of elements in the data. Under the null hypothesis of no trend, and assuming that the data are independent and identically distributed with a zero mean and a variance S denoted by σ^2, which is calculated as ($t_i -$ - the repeated values in the analyzed sequence):

$$\sigma^2 = \frac{1}{18}\left(n(n-1)(2n+5) - \sum_{i=1}^{m} t_i(t_i - 1)(2t_i + 5)\right)$$

To test hypotheses, the standard normal distribution, denoted as the test statistic Z, is used, which is defined as follows for the trend test::

$$Z = \begin{bmatrix} \frac{S-1}{\sigma} & S > 0 \\ 0 & S = 0 \\ \frac{S+1}{\sigma} & S < 0 \end{bmatrix}$$

In the two-sided test for trend, the null hypothesis is represented as: H_0: there is no trend in the dataset, which will be rejected if the calculated Z statistic is greater than the critical value of this statistic obtained from the standard normal distribution table corresponding to the previously established level of significance. A positive value of Z indicates an increasing trend, and a negative value indicates a decreasing trend.

The magnitude of the trend is estimated using a non-parametric slope estimator based on the median, proposed by Sen [92] and extended by Hirsch [93]. The slope estimator is given by:

$$\beta = Median\left[\frac{x_j - x_k}{j-k}\right] \text{ for all } k < j$$

Where $1 < k < j < n$, and β is treated as the median of all possible pairs of combinations for the entire dataset.

9. Results and Discussion

In the present study, the following properties of long-term sequences of monthly precipitation totals and monthly mean temperatures were investigated for 377 catchments from the area of 6 WMO regions. The scope of research and calculations included:

- the values of long-term sequences of 110 years in monthly cross sections were determined,
- statistics were calculated: average values for each calendar month, minimum value, maximum value, mean value, standard deviation (Table 2),
- the values of these trends were determined, the Mann Kendall test (TKM) was used to evaluate the trend values (Table 3, Table 5)
- examined whether the long-term series showed change points using the Pettitt test (TP) (Table 3, Table 5),
- if the long-term series showed points of change, it was examined whether the sub-series (after the point of change up to 2010) has a significant trend and to what extent this trend has changed (Table 3, Table 5).

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Table 1 shows the coverage of the continents with the areas of the analyzed catchments. A total of 12.76% of the land area out of 509.9 million square kilometers of land area was included in the analysis.

Table 2. Characteristics calculated based on monthly precipitation sums in analyzed watersheds in terms of precipitation polarization.

No	GRDC	WMO	RIVER	COUNTRY	AREA	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	MIN	MAX	MEAN	STD
1	1104150	1	CHELIF	DZ	43750	54.9	43.2	41.0	37.8	34.1	11.3	3.8	7.4	26.8	40.3	48.3	56.0	0.2	209.6	33.7	30.54
2	1147010	1	CONGO	CD	3475000	122.7	123.2	158.3	152.1	105.9	71.0	70.2	97.6	129.9	161.9	163.5	146.5	45.2	227.2	125.2	36.04
3	1159100	1	ORANGE	ZA	850530	58.5	59.4	56.9	31.4	13.5	6.7	5.2	7.0	11.6	26.9	38.0	44.8	0.2	166.1	30.0	27.57
4	1160580	1	GROOT-VIS	ZA	29745	50.5	58.3	65.2	38.8	24.9	17.0	15.9	19.9	27.5	40.2	47.9	46.9	0.5	226.6	37.8	30.28
5	1160880	1	TUGELA	ZA	28920	147.7	127.5	102.6	46.1	20.6	12.5	13.1	23.0	41.2	83.4	113.0	131.5	0.2	351.2	71.9	60.10
6	1286900	1	RUFIJI	TZ	158200	176.3	154.7	196.3	155.0	41.8	7.9	5.1	4.1	6.2	15.3	55.9	152.7	0.1	380.9	80.9	84.20
7	1289200	1	PANGANI	TZ	25110	68.9	74.1	115.9	197.3	124.1	33.2	20.0	19.2	20.6	37.3	78.5	82.3	1.2	436.6	72.6	69.59
8	1289450	1	RUVU	TZ	15190	113.9	101.3	181.6	250.1	107.4	31.0	20.9	19.2	36.1	53.2	98.6	119.5	0.0	695.0	94.4	83.42
9	1309700	1	SEBOU	MA	17250	78.2	81.1	77.7	72.4	41.0	17.1	4.0	5.8	20.6	53.3	82.9	94.5	0.1	287.0	52.4	51.53
10	1336500	1	CROSS	CM	6810	23.9	51.3	144.4	194.9	241.0	311.6	379.4	398.6	425.5	312.4	90.5	25.0	0.0	1085.2	216.5	164.78
11	1338050	1	SANAGA	CM	131520	13.0	24.4	89.9	144.1	193.2	188.0	205.0	237.2	280.7	246.0	61.8	15.0	0.0	478.2	141.5	101.62
12	1339100	1	NYONG	CM	26400	29.8	51.4	135.6	178.5	224.5	160.6	96.3	136.0	265.5	303.0	127.0	36.4	0.0	1064.1	145.4	100.71
13	1340500	1	NTEM	CM	18100	50.8	72.3	152.4	182.1	198.2	123.1	56.1	63.4	212.0	281.4	166.5	61.3	0.0	1067.8	135.0	95.45
14	1362100	1	NILE	EG	2900000	10.3	13.9	27.1	45.9	64.1	74.5	110.9	123.9	86.3	52.0	26.0	14.7	3.3	167.5	54.2	38.6
15	1389090	1	MANGOKY	MG	53225	229.6	178.8	90.7	41.7	22.5	11.8	12.1	10.9	16.3	31.9	85.5	161.0	0.0	562.4	74.4	92.63
16	1389230	1	TSIRIBIHINA	MG	45000	293.6	215.3	142.3	58.7	24.7	12.1	14.2	12.6	18.0	48.3	107.0	198.6	0.0	613.7	95.5	110.17
17	1425500	1	CAVALLY	CI	28800	31.9	69.1	144.0	173.2	228.5	274.1	154.5	177.9	296.3	245.2	126.6	59.3	1.2	672.2	165.0	102.46
18	1426380	1	BANDAMA	CI	95500	12.3	32.4	80.5	117.4	142.3	153.8	129.8	159.0	192.3	123.5	40.7	16.6	0.0	434.6	100.1	71.48
19	1427500	1	SASSANDRA	CI	62000	14.2	40.8	96.6	130.3	154.1	185.4	175.4	222.9	250.6	157.2	52.5	18.5	0.0	624.8	124.9	90.50
20	1427600	1	DAVO	CI	6600	26.9	60.7	131.0	153.1	184.9	207.8	93.8	93.3	172.9	153.9	89.0	39.4	0.0	597.4	117.2	77.62
21	1428500	1	COMOE	CI	69900	6.8	20.0	58.4	104.0	136.8	150.1	147.2	177.8	187.4	115.3	33.6	9.4	0.0	388.7	95.6	73.07
22	1445100	1	KOUILOU	CG	55010	160.5	150.9	192.5	203.9	126.1	7.7	2.2	4.9	19.7	119.5	251.4	192.7	0.0	467.0	119.3	98.86
23	1526300	1	PRA	GH	22714	20.3	59.9	124.2	146.6	182.1	221.1	119.8	73.2	153.5	175.3	91.9	38.4	0.0	428.0	117.2	74.41

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24	1530100	1	TANO	GH	15800	19.6	53.3	119.1	140.1	201.9	253.5	125.8	73.7	155.9	177.6	91.1	38.5	0.0	568.5	120.8	86.63
25	1531700	1	VOLTA	GH	394100	3.6	10.3	32.6	64.8	101.9	136.4	167.4	207.6	182.3	80.4	16.6	6.2	0.0	333.8	84.2	74.34
26	1643100	1	OGOOUE	GA	205000	120.8	135.6	202.3	200.2	185.3	52.2	17.1	28.4	118.8	267.1	249.9	151.6	0.4	770.6	144.1	90.22
27	1644100	1	NYANGA	GA	20000	164.0	162.4	200.6	192.2	108.3	6.4	1.6	2.5	18.7	162.2	278.9	192.0	0.0	562.6	124.2	110.57
28	1732100	1	MONO	BJ	21575	10.8	26.5	73.0	113.0	141.1	165.5	178.2	174.9	195.0	116.7	25.5	14.3	0.1	370.9	102.9	77.29
29	1733600	1	OUEME	BJ	46990	7.1	15.2	50.1	92.7	137.8	157.3	179.8	184.9	194.0	108.5	16.4	6.2	0.0	404.4	95.8	80.01
30	1789300	1	TANA	KE	42220	34.4	25.8	77.8	181.4	76.3	17.9	14.4	15.9	15.2	82.2	168.3	77.2	2.5	527.0	65.6	73.02
31	1812100	1	SENEGAL	SN	268000	0.7	0.9	1.8	6.1	21.9	65.2	128.4	178.6	118.5	34.5	4.2	1.5	0.0	310.4	46.9	62.73
32	1813200	1	GAMBIA	SN	42000	0.6	0.9	2.5	7.7	44.9	151.1	240.1	314.0	259.8	90.9	12.8	2.0	0.0	482.6	93.9	117.80
33	1814070	1	GEBA	SN	7340	0.3	0.7	0.4	1.8	25.8	137.9	225.4	343.0	287.0	106.0	9.1	0.9	0.0	653.1	94.9	128.2
34	1815020	1	CORUBAL	SN	23840	0.9	1.5	4.4	16.2	70.8	205.9	324.4	429.2	364.3	172.0	33.6	4.1	0.0	796.7	135.6	160.32
35	1834101	1	NIGER	NG	575500	1.6	2.4	10.0	27.5	58.0	85.7	133.1	169.2	118.0	43.0	5.9	1.6	0.1	236.1	54.7	57.78
36	1878100	1	SHEBELLE	SO	278000	9.0	16.7	38.5	105.4	93.7	35.5	49.8	63.4	58.1	85.4	39.0	9.8	0.2	268.1	50.4	39.91
37	1880100	1	JUBA	SO	179520	10.9	18.3	50.1	142.6	111.9	30.1	35.6	43.1	61.6	108.6	48.8	14.2	0.2	396.8	56.3	49.87
38	1891500	1	ZAMBEZI	MZ	940000	208.8	183.3	141.2	39.8	6.0	1.3	0.6	1.1	4.7	28.5	101.4	190.5	0.1	390.0	75.6	84.92
39	1894200	1	BUZI	MZ	26314	240.1	215.0	174.1	58.3	24.7	19.8	17.9	17.0	19.1	43.4	107.8	195.1	0.6	769.3	94.4	107.3
40	1895500	1	SAVE	MZ	100885	152.1	136.7	97.6	32.2	12.4	8.9	7.1	5.7	9.9	29.2	82.6	138.8	0.2	589.7	59.4	75.1
41	1896500	1	LIMPOPO	MZ	342000	105.6	89.2	67.7	29.0	11.3	5.2	4.1	4.4	11.7	37.0	74.0	91.1	0.1	344.5	44.2	48.27
42	1897500	1	INCOMATI	MZ	37600	137.7	124.4	100.4	48.3	19.7	10.9	10.6	12.2	29.9	63.2	111.4	124.6	0.0	504.0	66.1	64.89
43	1899100	1	MAPUTO	MZ	28500	132.7	110.3	91.4	47.4	20.3	12.4	11.6	16.4	36.0	80.0	117.1	129.3	0.1	462.8	67.1	62.04
44	1992900	1	SHIRE	MW	149500	236.8	209.6	218.0	125.7	38.6	13.6	9.9	8.3	7.6	15.0	72.1	191.1	1.0	390.7	95.5	97.09
45	2178300	2	YONGDING HE	CN	42500	3.0	3.6	10.2	16.7	33.2	56.0	111.7	87.4	50.7	19.1	8.5	2.8	0.1	249.5	33.6	42.12
46	2178400	2	DALINGHE	CN	17687	2.1	2.8	8.6	19.3	42.7	80.2	148.2	120.3	46.9	23.8	8.3	3.2	0.0	474.1	42.2	58.50
47	2178500	2	LUAN HE	CN	44100	2.7	3.2	8.6	16.4	37.3	71.3	142.6	109.0	50.7	19.9	7.6	2.6	0.0	315.9	39.3	51.49
48	2179100	2	LIAO HE	CN	120764	2.5	3.0	8.8	15.1	36.7	71.3	130.1	99.7	39.5	20.7	7.6	3.2	0.0	315.0	36.5	47.52
49	2180800	2	HUANG HE (YELLOW R	CN	730036	3.8	5.4	12.7	22.4	36.4	55.0	83.8	87.0	61.1	28.6	8.9	2.9	0.0	209.2	34.0	34.22
50	2181900	2	YANGTZE RIVER (CHA	CN	1705383	24.4	35.6	60.0	93.6	127.9	170.2	162.9	144.9	107.7	70.6	37.1	20.0	3.0	310.0	87.9	58.10

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51	2181950	2	HUAI HE	CN	121330	24.1	28.9	48.7	63.2	77.0	110.7	194.6	134.8	81.7	49.2	35.5	19.1	0.0	523.6	72.3	68.36
52	2186800	2	XI JIANG	CN	329705	27.7	36.9	53.7	96.6	194.1	248.5	230.2	204.9	116.2	80.5	46.1	26.6	2.9	393.4	113.5	90.27
53	2186901	2	BEI JIANG	CN	38363	58.1	91.0	148.1	220.7	276.0	268.3	168.0	172.2	102.1	60.2	50.6	44.2	0.3	582.7	138.3	105.60
54	2186950	2	DONG JIANG	CN	25325	45.9	79.9	130.3	202.2	278.0	315.5	219.9	219.5	143.0	52.8	37.8	37.4	0.1	749.8	146.8	126.69
55	2260100	2	CHINDWIN RIVER	MM	27420	19.5	36.8	73.1	146.7	227.2	641.4	820.6	637.6	448.1	187.0	32.1	15.1	0.0	1284.9	273.8	289.55
56	2260500	2	IRRAWADDY	MM	117900	15.8	31.4	52.9	84.2	145.1	342.1	393.4	363.5	250.6	147.0	37.3	13.8	0.3	624.1	156.4	145.75
57	2261500	2	SITTANG RIVER	MM	14660	6.1	3.4	5.1	31.4	159.9	196.5	234.0	250.8	212.9	139.4	40.6	8.6	0.0	451.6	107.4	106.79
58	2335950	2	INDUS	PK	832418	31.1	36.1	43.7	31.3	23.7	28.4	90.5	86.6	41.8	12.0	7.8	17.8	0.6	184.2	37.6	31.84
61	2423450	2	KARKHEH	IR	45882	79.7	66.5	83.6	59.1	23.0	1.8	0.9	0.6	1.3	18.0	60.0	71.3	0.0	265.6	38.8	39.95
62	2423500	2	KARUN	IR	60769	111.2	88.2	108.4	57.8	16.3	1.0	1.1	0.8	1.2	14.3	60.5	109.5	0.0	302.8	47.5	51.62
63	2569005	2	MEKONG	KH	635000	11.4	18.5	37.5	77.2	176.9	228.6	278.5	288.9	234.4	113.6	41.1	15.4	1.2	445.9	126.8	108.40
64	2587100	2	ISHIKARI	JP	12697	89.0	66.1	58.8	59.3	75.5	76.6	111.1	135.1	140.4	111.9	114.0	105.6	13.7	535.8	95.3	46.34
65	2588200	2	YODO	JP	7281	98.7	92.9	117.5	135.7	149.6	222.3	207.8	155.8	214.7	145.7	99.7	94.6	20.5	574.2	144.6	78.17
66	2588301	2	KISO	JP	4684	74.6	78.3	115.3	136.0	143.1	211.1	214.6	154.9	215.1	139.9	89.0	73.1	17.4	560.6	137.1	81.42
67	2588320	2	TENRYU	JP	4880	56.1	67.6	112.2	132.3	141.2	206.6	197.5	162.0	206.9	143.5	82.9	55.9	3.5	538.5	130.4	82.86
68	2588551	2	TONE	JP	12458	50.4	57.1	80.5	108.6	132.2	179.9	194.4	221.1	232.9	164.2	77.7	53.4	9.7	576.8	129.4	86.95
69	2588700	2	KITAKAMI	JP	7869	74.8	67.1	86.1	103.8	110.2	124.9	168.7	168.7	175.7	130.3	105.0	85.3	11.9	453.3	116.7	60.45
70	2589200	2	GONO (GO)	JP	3807	81.9	84.1	108.3	127.2	131.4	208.4	214.6	113.9	191.5	113.5	86.9	81.3	8.5	537.0	128.6	80.46
71	2589500	2	SHINANO, CHIKUMA	JP	9719	116.8	92.5	95.4	93.3	104.8	153.2	177.7	155.1	187.4	140.2	109.7	120.5	19.8	403.3	128.9	54.78
72	2589700	2	MOGAMI	JP	6271	131.5	98.2	91.9	89.0	91.2	119.2	173.9	155.8	155.7	132.2	130.6	150.0	16.5	461.0	126.6	53.82
73	2595400	2	EUPHRATES	IQ	274100	49.7	46.6	46.0	44.6	29.9	10.0	4.5	4.0	5.4	24.2	40.0	48.5	0.0	147.1	29.4	24.81
74	2595700	2	TIGRIS	IQ	134000	78.1	82.7	87.1	77.3	41.1	7.6	2.7	2.7	4.4	28.0	65.6	76.3	0.1	232.3	46.1	40.99
75	2651100	2	BRAHMAPUTRA	BD	636130	15.2	28.3	53.1	107.3	163.8	274.8	313.0	272.4	194.2	85.0	16.4	9.1	1.3	651.4	127.7	120.00
76	2677100	2	HAN-GANG (HAN RIVE	KR	25046	28.6	32.1	47.5	76.9	90.9	134.3	311.7	254.4	153.2	49.2	45.0	28.4	0.5	757.3	104.3	113.63
77	2694510	2	NAKTONG	KR	22916	29.0	34.1	50.6	89.6	91.7	155.4	253.2	204.3	138.0	47.8	36.4	23.5	0.2	627.2	96.1	96.62
78	2846800	2	GANGES	IN	835000	20.6	22.3	19.7	18.3	36.6	136.1	315.6	307.2	181.9	42.0	8.9	9.3	0.4	441.1	93.2	115.61
79	2853150	2	MAHI RIVER	IN	33670	2.7	1.6	1.9	1.6	7.1	96.6	283.9	246.4	153.9	21.2	8.4	2.1	0.0	678.1	69.0	118.18

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80	2853200	2	NARMADA	IN	89345	13.5	12.4	9.9	5.1	10.5	144.6	360.4	328.4	201.5	38.8	15.6	7.9	0.0	626.0	95.7	138.52
81	2853300	2	TAPTI RIVER	IN	61575	6.8	5.3	5.7	3.8	11.5	139.3	253.2	197.8	161.0	45.9	22.2	6.6	0.0	461.8	71.6	97.95
82	2854050	2	DAMODAR RIVER	IN	19220	17.2	24.2	18.7	17.7	48.3	189.2	329.8	312.8	228.1	80.7	12.0	5.7	0.0	652.8	107.0	132.09
84	2854300	2	KRISHNA	IN	251355	3.1	3.5	6.8	21.0	45.0	120.2	193.1	149.8	153.3	96.4	32.2	6.7	0.0	324.1	69.3	74.57
85	2854500	2	PENNER RIVER	IN	53290	6.2	3.9	6.4	20.7	54.4	56.3	81.5	93.9	125.6	123.0	71.4	19.8	0.0	324.5	55.3	59.23
86	2854800	2	CAUVERY RIVER	IN	74004	9.9	7.6	14.9	55.8	107.8	103.1	159.7	129.5	122.7	173.8	98.4	30.8	0.0	390.3	84.5	69.53
87	2855800	2	MAHANADI RIVER (MA	IN	132090	14.5	21.5	19.0	17.4	25.1	203.2	399.4	386.4	224.3	62.2	11.9	5.8	0.0	626.7	115.9	152.84
88	2856900	2	GODAVARI	IN	299320	8.3	11.3	13.1	18.1	24.5	168.9	321.4	280.1	202.0	70.5	20.8	6.8	0.0	487.2	95.5	119.05
89	2901202	2	ANADYR	RU	156000	19.5	13.6	12.3	11.2	11.8	25.1	51.5	51.4	30.5	24.6	23.1	17.6	0.0	200.2	24.3	20.78
90	2902850	2	KAMCHATKA	RU	51600	42.6	35.4	29.8	35.4	33.8	39.3	66.3	73.3	52.8	47.6	46.5	44.4	0.0	263.9	45.6	30.77
91	2903420	2	LENA	RU	2430000	11.2	8.2	8.8	14.2	28.1	49.0	61.0	61.8	39.9	26.2	17.5	13.2	1.8	96.2	28.3	20.66
92	2906900	2	AMUR	RU	1730000	5.4	4.8	9.4	22.5	42.7	78.3	119.7	109.8	60.9	26.4	13.6	7.8	0.6	188.5	41.8	41.71
93	2909150	2	YENISEI	RU	2440000	15.7	11.2	12.4	19.0	33.8	55.6	70.9	69.1	44.3	30.9	24.6	19.4	3.5	95.8	33.9	21.73
94	2912600	2	OB	RU	2949998	21.2	16.6	19.1	25.5	42.2	56.3	68.4	62.1	45.7	39.7	32.7	25.5	4.5	99.5	37.9	19.01
96	2917100	2	AMU DARYA	UZ	450000	33.7	38.3	54.6	49.0	32.5	10.2	5.6	3.4	3.3	12.6	21.5	29.7	0.2	103.8	24.5	20.30
97	2919200	2	URAL	KZ	190000	20.8	16.5	19.4	22.9	33.6	39.4	43.2	31.9	27.5	32.5	26.9	25.2	0.7	107.7	28.3	17.40
99	2964998	2	MAE KLONG	TH	26449	5.6	16.2	36.7	83.3	210.3	283.8	294.4	324.9	292.3	186.5	46.5	6.2	0.0	653.6	148.9	135.25
100	2998110	2	YANA	RU	224000	5.8	6.0	5.2	7.3	16.8	36.9	45.5	39.8	24.0	13.7	9.2	7.1	0.0	99.7	18.1	17.00
101	2998150	2	OMOLOY	RU	10800	5.3	5.4	5.0	6.7	14.1	28.8	36.0	32.7	19.2	9.7	7.4	5.6	0.0	102.8	14.7	14.95
102	2998400	2	INDIGIRKA	RU	305000	8.2	7.9	5.8	6.5	13.7	34.7	49.1	44.8	24.4	15.0	12.0	9.2	0.0	107.1	19.3	17.39
103	2998450	2	ALAZEYA	RU	29000	12.7	11.2	8.2	6.5	10.3	27.0	37.4	34.9	22.5	18.7	16.8	13.2	0.0	113.1	18.3	15.44
104	2998510	2	KOLYMA	RU	526000	14.6	12.9	9.7	8.3	13.6	32.6	50.7	47.8	29.7	20.9	19.5	14.6	0.0	106.5	22.9	18.12
105	2998702	2	ANYUY (TRIB. KOLYM	RU	30000	12.7	8.4	7.3	5.4	6.9	22.4	44.7	36.2	20.7	15.0	13.5	11.7	0.0	212.2	17.1	17.64
106	2998720	2	BOL. ANYUY (TRIB.	RU	49600	12.7	9.0	7.4	6.2	8.0	23.2	45.1	36.1	22.5	16.2	14.7	12.1	0.0	175.0	17.8	16.77
107	2998800	2	PALYAVAAM	RU	6810	15.6	10.8	8.8	8.1	9.6	18.2	40.3	41.4	29.9	23.4	18.8	13.6	0.0	207.4	19.9	18.69
108	2999150	2	ANABAR	RU	78800	7.8	6.6	8.1	11.0	19.0	33.5	42.3	39.2	29.0	19.5	11.5	8.8	0.0	160.5	19.7	17.54
109	2999200	2	NADYM	RU	48000	21.4	15.7	20.9	23.7	38.9	56.9	70.6	68.1	58.2	45.5	30.5	24.2	0.5	172.1	39.6	25.50

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110	2999250	2	TAZ	RU	100000	24.0	18.0	21.9	28.0	37.2	57.3	62.7	68.9	57.5	52.7	37.5	27.8	1.1	144.1	41.1	23.93
111	2999500	2	PUR	RU	95100	21.6	16.9	21.6	25.6	37.3	55.9	67.0	69.9	59.3	48.1	33.8	24.9	2.6	148.6	40.2	24.71
112	2999850	2	KHATANGA	RU	275000	9.4	8.2	8.5	12.4	18.9	38.9	43.6	48.0	30.4	21.5	13.3	11.3	0.0	129.4	22.0	18.74
113	2999910	2	OLENEK	RU	198000	10.2	8.6	9.7	12.0	21.0	36.6	44.9	44.1	31.2	23.6	14.5	12.1	0.9	114.7	22.4	16.82
114	3102500	3	ATRATO	CO	9432	405.2	329.2	357.8	495.4	555.8	511.6	516.5	554.1	502.5	507.8	512.8	480.6	48.5	1065.2	477.4	118.18
115	3103300	3	MAGDALENA	CO	257438	73.1	87.6	131.8	204.6	237.8	181.0	159.6	176.0	207.2	261.7	213.5	112.9	22.0	400.0	170.6	69.09
116	3178800	3	LIMARI	CL	11343	0.6	1.6	1.9	5.1	30.5	43.0	47.6	30.1	7.8	3.7	1.8	1.3	0.0	275.6	14.6	27.87
117	3178900	3	HUASCO	CL	7187	0.9	1.7	1.5	3.8	14.4	22.1	20.5	12.3	2.7	2.0	1.0	0.7	0.0	202.2	7.0	17.27
120	3179250	3	RAPEL	CL	13186	5.0	3.8	11.1	35.9	121.5	170.2	163.8	113.4	55.2	33.9	20.3	9.9	0.0	473.6	62.0	77.45
121	3179500	3	BIOBIO	CL	24029	23.5	22.2	44.3	91.9	210.0	234.6	207.6	163.8	96.9	69.0	49.6	44.1	0.1	611.1	104.8	98.00
122	3181500	3	BAKER	CL	23736	38.1	34.0	48.7	57.2	75.9	71.3	69.5	68.8	44.2	44.1	36.2	37.8	0.0	333.4	52.1	41.99
123	3206720	3	ORINOCO	VE	836000	39.1	51.9	83.6	185.2	293.6	340.5	342.0	294.4	229.5	197.7	140.8	76.6	9.8	501.6	189.6	112.18
124	3258200	3	SALADO	AR	29000	101.6	88.7	104.5	63.6	34.6	20.1	20.8	22.1	40.8	76.9	91.0	102.5	0.1	256.3	63.9	47.61
125	3265601	3	PARANA	AR	2346000	178.4	153.9	142.4	88.9	63.1	38.9	28.0	29.5	60.3	104.6	131.7	168.3	3.1	264.1	99.0	57.62
126	3275750	3	COLORADO (ARGENTIN	AR	223000	33.9	30.1	30.4	19.6	24.3	25.1	22.9	19.9	19.6	22.7	23.5	28.5	1.4	101.7	25.0	15.31
127	3275990	3	NEGRO (ARGENTINIA)	AR	95000	19.1	19.2	30.1	42.8	82.9	95.3	85.2	63.3	40.7	33.3	25.5	25.2	0.7	299.0	46.9	39.77
128	3276200	3	CHUBUT	AR	16400	18.5	21.8	27.9	43.6	74.2	85.0	67.8	58.9	36.8	27.6	23.7	21.4	0.4	224.1	42.3	34.18
129	3276800	3	SANTA CRUZ	AR	15550	28.4	20.6	34.5	41.6	44.2	33.4	36.4	32.1	26.4	20.6	21.4	25.5	0.0	176.4	30.4	26.02
130	3308400	3	CUYUNI	GY	53400	128.9	82.7	90.1	116.5	201.9	246.2	233.3	196.6	130.8	107.6	121.6	160.0	6.4	471.4	151.3	79.96
131	3308600	3	ESSEQUIBO	GY	66600	102.2	82.5	109.4	177.3	328.6	365.9	307.5	199.3	94.6	64.6	75.0	111.6	2.2	624.3	168.2	124.29
132	3410500	3	CORANTIJN	SR	51600	143.5	132.8	170.5	228.4	359.2	318.8	260.5	155.0	65.0	48.3	64.1	116.7	0.0	567.5	171.9	118.72
133	3411300	3	COPPENAME	SR	12300	210.7	170.5	207.4	261.6	374.6	341.8	273.7	158.0	71.8	53.4	82.1	167.8	0.1	631.5	197.8	121.59
134	3412800	3	MARONI	SR	63700	223.8	204.7	266.8	314.8	379.1	268.9	203.0	122.6	52.9	46.1	81.8	180.7	0.3	1246.6	195.4	132.88
135	3469050	3	URUGUAY	UY	244000	143.2	133.3	128.6	150.1	132.6	119.6	110.8	100.6	141.1	157.8	129.0	127.0	19.0	439.2	131.2	58.78
136	3469100	3	NEGRO (URUGUAY)	UY	63000	98.5	100.1	118.0	103.4	105.8	94.2	99.9	91.4	106.9	99.3	92.8	91.0	1.6	623.3	100.1	59.64
137	3514800	3	OYAPOCK	GF	25120	295.7	275.4	309.3	375.9	414.8	273.0	177.5	103.1	51.6	45.2	90.8	222.6	0.0	1870.9	219.6	166.35
138	3629000	3	AMAZONAS	BR	4640300	240.9	230.4	253.3	223.5	193.7	145.8	120.6	106.5	125.1	165.9	186.6	222.0	69.5	333.9	184.5	53.88

139	3629150	3	RIO TAPAJOS	BR	358657	347.4	324.9	313.1	182.6	58.8	16.2	9.5	24.7	84.8	174.3	227.5	310.5	0.0	540.7	172.9	133.97
140	3629204	3	RIO JAMANXIM	BR	40400	347.0	342.2	357.3	259.1	92.2	21.2	14.4	27.8	105.4	195.4	240.0	313.0	0.0	629.1	192.9	146.18
141	3630050	3	XINGU	BR	446570	312.6	301.7	294.3	192.9	73.3	22.4	12.7	24.5	78.3	166.6	200.0	268.1	0.0	483.5	162.3	119.37
142	3630300	3	RIO MAICURU	BR	17072	182.6	218.0	294.5	296.9	270.2	176.4	132.9	85.7	78.5	61.4	66.0	100.4	0.0	1051.9	163.6	113.08
143	3631050	3	RIO ARAGUARI	BR	23373	307.1	333.5	355.5	392.4	379.8	242.5	160.4	77.2	33.3	30.1	56.1	172.0	0.0	1972.8	211.7	169.92
144	3631100	3	RIO JARI	BR	51343	243.4	245.0	276.6	325.6	362.4	224.5	177.2	102.1	51.2	37.8	51.7	127.6	0.0	1758.9	185.4	140.04
145	3631210	3	RIO PARU DE ESTE	BR	30945	203.1	199.0	259.2	309.7	355.7	219.5	176.1	100.8	57.3	38.9	46.0	103.8	0.0	1444.9	172.4	129.07
146	3649950	3	TOCANTINS	BR	742300	277.6	248.8	257.7	140.6	44.2	9.6	6.8	12.3	47.3	133.9	201.6	269.1	0.0	528.5	137.5	116.47
147	3650150	3	RIO CAPIM	BR	38178	267.6	306.1	424.7	322.1	165.5	51.2	29.4	22.5	26.9	49.6	81.0	162.7	0.0	907.2	159.1	149.44
148	3650202	3	RIO GURUPI	BR	31850	234.7	254.5	375.0	309.1	182.8	69.3	40.8	33.2	28.0	41.3	62.4	125.4	0.5	682.5	146.4	130.83
149	3650285	3	RIO PINDARE	BR	34300	218.9	244.5	332.6	248.1	121.9	31.4	15.8	10.9	19.3	40.0	80.5	123.6	0.0	709.3	124.0	121.43
150	3650335	3	RIO MEARIM	BR	25500	185.2	200.8	248.2	182.1	76.8	17.4	10.1	7.8	20.3	49.8	91.4	122.9	0.0	566.7	101.1	98.89
151	3650359	3	RIO ITAPECURU	BR	50800	190.0	211.0	266.6	223.4	89.9	21.6	11.4	8.2	19.3	50.1	84.8	129.0	0.0	538.8	108.8	104.80
152	3650481	3	RIO PARNAIBA	BR	322823	154.3	162.2	186.5	127.6	40.5	8.7	5.1	3.6	12.5	51.8	99.1	128.7	0.0	435.8	81.7	78.86
153	3650525	3	RIO ACARAU	BR	11160	74.3	129.8	208.1	190.2	93.5	26.8	11.6	4.1	1.7	2.6	6.2	24.7	0.0	504.5	64.5	89.02
154	3650649	3	RIO JAGUARIBE	BR	48200	94.3	133.5	192.7	150.7	69.3	27.5	13.6	5.4	5.5	10.3	18.5	43.9	0.1	450.4	63.8	77.52
155	3650885	3	RIO PARAIBA	BR	19244	36.5	60.9	100.2	96.9	70.3	67.3	53.9	28.5	13.8	8.2	10.4	21.2	0.0	362.8	47.3	51.21
156	3651900	3	SAO FRANCISCO	BR	622600	155.5	129.3	134.4	65.1	21.3	10.9	8.7	7.1	20.8	68.3	141.2	184.8	0.0	430.0	78.9	76.93
157	3652039	3	RIO ITAPICURU	BR	35150	55.2	59.0	72.6	64.3	58.6	51.8	47.6	32.4	21.0	25.6	54.5	66.1	0.0	331.8	50.7	44.64
158	3652050	3	RIO VAZA-BARRIS	BR	15740	46.4	53.4	69.1	65.1	69.5	61.0	58.8	37.2	21.4	21.3	35.8	49.1	0.0	314.5	49.0	41.96
159	3652135	3	RIO PARAGUACU	BR	53866	77.2	76.6	87.6	68.4	44.7	41.9	39.0	26.7	22.6	39.3	88.1	98.7	0.0	435.8	59.2	55.48
160	3652220	3	RIO DE CONTAS	BR	42245	102.1	81.0	87.3	51.3	17.8	12.0	9.8	9.8	15.6	55.6	124.4	129.6	0.0	445.2	58.0	66.71
161	3652320	3	RIO PRADO	BR	30360	112.6	86.5	100.2	59.5	30.9	26.1	27.4	21.7	28.5	69.2	141.3	144.4	0.5	461.8	70.7	68.93
162	3652455	3	JEQUITINHONHA	BR	67769	153.8	104.1	112.5	49.8	22.5	13.1	14.7	11.8	26.4	83.8	165.6	189.3	0.0	519.1	79.0	83.82
163	3652500	3	MUCURI	BR	14174	151.6	104.8	122.5	68.3	36.3	25.9	34.2	24.0	36.0	91.4	167.8	169.5	0.0	542.7	86.0	80.73
164	3652600	3	RIO DOCE	BR	78456	220.3	129.5	142.6	63.6	26.9	18.3	16.6	17.3	37.8	107.4	204.3	249.6	0.0	565.9	102.9	101.32
165	3652890	3	PARAIBA DO SUL	BR	55083	248.4	174.6	166.0	76.6	42.1	30.9	24.3	27.7	64.2	118.1	179.2	241.7	0.1	449.3	116.2	93.15

166	3653120	3	RIO RIBEIRA DO IGU	BR	12450	208.6	169.6	134.8	80.8	99.4	86.6	75.4	68.9	106.9	130.2	113.7	155.8	0.2	429.6	119.2	67.57
167	3653400	3	RIO JACUI	BR	71454	144.5	129.0	116.7	132.4	122.0	137.7	141.0	133.6	160.3	151.8	125.5	127.6	4.0	381.8	135.2	60.48
168	3843100	3	MIRA	EC	4960	117.3	116.2	128.5	148.5	111.7	69.2	41.9	42.2	71.7	117.7	131.3	116.9	13.3	330.4	101.1	50.87
169	3844100	3	ESMERALDAS	EC	18800	244.9	274.0	293.9	289.1	183.1	95.9	45.8	46.8	83.2	91.9	88.6	137.4	8.0	555.1	156.2	105.90
170	3844400	3	DAULE	EC	8690	275.5	318.2	333.5	267.3	128.4	56.6	22.3	16.3	29.5	31.9	32.3	90.2	0.2	677.7	133.5	140.59
171	3844450	3	VINCES	EC	4400	360.3	384.3	400.9	363.2	183.7	78.7	25.8	24.0	45.7	53.5	55.0	143.3	1.3	777.4	176.5	166.87
174	3948800	3	CANETE	PE	4900	93.5	90.0	105.7	36.3	11.0	4.3	4.1	5.2	15.8	26.7	31.3	62.5	0.0	229.4	40.5	40.69
176	4101500	4	COLVILLE RIVER	US	53535	10.3	8.7	7.5	6.6	6.2	20.1	28.1	34.7	19.0	18.1	11.0	9.9	0.0	112.9	15.0	15.59
177	4101800	4	NOATAK RIVER	US	31080	16.0	15.0	15.9	11.5	9.5	19.8	48.4	60.9	47.8	37.3	19.6	20.0	0.2	158.6	26.8	22.28
178	4101900	4	KOBUK RIVER	US	24657	18.1	15.9	19.0	11.3	11.0	25.5	50.9	61.9	43.3	28.4	18.9	18.4	0.2	184.7	26.9	23.10
179	4102100	4	KUSKOKWIM RIVER	US	80549	24.8	21.6	22.2	22.2	24.6	50.1	78.6	89.9	59.4	39.1	28.8	29.1	0.5	195.3	40.9	30.65
180	4102710	4	COPPER RIVER	US	62678	46.5	46.7	35.0	31.7	41.9	55.9	74.7	81.4	97.5	88.3	65.9	63.6	2.5	553.6	60.7	43.12
181	4102740	4	NUSHAGAK RIVER	US	25512	31.6	28.4	30.6	28.1	31.2	47.5	75.3	106.6	83.1	61.7	42.3	39.7	0.0	318.6	50.5	36.89
182	4102800	4	SUSITNA RIVER	US	50246	43.9	38.6	33.3	25.4	27.4	47.2	73.8	96.3	93.4	64.1	43.7	53.9	2.8	222.9	53.4	35.55
183	4103200	4	YUKON RIVER	US	831390	19.7	16.1	15.0	11.6	19.3	37.9	52.7	54.1	38.9	27.6	21.3	20.0	2.9	98.8	27.9	16.67
184	4115201	4	COLUMBIA RIVER	US	665371	70.3	52.5	49.4	39.7	45.3	43.6	22.2	23.3	31.4	44.2	67.6	73.2	3.7	165.5	46.9	24.62
185	4126700	4	OUACHITA RIVER	US	39622	114.4	107.1	129.3	130.6	131.7	101.3	105.3	83.3	89.8	91.4	112.7	126.7	3.1	416.2	110.3	59.04
186	4126800	4	RED RIVER	US	174825	50.9	54.4	69.0	84.6	112.9	94.2	72.6	69.0	78.7	77.6	62.7	60.5	3.9	219.4	73.9	39.91
187	4127800	4	MISSISSIPPI RIVER	US	2964255	38.8	36.2	53.8	67.5	88.3	92.6	78.4	71.3	64.9	51.0	43.9	40.1	10.6	148.7	60.6	24.95
188	4145081	4	SKAGIT RIVER	US	7089	241.5	171.4	154.5	96.7	72.5	57.7	33.4	39.2	79.2	160.5	245.7	257.6	1.0	609.5	134.2	102.81
189	4145900	4	ROGUE RIVER	US	10202	157.4	121.5	105.5	65.7	49.5	28.6	9.4	12.6	28.7	73.7	146.8	166.2	0.1	517.3	80.5	73.94
190	4146110	4	KLAMATH RIVER	US	31339	129.3	104.9	87.8	52.2	37.6	23.4	8.1	10.5	19.4	53.2	110.1	133.5	0.0	425.3	64.2	64.29
191	4146180	4	EEL RIVER (CALIF.)	US	8063	272.6	225.2	175.0	91.2	46.1	15.9	2.4	6.3	18.7	81.0	184.6	262.0	0.0	841.9	115.1	135.02
192	4146280	4	SACRAMENTO RIVER	US	60886	158.8	137.7	114.0	64.2	38.1	18.6	4.1	6.1	16.1	49.4	104.8	145.4	0.0	564.3	71.4	81.19
193	4146360	4	SAN JOAQUIN RIVER	US	35058	100.8	89.8	80.5	42.4	19.8	6.1	2.1	2.2	8.4	25.2	54.5	84.1	0.0	354.1	43.0	53.95
194	4146400	4	SALINAS RIVER	US	10764	82.1	76.2	60.3	29.3	9.3	1.6	0.6	1.1	5.1	15.1	39.6	66.9	0.0	304.7	32.3	46.22
195	4147011	4	PENOBSCOT RIVER	US	19464	78.6	66.0	79.3	82.7	86.1	97.5	99.3	89.9	96.4	99.7	98.5	87.9	12.6	267.7	88.5	36.70

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196	4147060	4	ST. CROIX RIVER	US	3559	89.6	74.2	89.0	85.3	86.5	89.3	87.6	81.5	94.3	101.1	106.8	101.6	9.3	279.7	90.6	39.23
197	4147380	4	MERRIMACK RIVER	US	12005	82.8	75.9	91.8	92.1	91.0	95.8	97.5	91.1	93.0	90.6	99.2	94.4	6.3	355.5	91.3	40.96
198	4147460	4	CONNECTICUT RIVER	US	25019	76.3	68.1	82.8	85.9	92.6	99.5	102.7	98.2	96.4	91.6	93.4	84.5	10.5	296.2	89.3	35.85
199	4147500	4	HUDSON RIVER	US	20953	78.8	70.2	84.8	86.0	92.1	98.0	101.1	95.0	95.8	90.1	91.3	86.6	8.6	224.7	89.2	35.14
200	4147600	4	DELAWARE RIVER	US	17560	82.1	72.9	89.7	96.9	101.6	106.9	113.3	109.4	103.4	93.9	91.9	90.5	8.2	361.8	96.0	42.11
201	4147703	4	SUSQUEHANNA RIVER	US	70189	70.4	61.0	82.4	87.3	96.4	102.2	102.5	96.7	91.7	82.2	77.7	74.3	6.3	304.1	85.4	35.44
202	4147900	4	POTOMAC RIVER	US	29940	71.2	60.7	84.0	83.8	96.1	102.3	98.7	97.3	86.5	76.7	68.8	71.5	4.0	260.3	83.1	38.87
203	4148050	4	JAMES RIVER	US	17503	80.8	71.2	91.8	84.4	97.5	98.8	108.3	104.2	91.1	83.3	75.8	79.8	3.5	287.8	88.9	42.61
204	4148090	4	ROANOKE RIVER	US	21715	85.8	79.0	98.0	87.9	97.2	101.8	114.9	110.5	96.5	82.9	73.5	84.6	1.1	296.1	92.7	45.14
205	4148232	4	CAPE FEAR RIVER	US	13611	89.5	90.2	99.4	85.6	94.6	113.7	142.5	130.9	106.0	77.5	71.9	85.5	1.5	414.8	98.9	49.17
206	4148300	4	PEE DEE RIVER	US	22870	91.7	92.2	105.9	88.8	94.5	111.5	131.1	124.3	99.6	81.5	72.7	89.7	0.2	334.5	98.6	47.06
207	4148550	4	SANTEE RIVER	US	38073	101.1	102.4	116.7	90.8	93.9	110.4	125.9	125.3	98.9	83.1	75.5	100.8	0.3	361.6	102.1	49.80
208	4148650	4	SAVANNAH RIVER	US	25512	112.5	116.0	127.7	95.9	95.0	112.2	128.5	118.0	97.0	78.9	78.2	109.4	2.3	329.0	105.8	51.50
209	4148720	4	ALTAMAHA RIVER	US	35224	106.6	111.5	126.8	90.7	89.2	107.9	130.5	117.8	92.2	68.2	72.0	101.4	1.4	348.9	101.2	50.97
210	4148851	4	ST. JOHNS RIVER	US	22922	66.1	74.3	88.7	65.1	98.4	175.6	180.9	173.6	169.3	97.3	50.5	63.5	2.9	415.9	108.6	70.66
211	4149120	4	PEARL RIVER	US	17024	135.0	132.6	148.0	133.5	118.3	103.6	132.5	106.5	87.5	76.9	104.4	141.4	0.5	373.6	118.3	61.59
212	4149400	4	ALABAMA RIVER	US	56895	128.3	131.6	153.9	119.0	104.4	104.0	131.5	104.7	91.2	72.2	95.5	129.2	1.0	428.2	113.8	56.31
213	4149413	4	TOMBIGBEE RIVER	US	47700	135.1	131.9	149.3	124.0	114.4	102.5	124.6	98.4	88.1	76.8	105.8	134.1	0.9	416.5	115.4	57.70
214	4149632	4	APALACHICOLA RIVER	US	49728	116.2	123.1	141.4	106.2	95.5	112.8	146.3	120.5	97.9	67.1	82.8	114.6	1.4	424.8	110.4	53.88
215	4149781	4	SUWANNEE RIVER	US	24320	96.2	97.5	113.9	81.6	84.5	151.5	170.7	161.2	119.7	68.3	56.6	85.1	2.4	425.7	107.2	61.43
216	4150283	4	NUECES RIVER	US	43823	28.7	32.6	36.3	52.8	79.2	70.3	56.0	53.9	79.2	62.7	38.3	31.5	0.1	292.5	51.8	43.22
217	4150330	4	SAN ANTONIO RIVER	US	10155	43.0	47.6	50.2	70.4	90.8	84.2	68.3	58.1	88.1	80.2	56.0	48.3	0.6	351.5	65.4	51.21
218	4150450	4	COLORADO RIVER (CA	US	108788	25.1	30.0	31.7	49.1	74.8	63.3	52.4	53.7	69.2	58.9	34.3	27.6	0.4	256.0	47.5	35.52
219	4150500	4	BRAZOS RIVER	US	116827	36.0	41.0	46.1	63.7	91.6	76.2	56.4	58.0	71.4	68.5	47.9	42.2	0.9	220.1	58.3	37.49
220	4150600	4	TRINITY RIVER (TEX	US	44512	63.5	69.0	76.8	96.4	119.2	89.7	63.7	57.9	79.4	89.6	77.7	75.7	3.2	319.2	79.9	48.67
221	4150700	4	SABINE RIVER	US	24162	102.5	99.9	106.1	112.1	124.9	101.8	92.1	76.8	85.4	95.5	105.9	118.9	5.1	377.8	101.8	55.10
222	4152050	4	COLORADO RIVER (PA	US	618715	25.0	25.2	25.8	19.3	16.6	13.0	35.6	41.4	29.3	25.7	20.2	25.0	0.9	106.5	25.2	15.52

223	4202100	4	ALSEK RIVER	CA	16200	40.6	27.5	24.9	21.0	25.4	36.7	51.2	50.8	45.3	55.1	49.2	42.0	0.0	268.5	39.1	31.82
224	4202601	4	TAKU RIVER	CA	17700	90.0	64.1	58.9	47.6	49.8	51.0	72.1	94.5	129.0	146.1	105.6	96.1	3.1	392.0	83.7	54.50
225	4204900	4	STIKINE RIVER	US	51593	65.2	41.0	37.7	29.8	30.5	40.9	62.0	69.4	79.9	84.8	70.5	68.5	0.2	437.8	56.7	46.36
226	4206100	4	NASS RIVER	CA	19200	158.4	106.6	90.7	73.1	50.4	55.4	68.9	96.6	144.0	216.1	161.5	167.5	3.0	681.1	115.8	79.49
227	4206250	4	SKEENA RIVER	CA	42200	78.6	49.4	42.5	36.1	40.6	51.8	56.3	57.5	77.3	99.1	83.0	84.5	0.8	409.9	63.1	37.34
228	4207900	4	FRASER RIVER	CA	217000	60.6	39.8	37.2	29.5	39.7	55.2	51.5	47.8	49.0	55.7	62.9	64.0	6.5	130.1	49.4	20.05
229	4208025	4	MACKENZIE RIVER	CA	1660000	21.8	17.7	17.8	16.1	29.7	47.5	58.9	52.6	-415.7	-426.5	-428.3	-432.1	6.4	89.8	31.7	16.35
230	4208040	4	PEEL RIVER (TRIB.	CA	70600	22.2	20.5	17.9	15.2	22.2	45.1	59.8	54.1	41.8	35.7	26.3	26.0	3.4	107.6	32.2	18.48
231	4209150	4	ANDERSON RIVER	CA	56300	13.0	11.8	13.3	12.0	14.2	20.3	31.8	40.1	26.6	24.5	18.0	14.1	0.0	138.1	20.0	14.62
232	4209402	4	COPPERMINE RIVER	CA	50700	9.7	8.3	12.4	13.0	16.6	23.8	37.6	50.1	36.1	26.3	16.0	12.3	0.0	182.3	21.8	17.97
233	4209600	4	ELLICE RIVER	CA	16900	5.6	6.7	7.1	8.3	11.7	19.9	27.3	35.8	25.4	21.0	11.6	7.8	0.0	154.8	15.7	15.25
234	4209800	4	BACK RIVER	CA	98200	7.9	8.4	9.6	12.1	14.8	24.9	33.6	43.6	34.4	26.3	16.2	10.9	0.0	141.9	20.2	16.80
235	4209850	4	HAYES RIVER (TRIB.	CA	18100	7.4	8.3	10.1	14.6	14.7	19.0	30.1	40.3	30.4	24.4	15.5	10.8	0.0	118.2	18.8	16.72
236	4213711	4	NELSON RIVER	CA	1060000	20.7	16.8	23.2	28.9	51.0	78.4	71.6	62.4	-303.6	-323.3	-330.4	-333.4	4.0	147.2	40.2	24.76
237	4214025	4	HAYES RIVER (TRIB.	CA	103000	19.8	16.7	22.5	24.2	37.8	60.2	76.2	69.3	60.1	41.2	34.0	23.6	0.0	159.8	40.5	27.91
238	4214035	4	AUX MELEZES	CA	42700	31.8	27.5	29.0	27.3	34.1	53.2	67.0	71.9	69.9	55.8	48.6	38.9	0.0	233.1	46.2	27.37
239	4214040	4	CANIAPISCAU	CA	86800	43.2	34.3	40.9	41.0	45.1	70.0	95.9	90.1	83.1	71.9	59.9	45.9	0.0	315.8	60.1	33.32
240	4214051	4	THELON RIVER	CA	152000	10.0	8.9	11.0	14.4	16.2	28.6	40.3	44.2	39.1	27.7	17.8	12.0	0.0	164.7	22.5	18.20
241	4214070	4	THLEWIAZA RIVER	CA	27000	13.2	9.7	13.9	17.3	22.5	35.0	55.4	49.9	46.5	31.3	19.7	14.0	0.1	156.3	27.4	22.37
242	4214075	4	FERGUSON RIVER	CA	12400	8.9	8.4	11.2	15.4	13.4	24.6	36.6	48.0	41.0	26.9	18.5	11.2	0.0	114.7	22.0	19.91
243	4214080	4	ATTAWAPISKAT RIVER	CA	36000	27.6	21.6	28.1	36.9	49.1	74.4	90.6	83.6	80.5	57.4	44.2	29.8	0.0	245.3	52.0	35.36
244	4214090	4	KAZAN RIVER	CA	72300	8.2	7.6	10.7	14.5	14.5	25.7	41.8	43.5	40.8	27.7	16.7	10.9	0.0	155.9	21.9	19.61
245	4214100	4	QUOICH RIVER	CA	30100	8.0	8.1	10.9	15.3	13.7	21.6	38.2	41.7	38.6	26.6	19.5	11.1	0.0	145.8	21.1	19.54
246	4214105	4	SEAL RIVER	CA	48100	20.0	13.8	18.6	19.1	30.4	48.0	69.8	60.4	55.7	36.0	28.3	19.8	0.2	226.7	35.0	26.20
247	4214270	4	CHURCHILL RIVER	CA	287000	20.5	16.9	20.5	23.1	39.8	64.3	80.3	67.3	53.3	31.8	28.2	22.1	2.9	149.1	39.0	25.63
248	4214440	4	SEVERN RIVER (TRIB	CA	94300	23.8	19.1	24.8	28.4	45.1	70.5	88.8	81.0	72.5	50.1	41.8	27.3	1.0	183.7	47.8	31.36
249	4214450	4	WINISK RIVER	CA	50000	29.0	24.4	29.8	36.2	53.6	77.6	95.5	86.7	80.1	55.9	46.8	32.0	3.1	195.6	54.0	32.90

250	4214520	4	ALBANY RIVER	CA	118000	42.2	36.7	38.8	45.2	63.4	82.5	87.4	79.8	82.9	63.4	62.1	45.7	6.3	189.3	60.8	28.34
251	4214551	4	MOOSE RIVER (TRIB.	CA	60100	52.1	40.2	47.6	48.3	67.1	76.7	87.0	79.1	89.6	70.2	67.2	57.0	5.1	173.4	65.2	27.61
252	4214650	4	NOTTAWAY	CA	57500	58.3	41.5	49.7	53.7	72.6	96.2	113.7	101.4	110.1	85.9	75.8	62.9	11.6	202.4	76.8	33.79
253	4214680	4	RUPERT RIVER	CA	40900	55.0	49.9	50.3	43.3	63.3	81.6	99.9	100.7	98.3	74.3	74.2	59.9	1.6	234.7	70.9	33.99
254	4214700	4	EASTMAIN	CA	44300	36.1	29.3	36.2	36.1	52.4	77.7	97.8	99.3	105.1	79.6	64.6	46.4	0.3	213.0	63.4	34.85
255	4214770	4	GRANDE RIVIERE	CA	96300	31.3	23.7	32.1	33.9	48.3	76.7	96.1	99.2	106.5	80.8	61.2	43.0	0.0	218.4	61.1	36.00
256	4214800	4	GRANDE RIVIERE DE	CA	42200	27.9	22.4	26.1	29.3	42.1	66.9	84.3	92.2	101.5	75.2	60.2	43.4	0.0	189.3	56.0	35.02
257	4214900	4	BALEINE, GRANDE RI	CA	29800	34.5	27.6	27.0	24.6	29.3	50.6	76.3	68.3	70.1	50.6	41.4	33.1	0.0	285.4	44.5	30.85
258	4214930	4	ARNAUD	CA	26900	17.6	16.2	19.0	16.5	21.3	34.5	42.7	51.3	47.9	38.8	33.5	27.9	0.0	152.1	30.6	22.36
259	4214940	4	FEUILLES (RIVIERE	CA	41700	23.5	21.2	23.4	21.5	27.8	42.4	53.7	63.2	62.3	50.4	44.0	33.5	0.0	140.1	38.9	24.58
260	4214950	4	GEORGE RIVER	CA	35200	38.7	31.4	33.4	30.6	31.7	53.1	87.0	74.3	71.0	53.6	45.0	36.1	0.0	284.9	48.8	33.07
261	4231630	4	SAINT JOHN RIVER	CA	39900	74.5	61.0	69.9	71.0	81.9	95.1	105.2	94.5	94.0	92.5	86.6	82.9	10.4	242.3	84.1	31.69
263	4243300	4	ST. MAURICE (RIVIE	CA	42000	63.3	55.3	59.6	56.2	70.6	91.2	106.1	93.0	99.0	74.6	74.8	71.9	6.9	220.9	76.3	31.58
264	4243400	4	SAGUENAY (RIVIERE)	CA	73000	53.8	42.2	47.3	52.5	70.3	97.8	117.0	99.4	100.5	81.3	76.0	60.7	3.3	199.8	74.9	34.81
265	4243610	4	MANICOUAGAN (RIVIE	CA	45800	54.0	44.6	57.0	54.6	70.1	97.7	125.0	107.0	107.1	85.3	81.9	65.1	2.5	329.2	79.1	37.35
266	4244500	4	CHURCHILL, FLEUVE	CA	92500	56.3	44.9	53.6	50.0	51.7	81.6	104.1	92.9	88.0	75.7	66.9	56.1	0.0	284.1	68.5	32.55
267	4244635	4	NATASHQUAN (RIVIER	CA	15600	62.4	53.6	65.2	52.7	67.1	82.5	94.0	99.5	84.5	88.0	73.0	64.4	0.1	254.6	73.9	35.23
268	4244660	4	LITTLE MECATINA RI	CA	19100	70.5	56.7	68.7	60.6	70.0	86.5	97.1	100.1	91.1	94.7	84.6	76.0	0.0	241.1	79.7	34.00
269	4351900	4	BRAVO	MX	450902	15.2	14.6	14.6	21.0	33.7	39.9	56.9	58.8	60.4	35.0	17.4	16.2	0.9	148.2	32.0	24.79
270	4353300	4	YAQUI	MX	57908	29.9	22.0	15.9	7.4	7.2	33.1	139.5	120.6	58.3	29.4	21.3	33.4	0.2	258.9	43.2	46.84
271	4355300	4	FUERTE	MX	34247	36.1	23.6	13.4	8.3	8.9	65.1	185.4	170.1	109.3	45.6	23.8	47.0	0.1	313.0	61.4	66.52
272	4356080	4	SAN PEDRO	MX	25800	17.1	11.0	4.3	3.8	11.4	73.7	145.1	144.9	110.6	35.8	15.0	16.4	0.0	643.5	49.1	62.52
273	4356100	4	SANTIAGO	MX	128943	16.9	10.2	7.3	8.0	24.8	118.6	177.4	153.0	119.2	42.8	13.4	13.8	0.2	348.4	58.8	67.46
274	4356280	4	ARMERIA	MX	9744	20.0	12.5	7.4	8.3	23.6	141.7	181.6	147.8	155.7	70.3	25.5	20.9	0.0	420.9	67.9	76.15
275	4356700	4	VERDE	MX	17617	8.3	10.5	12.4	30.8	108.7	231.9	222.0	225.9	248.9	113.9	23.8	11.6	0.0	522.1	104.1	108.63
276	4358300	4	PANUCO	MX	58115	23.5	22.7	26.0	45.3	76.3	145.4	152.3	138.3	184.0	93.7	39.0	23.2	0.4	592.5	80.8	73.16
277	4359220	4	PAPALOAPAN	MX	21419	46.7	41.7	43.6	60.4	124.1	326.9	375.4	348.3	361.2	201.1	100.5	65.4	2.4	1003.3	174.6	153.14

278	4362201	4	GRISALVA	MX	37702	16.7	16.1	16.4	37.5	120.8	266.5	208.5	223.4	272.1	145.6	43.2	24.4	0.0	556.6	115.9	112.02
279	4362600	4	USUMACINTA	MX	50743	104.0	72.1	66.5	77.5	170.9	362.0	346.2	325.4	380.1	294.3	169.9	127.6	6.1	621.9	208.0	134.59
280	4664800	4	LEMPA	SV	18176	11.3	8.7	13.2	42.6	148.2	272.4	218.7	236.7	279.2	170.7	37.7	16.1	0.0	568.1	121.3	117.29
281	4772300	4	GRANDE DE MATAGALP	NI	14646	78.4	42.1	32.2	44.1	176.6	323.3	325.3	298.0	271.9	243.2	135.5	100.7	0.0	714.0	172.6	129.74
282	4773800	4	SAN JUAN	NI	28600	53.2	30.4	20.3	35.7	170.9	269.5	237.4	232.7	281.6	273.3	135.1	82.5	0.2	728.7	151.9	119.67
283	5101201	5	BURDEKIN	AU	129760	137.0	128.6	83.4	37.2	25.9	25.6	17.8	14.2	13.8	27.0	52.9	87.2	0.1	597.5	54.2	66.25
284	5101301	5	FITZROY	AU	135757	106.8	100.5	67.0	39.0	34.2	34.8	28.0	21.8	24.9	44.4	66.6	94.9	0.2	531.4	55.2	54.76
285	5109170	5	GILBERT RIVER	AU	11800	207.7	183.3	106.0	25.6	12.7	12.3	6.7	4.8	6.3	18.7	53.8	119.1	0.0	907.4	63.1	91.86
286	5109200	5	MITCHELL RIVER (N.	AU	45872	233.7	230.1	160.7	43.3	16.6	13.0	6.8	5.6	6.9	18.6	59.8	143.3	0.1	639.7	78.2	105.72
287	5141100	5	BRANTAS	ID	8650	353.9	314.6	327.4	224.7	157.6	96.0	73.9	45.1	56.5	137.0	238.6	314.1	0.0	684.7	195.0	137.15
288	5141200	5	SOLO (BENGAWAN SOL	ID	12804	321.7	298.8	304.5	203.2	137.6	82.4	52.7	36.7	48.6	114.2	214.6	282.9	0.0	578.7	174.8	128.36
289	5223100	5	KELANTAN	MY	11900	209.1	108.3	136.7	151.9	193.5	179.6	158.2	197.2	245.1	303.5	350.8	412.0	4.0	875.8	220.5	119.37
290	5224500	5	PAHANG	MY	19000	195.5	127.9	163.4	204.0	208.8	159.9	141.7	171.8	215.0	278.0	293.0	322.3	18.4	876.1	206.8	93.08
291	5230300	5	RAJANG	MY	34053	382.7	298.7	324.5	286.9	272.8	253.2	211.2	280.2	290.3	358.1	341.8	438.5	51.1	957.2	311.6	119.93
292	5231700	5	KINABATANGAN	MY	10800	268.2	204.4	196.1	183.4	245.7	214.2	191.6	206.8	221.5	214.6	237.8	248.7	7.2	1035.7	219.4	84.96
294	5550500	5	SEPIK	PG	40922	353.8	342.3	404.8	341.9	305.7	231.0	214.4	265.7	266.1	278.0	275.6	331.3	16.4	841.7	300.9	108.33
295	5553100	5	PURARI	PG	11100	290.3	302.7	359.8	264.9	255.6	170.8	154.9	174.2	226.3	245.4	247.8	287.4	0.0	984.9	248.3	110.02
296	5606100	5	BLACKWOOD RIVER	AU	20500	13.2	14.0	21.1	33.1	70.7	90.4	91.2	73.5	54.0	38.5	21.5	14.3	0.1	244.3	44.6	38.03
297	5607100	5	MURCHISON RIVER	AU	82300	23.3	27.3	25.8	18.1	26.5	32.1	26.7	17.1	6.2	5.5	6.6	11.0	0.1	192.5	18.9	23.28
298	5607200	5	GASCOYNE RIVER	AU	73400	28.5	39.4	29.6	19.7	25.9	29.5	20.9	11.1	3.3	3.8	5.1	11.1	0.1	255.4	19.0	27.32
299	5607400	5	ASHBURTON RIVER	AU	70200	48.5	58.8	41.0	20.5	22.8	24.4	14.2	9.1	2.5	3.4	7.4	19.5	0.0	240.5	22.7	33.21
300	5607450	5	FORTESCUE RIVER	AU	48900	60.9	71.7	53.7	22.8	21.3	21.5	12.2	7.6	2.6	4.1	8.5	31.8	0.0	277.1	26.6	40.25
301	5607500	5	DE GREY RIVER	AU	49600	61.3	70.3	51.4	18.0	19.4	20.4	11.0	5.6	1.7	4.1	7.9	30.0	0.0	331.6	25.1	41.87
302	5608024	5	FITZROY RIVER	AU	45300	169.3	151.2	84.7	21.9	11.2	7.4	5.1	2.1	4.4	16.6	39.2	97.8	0.0	488.1	50.9	74.18
303	5608090	5	ORD	AU	46100	162.8	153.2	92.5	19.2	9.0	5.1	4.1	1.6	4.9	21.5	47.3	103.5	0.0	475.2	52.1	75.50
304	5608400	5	DURACK RIVER	AU	4150	192.2	192.2	110.0	25.7	13.1	7.2	4.5	1.6	6.8	26.7	58.4	127.3	0.0	537.1	63.8	87.66
305	5608500	5	DRYSDALE	AU	14000	239.5	213.0	164.3	37.5	11.6	6.1	4.2	1.5	4.7	27.5	76.7	174.6	0.0	673.3	80.1	104.96

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306	5708110	5	VICTORIA RIVER	AU	44900	148.5	160.2	101.2	17.8	6.4	3.3	3.3	1.0	4.8	21.5	53.9	111.3	0.0	482.8	52.8	77.09
307	5708145	5	DALY	AU	47000	245.4	235.7	172.3	35.2	6.1	2.6	1.5	1.3	6.0	31.9	92.7	191.7	0.0	583.0	85.2	111.58
308	5709100	5	ROPER RIVER	AU	47400	189.7	191.0	149.8	34.0	6.2	4.4	1.7	1.5	4.1	21.3	60.4	148.3	0.0	563.6	67.7	93.81
309	5709110	5	MACARTHUR RIVER	AU	10400	174.3	169.7	118.6	22.1	7.0	5.3	2.7	0.9	6.1	23.9	40.0	104.1	0.0	615.0	56.2	87.07
310	5803180	5	SOUTH ESK RIVER	AU	3278	48.6	42.9	48.9	58.8	64.1	71.1	74.3	74.6	67.9	67.2	55.7	61.0	1.1	218.0	61.3	34.09
311	5865300	5	WAIKATO RIVER	NZ	11395	102.9	100.4	102.5	111.9	138.8	154.5	154.5	144.5	132.5	135.2	115.5	127.9	6.2	405.0	126.8	55.64
312	5868100	5	CLUTHA	NZ	20306	91.9	71.7	92.7	81.1	82.1	74.8	67.3	71.8	85.9	92.3	84.7	90.8	5.1	271.8	82.3	40.61
313	6112090	6	DOURO	PT	91491	65.8	60.0	58.6	56.1	61.4	42.6	19.4	17.0	39.9	66.7	73.7	76.9	0.4	216.5	53.2	38.97
314	6113050	6	TEJO	PT	67490	75.7	71.5	67.5	62.4	59.5	36.6	11.2	12.0	40.3	75.1	86.4	88.0	0.2	275.9	57.2	46.61
315	6116200	6	GUADIANA	PT	60883	58.4	59.2	57.3	54.1	45.6	28.3	5.7	7.0	30.8	60.5	69.2	70.3	0.1	247.3	45.5	39.80
316	6122100	6	SEINE	FR	65000	63.3	53.3	54.4	53.0	62.0	60.9	62.6	61.2	58.6	65.9	68.3	70.1	1.7	180.5	61.1	29.14
317	6123100	6	LOIRE	FR	110000	64.5	56.9	59.1	60.1	73.3	63.5	59.1	61.5	65.0	73.1	75.2	73.0	3.0	188.9	65.4	29.90
318	6125100	6	GARONNE	FR	52000	74.4	66.6	72.7	81.1	90.2	70.9	52.9	63.7	72.7	82.0	81.4	87.7	1.4	236.2	74.7	36.17
319	6139100	6	RHONE	FR	95590	77.1	71.4	79.0	80.6	91.4	87.6	72.7	86.4	92.9	101.6	99.4	89.8	6.5	278.0	85.8	39.95
320	6217100	6	GUADALQUIVIR	ES	46995	61.9	65.2	67.2	59.1	46.0	24.0	4.4	5.8	30.5	61.9	71.8	76.3	0.1	270.0	47.9	44.12
321	6226800	6	EBRO	ES	84230	48.2	44.0	51.3	61.5	72.4	55.8	32.3	36.2	55.4	63.8	63.4	59.4	2.3	192.9	53.6	27.88
322	6229500	6	VAENERN-GOETA (GOE	SE	46886	48.7	33.9	36.2	39.5	47.8	63.9	77.3	82.7	70.2	70.5	64.6	52.2	3.6	180.0	57.3	30.02
323	6233650	6	ANGERMANAELVEN	SE	30638	49.2	38.8	39.5	32.9	40.8	57.4	81.6	76.4	68.8	58.0	54.4	50.1	3.9	187.3	54.0	27.76
324	6233750	6	LULEAELVEN	SE	24924	43.3	35.1	32.9	29.7	35.7	51.8	75.5	72.4	61.3	56.7	49.3	44.6	2.5	155.8	49.0	24.79
325	6233850	6	KALIXAELVEN	SE	23103	31.0	26.6	26.9	27.8	33.5	48.5	70.5	69.0	53.6	47.8	43.5	33.7	2.5	168.1	42.7	24.95
326	6233900	6	MUONIO	SE	14409	26.5	22.4	21.7	21.1	27.2	46.9	67.1	64.0	46.9	38.6	34.0	25.9	1.8	155.7	36.9	23.44
327	6335020	6	RHINE RIVER	DE	159300	74.0	64.0	66.6	67.2	79.4	88.8	92.0	90.9	75.3	73.1	78.4	80.5	7.4	202.3	77.5	33.15
328	6337200	6	WESER	DE	37720	61.8	50.8	50.8	52.3	61.3	69.1	78.9	73.9	58.6	58.3	62.3	65.4	2.3	186.6	62.0	28.94
329	6340110	6	ELBE RIVER	DE	131950	44.3	38.4	41.1	45.2	60.3	69.7	77.7	72.5	51.1	46.0	47.3	47.9	2.1	183.9	53.5	25.72
330	6348800	6	PO	IT	70091	55.2	55.4	76.8	90.8	111.6	87.8	72.8	86.0	88.6	113.9	94.1	69.1	1.7	311.3	83.5	47.78
331	6401090	6	OELFUSA	IS	5678	100.2	96.6	86.9	70.1	58.1	65.5	68.1	80.9	100.5	112.3	95.3	101.4	3.9	345.2	86.3	45.50
332	6401120	6	THJORSA	IS	7380	103.9	97.5	86.5	76.3	63.2	73.0	77.4	97.7	110.2	120.6	99.8	115.6	4.4	312.8	93.5	42.93

333	6401601	6	SVARTA, SKAGAFIROI	IS	393	41.6	39.4	36.4	27.4	25.4	33.8	39.3	47.5	49.7	53.3	42.5	44.3	0.0	170.0	40.0	21.62
334	6401701	6	JOEKULSA A FJOELLU	IS	7074	53.2	39.6	40.9	36.1	34.6	40.3	53.6	58.8	63.9	62.7	51.3	52.8	0.1	200.0	49.0	26.39
335	6401800	6	LAGARFLJOT	IS	2782	107.6	74.8	69.6	56.1	44.5	44.8	52.6	64.1	89.9	101.1	93.8	100.4	0.0	439.4	75.0	51.17
336	6421100	6	MAAS	NL	29000	76.0	64.0	65.1	60.8	63.9	72.7	79.7	79.7	69.6	73.8	76.2	82.9	1.6	212.9	72.0	33.23
337	6457010	6	ODER RIVER	PL	109729	38.2	33.2	36.7	41.8	61.4	69.8	83.5	75.7	50.9	44.3	45.1	42.5	4.1	214.6	51.9	26.18
338	6458010	6	WISLA	PL	194376	34.2	30.0	33.2	42.1	61.3	76.9	88.0	78.6	52.9	43.4	44.3	38.5	2.2	178.0	52.0	27.49
339	6604650	6	SPEY	GB	2861	89.1	64.1	64.6	52.7	58.0	56.4	65.9	73.2	70.3	90.6	89.7	81.6	11.8	223.9	71.3	32.25
340	6604750	6	TWEED	GB	4390	88.1	62.7	66.4	54.9	64.1	62.9	75.4	85.3	74.9	94.8	88.3	84.7	3.6	218.0	75.2	34.53
341	6605600	6	TRENT	GB	7486	70.1	55.3	53.8	55.9	58.8	59.9	68.8	74.4	63.5	79.7	74.7	74.9	3.9	175.3	65.8	31.03
342	6607650	6	THAMES	GB	9948	64.9	47.3	50.8	49.7	54.9	50.4	57.1	60.5	53.8	71.7	70.9	70.5	0.9	184.5	58.5	31.36
343	6688150	6	SAKARYA	TR	55322	52.1	45.4	45.2	45.5	49.4	36.3	19.7	15.1	22.7	38.4	46.2	61.6	0.8	172.4	39.8	24.31
344	6688600	6	KIZILIRMAK	TR	75121	51.4	40.6	43.1	49.3	54.5	36.9	17.8	12.6	22.0	36.1	45.4	54.7	0.3	230.1	38.7	26.44
345	6730500	6	TANA (NO, FI)	NO	14165	24.5	21.5	20.1	19.8	23.5	43.3	57.7	54.5	41.3	35.7	30.1	24.7	3.3	149.3	33.1	19.86
346	6731310	6	DRAMSELV	NO	16020	49.7	35.1	38.1	36.9	50.0	67.1	85.6	90.4	68.5	75.4	61.4	51.5	2.6	257.2	59.2	34.96
347	6731400	6	GLOMA	NO	40243	45.3	33.8	33.8	32.4	43.4	63.4	77.3	81.5	62.2	63.9	53.8	47.3	3.0	172.6	53.2	26.92
348	6742900	6	DANUBE	RO	807000	45.7	42.4	47.4	59.2	78.1	93.9	86.0	77.4	63.6	59.3	61.0	54.9	5.5	156.7	64.1	25.79
349	6854100	6	KOKEMAENJOKI	FI	26025	41.3	31.4	32.3	33.7	41.2	57.8	70.5	77.6	65.1	60.1	52.5	45.0	1.2	164.3	50.7	27.40
350	6854500	6	OULUJOKI	FI	22841	39.4	34.7	32.4	33.3	44.1	61.9	74.0	80.7	62.4	56.0	50.9	41.2	5.9	155.0	50.9	26.50
351	6854600	6	IIJOKI	FI	14191	39.2	35.4	34.2	31.5	42.8	60.3	73.6	76.2	60.4	56.0	49.4	42.0	5.6	143.9	50.1	25.29
352	6854700	6	KEMIJOKI	FI	50686	30.7	30.0	28.9	26.9	35.9	57.3	67.0	69.8	52.7	47.8	40.6	32.9	3.5	137.1	43.4	23.61
353	6855200	6	KYMIJOKI	FI	36275	42.1	33.6	34.1	34.4	40.6	59.7	73.1	80.7	64.2	59.8	51.8	44.5	0.8	183.7	51.5	27.99
354	6855400	6	VUOKSI	FI	61061	41.9	35.3	34.0	35.1	42.6	64.3	71.2	80.1	66.2	58.3	54.3	45.7	4.6	152.7	52.4	26.03
355	6934100	6	SKJERN A	DK	1040	70.0	49.4	52.3	43.6	48.3	60.4	68.7	79.7	83.5	89.1	84.9	77.2	0.0	255.5	67.3	35.14
356	6934250	6	GUDENA	DK	1290	61.7	44.5	47.2	39.8	46.0	54.9	64.5	70.1	70.5	74.6	73.5	66.4	0.6	196.8	59.5	30.81
357	6970100	6	ONEGA	RU	55770	33.9	26.7	30.4	33.6	46.0	62.3	63.0	72.9	62.9	57.7	47.6	41.6	3.0	175.2	48.2	24.28
358	6970250	6	NORTHERN DVINA(SEV	RU	348000	35.2	26.4	29.3	34.7	47.9	64.2	68.8	68.9	62.0	57.8	47.6	40.7	3.6	132.2	48.6	21.95
359	6970500	6	MEZEN	RU	56400	31.3	24.1	27.7	32.7	44.4	61.2	64.4	68.7	61.8	55.1	42.4	35.7	3.8	150.6	45.8	23.54

360	6970700	6	PECHORA	RU	312000	32.0	25.5	27.9	31.1	40.1	51.6	60.7	69.6	62.5	54.3	44.3	35.1	5.8	131.9	44.6	20.32
361	6971130	6	TULOMA	RU	17500	26.4	24.4	24.3	26.4	36.3	55.9	67.9	64.8	50.9	44.9	34.6	29.6	6.3	148.8	40.5	22.57
362	6971450	6	PONOY	RU	15200	26.2	22.6	25.3	26.0	34.0	50.7	53.7	57.9	53.1	43.5	35.0	32.6	1.8	193.8	38.4	22.01
363	6971600	6	VARZUGA	RU	7940	25.9	21.7	23.9	26.6	37.2	49.5	58.6	65.1	54.0	46.5	38.7	31.5	2.3	139.2	39.9	22.93
364	6972130	6	NIZHNY VYG (SOROKA	RU	27000	30.4	26.2	27.4	31.0	40.3	62.7	63.6	76.1	63.9	56.4	45.9	36.4	4.9	162.8	46.7	25.87
365	6972350	6	NARVA	EE	56000	37.1	30.5	32.1	35.7	48.4	71.4	80.1	82.6	64.6	55.6	51.8	43.9	3.8	167.7	52.8	28.59
366	6972430	6	NEVA	RU	281000	38.5	31.9	33.5	36.1	46.6	67.7	75.4	78.6	-3385.3	-3391.6	-3397.8	-3406.0	5.1	162.2	52.9	25.00
367	6972800	6	KEM	RU	27900	30.7	27.6	27.3	29.4	42.4	60.2	67.9	71.3	59.7	49.6	43.2	34.2	3.8	149.6	45.3	24.19
368	6972860	6	KOVDA	RU	25900	29.7	26.7	27.1	28.5	41.5	56.3	65.8	67.3	54.8	46.8	40.2	31.7	0.4	149.9	43.0	24.35
369	6973300	6	WESTERN DVINA (DAU	LV	64500	39.2	34.4	36.2	39.7	56.0	78.4	89.3	78.3	60.8	52.4	48.9	44.6	0.5	228.3	54.9	29.97
370	6974150	6	NEMAN	LT	81200	39.2	32.0	35.0	41.7	56.0	74.4	86.6	77.0	56.4	49.7	49.5	46.2	1.4	178.0	53.6	28.24
371	6977100	6	VOLGA	RU	1360000	34.1	27.2	28.8	32.0	45.7	63.2	70.6	61.5	54.0	52.1	44.2	39.2	2.4	113.7	46.1	20.54
372	6978250	6	DON	RU	378000	34.4	28.5	28.4	32.7	42.6	55.2	57.3	45.8	39.3	38.9	41.3	40.7	2.1	111.4	40.4	19.74
373	6980300	6	SOUTHERN BUG	UA	46200	33.4	31.9	29.4	41.4	53.5	77.9	80.3	60.3	42.9	37.2	40.1	38.1	0.5	174.7	47.2	29.07
374	6980800	6	DNIEPR	UA	463000	36.8	32.7	33.6	41.5	53.6	74.4	82.5	64.6	49.3	44.2	46.4	43.0	3.0	142.5	50.2	24.20
375	6981800	6	DNIESTR	MD	66100	33.4	33.4	33.9	48.4	68.9	90.3	90.9	72.5	52.8	43.9	42.3	37.6	3.6	195.4	54.0	30.97
376	6983350	6	KUBAN	RU	48100	70.2	58.3	62.0	69.4	84.7	95.9	82.0	76.0	74.4	77.7	82.8	82.3	3.1	203.9	76.3	33.93
377	6990700	6	KURA	AZ	178000	27.8	30.4	41.4	58.5	76.1	63.4	38.9	33.5	36.6	46.3	37.9	28.1	3.1	141.6	43.2	22.09

Table 3. Watersheds in which trends in factors related to precipitation polarization have been identified at a significance level of 0.05.

No	GRDC	WMO	RIVER	COUNTRY	POL/STD	sen_SD	sen_POL	P1	LOC_SD	LOC_POL	pvalP_SD	pvalP_POL	pval_SD_n	pval_POL_n	sen_SD_n	sen_POL_n	P2
7	1289200	1	PANGANI	TZ	6.26	-0.187	-0.712	3.81	1964	1964	0.01	0.00	0.37	0.23	-0.164	-0.762	4.64
14	1362100	1	NILE	EG	4.26	-0.041	-0.093	2.28	1964	1967	0.00	0.00	0.57	0.94	-0.029	-0.021	0.73
15	1389090	1	MANGOKY	MG	6.07	-0.206	-0.776	3.77	1939	1939	0.01	0.01	0.46	0.48	0.083	0.305	3.66
17	1425500	1	CAVALLY	CI	6.55	-0.213	-0.618	2.90	1963	1971	0.00	0.02	0.51	0.79	-0.104	-0.210	2.02
18	1426380	1	BANDAMA	CI	6.08	-0.170	-0.578	3.40	1929	1974	0.00	0.00	0.07	0.99	-0.089	-0.037	0.42
19	1427500	1	SASSANDRA	CI	6.90	-0.195	-0.523	2.68	1967	1960	0.01	0.06	0.91	0.70	0.027	-0.163	-6.05

20	1427600	1	DAVO	CI	7.70	-0.140	-0.464	3.31	1964	1964	0.00	0.01	0.12	0.49	0.170	0.314	1.85
21	1428500	1	COMOE	CI	5.32	-0.167	-0.576	3.44	1938	1938	0.00	0.00	0.19	0.11	-0.077	-0.323	4.20
24	1530100	1	TANO	GH	6.56	-0.166	-0.804	4.83	1968	1968	0.00	0.00	0.12	0.11	-0.180	-0.797	4.44
31	1812100	1	SENEGAL	SN	4.95	-0.151	-0.453	3.00	1967	1967	0.00	0.00	0.54	0.37	0.070	0.441	6.29
32	1813200	1	GAMBIA	SN	4.10	-0.187	-0.486	2.60	1965	1965	0.00	0.00	0.40	0.54	0.176	0.467	2.65
33	1814070	1	GEBA	SN	5.09	-0.217	-0.745	3.44	1965	1965	0.00	0.00	0.29	0.43	0.240	0.616	2.57
34	1815020	1	CORUBAL	SN	4.97	-0.374	-1.251	3.35	1967	1965	0.00	0.00	0.23	0.60	0.240	0.363	1.51
45	2178300	2	YONGDING HE	CN	5.92	-0.085	-0.391	4.57	1979	1967	0.09	0.03	0.24	0.09	-0.198	-0.619	3.12
47	2178500	2	LUAN HE	CN	6.13	-0.089	-0.378	4.25	1979	1978	0.07	0.06	0.51	0.13	-0.147	-1.077	7.31
49	2180800	2	HUANG HE (YELLOW R	CN	6.11	-0.050	-0.201	4.02	1968	1968	0.14	0.04	0.87	0.43	-0.010	-0.154	15.31
50	2181900	2	YANGTZE RIVER (CHA	CN	5.28	-0.083	-0.388	4.69	1932	1939	0.00	0.00	0.81	0.94	-0.007	0.010	-1.38
55	2260100	2	CHINDWIN RIVER	MM	4.44	0.239	1.046	4.37	1962	1963	0.02	0.02	0.52	0.39	-0.188	-1.537	8.17
62	2423500	2	KARUN	IR	5.87	0.058	0.274	4.70	1973	1973	0.00	0.00	0.33	0.24	-0.205	-0.842	4.10
73	2595400	2	EUPHRATES	IQ	5.93	-0.037	-0.139	3.81	1976	1977	0.16	0.12	0.09	0.22	-0.113	-0.322	2.85
74	2595700	2	TIGRIS	IQ	5.67	0.077	0.306	3.96	1937	1937	0.00	0.00	0.61	0.76	-0.024	0.048	-2.03
75	2651100	2	BRAHMAPUTRA	BD	5.42	-0.215	-1.109	5.17	1955	1955	0.00	0.00	0.29	0.11	-0.142	-0.677	4.76
76	2677100	2	HAN-GANG (HAN RIVE	KR	6.66	0.385	1.329	3.46	1962	1953	0.00	0.00	0.50	0.13	0.208	1.268	6.09
77	2694510	2	NAKTONG	KR	6.49	0.234	0.759	3.24	1952	1973	0.07	0.08	0.05	0.05	0.384	2.653	6.91
78	2846800	2	GANGES	IN	3.81	-0.077	-0.247	3.20	1978	1982	0.13	0.22	0.25	0.14	-0.305	-1.259	4.12
81	2853300	2	TAPTI RIVER	IN	4.71	0.128	0.426	3.32	1929	1929	0.01	0.00	0.62	0.53	-0.036	-0.159	4.37
89	2901202	2	ANADYR	RU	9.64	-0.047	-0.138	2.95	1950	1950	0.01	0.04	0.29	0.58	-0.036	-0.058	1.59
90	2902850	2	KAMCHATKA	RU	8.57	-0.131	-0.351	2.69	1956	1956	0.00	0.00	0.14	0.09	-0.075	-0.264	3.52
93	2909150	2	YENISEI	RU	4.25	-0.020	-0.074	3.66	1975	1954	0.01	0.01	0.09	0.54	0.081	-0.051	-0.62
96	2917100	2	AMU DARYA	UZ	5.10	0.027	0.089	3.31	1947	1951	0.00	0.01	0.11	0.07	-0.052	-0.230	4.42
103	2998450	2	ALAZEYA	RU	7.33	0.030	0.101	3.34	1995	1995	0.09	0.10	0.56	0.34	0.282	1.207	4.29
105	2998702	2	ANYUY (TRIB. KOLYM	RU	12.03	-0.060	-0.189	3.16	1986	1990	0.00	0.00	0.56	0.49	-0.066	0.160	-2.41
106	2998720	2	BOL. ANYUY (TRIB.	RU	10.43	-0.031	-0.105	3.41	1990	1990	0.03	0.07	0.00	0.06	0.215	0.635	2.96

107	2998800	2	PALYAVAAM	RU	11.10	-0.056	-0.155	2.75	1930	1930	0.00	0.01	0.48	0.91	-0.014	-0.011	0.78
114	3102500	3	ATRATO	CO	8.60	0.350	1.084	3.10	1941	1941	0.00	0.00	0.68	0.61	0.086	0.300	3.49
119	3178900	3	HUASCO	CL	11.71	-0.080	-0.259	3.25	1944	1944	0.00	0.00	0.72	0.54	0.013	0.092	6.96
124	3258200	3	SALADO	AR	5.38	0.134	0.379	2.82	1965	1965	0.00	0.00	0.22	0.88	0.153	0.121	0.79
129	3276800	3	SANTA CRUZ	AR	6.78	-0.174	-0.552	3.18	1941	1940	0.00	0.00	1.00	0.90	0.000	0.020	-71.56
132	3410500	3	CORANTIJN	SR	4.78	-0.193	-0.444	2.30	1938	1938	0.00	0.03	0.97	0.82	-0.004	0.073	-16.82
133	3411300	3	COPPENAME	SR	5.19	-0.256	-0.697	2.72	1955	1955	0.00	0.01	0.56	0.50	-0.097	-0.322	3.31
134	3412800	3	MARONI	SR	9.38	-0.375	-1.247	3.33	1949	1950	0.00	0.00	0.81	0.73	-0.040	-0.168	4.23
135	3469050	3	URUGUAY	UY	7.15	0.174	0.618	3.55	1945	1940	0.00	0.01	0.13	0.07	0.155	0.558	3.59
136	3469100	3	NEGRO (URUGUAY)	UY	10.43	0.191	0.586	3.07	1933	1933	0.00	0.01	0.27	0.28	0.087	0.324	3.71
137	3514800	3	OYAPOCK	GF	11.25	-0.203	-0.653	3.22	1958	1949	0.12	0.05	0.08	0.31	0.463	0.709	1.53
144	3631100	3	RIO JARI	BR	12.56	-0.219	-0.825	3.78	1958	1969	0.06	0.01	0.85	0.68	-0.029	-0.460	15.65
145	3631210	3	RIO PARU DE ESTE	BR	11.19	-0.204	-0.771	3.78	1940	1945	0.04	0.04	0.94	0.90	-0.013	0.084	-6.52
155	3650885	3	RIO PARAIBA	BR	7.08	0.177	0.624	3.53	1959	1959	0.04	0.05	0.33	0.22	0.124	0.659	5.30
166	3653120	3	RIO RIBEIRA DO IGU	BR	6.36	0.112	0.390	3.47	1981	1979	0.00	0.00	0.12	0.09	0.400	1.198	3.00
167	3653400	3	RIO JACUI	BR	6.25	0.126	0.494	3.91	1945	1962	0.03	0.03	0.56	0.53	0.059	0.434	7.38
168	3843100	3	MIRA	EC	6.23	-0.110	-0.382	3.46	1930	1929	0.00	0.00	0.30	0.99	0.047	-0.001	-0.02
171	3844450	3	VINCES	EC	4.65	0.160	0.796	4.99	1920	1946	0.14	0.01	0.89	0.95	0.017	0.041	2.45
176	4101500	4	COLVILLE RIVER	US	7.24	-0.041	-0.146	3.59	1967	1965	0.04	0.02	0.86	0.85	0.010	0.029	2.98
179	4102100	4	KUSKOKWIM RIVER	US	6.36	-0.068	-0.275	4.06	1955	1963	0.00	0.00	0.38	0.44	-0.054	-0.204	3.79
180	4102710	4	COPPER RIVER	US	12.78	-0.174	-0.532	3.06	1961	1961	0.00	0.00	0.46	0.58	0.047	0.157	3.36
181	4102740	4	NUSHAGAK RIVER	US	8.64	-0.091	-0.216	2.38	1951	1967	0.00	0.08	0.61	0.65	-0.031	0.192	-6.22
196	4147060	4	ST. CROIX RIVER	US	6.89	0.076	0.262	3.44	1956	1956	0.03	0.05	0.91	0.81	0.009	-0.081	-9.44
197	4147380	4	MERRIMACK RIVER	US	8.52	0.088	0.307	3.50	1976	1977	0.00	0.01	0.48	0.70	0.149	0.323	2.17
198	4147460	4	CONNECTICUT RIVER	US	7.97	0.056	0.191	3.42	1971	1971	0.01	0.03	0.81	0.95	0.050	0.034	0.68
200	4147600	4	DELAWARE RIVER	US	8.40	0.081	0.298	3.70	1970	1967	0.02	0.02	0.74	0.93	0.045	0.089	1.98

208	4148650	4	SAVANNAH RIVER	US	6.34	-0.073	-0.364	5.00	1945	1953	0.07	0.01	0.72	0.99	-0.022	-0.004	0.18
217	4150330	4	SAN ANTONIO RIVER	US	6.85	0.142	0.493	3.48	1964	1966	0.00	0.00	0.38	0.87	0.169	0.113	0.67
223	4202100	4	ALSEK RIVER	CA	8.44	-0.087	-0.320	3.68	1943	1943	0.00	0.00	0.13	0.25	0.053	0.134	2.54
224	4202601	4	TAKU RIVER	CA	7.14	-0.165	-0.524	3.18	1948	1948	0.00	0.00	0.64	0.96	0.050	0.006	0.12
225	4204900	4	STIKINE RIVER	US	9.44	-0.276	-0.903	3.27	1941	1942	0.00	0.00	0.84	0.75	0.011	0.048	4.31
226	4206100	4	NASS RIVER	CA	8.53	-0.204	-0.694	3.41	1967	1966	0.00	0.00	0.50	0.78	0.147	0.146	0.99
227	4206250	4	SKEENA RIVER	CA	10.96	-0.122	-0.423	3.46	1926	1936	0.00	0.00	0.30	0.52	-0.032	-0.100	3.08
230	4208040	4	PEEL RIVER (TRIB.	CA	5.64	0.038	0.153	4.01	1935	1935	0.01	0.00	0.49	0.24	0.014	0.080	5.73
233	4209600	4	ELLICE RIVER	CA	10.15	-0.043	-0.148	3.41	1939	1939	0.00	0.00	0.61	0.54	-0.013	-0.048	3.62
235	4209850	4	HAYES RIVER (TRIB.	CA	7.07	-0.037	-0.140	3.75	1937	1937	0.00	0.00	0.16	0.26	0.033	0.104	3.19
243	4214080	4	ATTAWAPISKAT RIVER	CA	6.94	0.078	0.250	3.20	1965	1965	0.00	0.00	0.60	0.53	-0.060	-0.315	5.22
248	4214440	4	SEVERN RIVER (TRIB	CA	5.83	0.045	0.160	3.58	1967	1937	0.08	0.06	0.26	0.68	0.097	0.084	0.86
261	4231630	4	SAINT JOHN RIVER	CA	7.32	0.054	0.254	4.68	1975	1975	0.12	0.02	0.71	0.56	0.044	0.255	5.84
263	4243300	4	ST. MAURICE (RIVIE	CA	6.78	0.076	0.265	3.47	1956	1956	0.00	0.00	0.76	0.95	0.020	0.026	1.30
267	4244635	4	NATASHQUAN (RIVIER	CA	7.22	-0.049	-0.199	4.03	1940	1944	0.00	0.01	0.55	0.70	0.017	0.057	3.40
277	4359220	4	PAPALOAPAN	MX	6.54	0.160	0.591	3.71	1950	1950	0.05	0.01	0.46	0.14	-0.203	-1.280	6.30
292	5231700	5	KINABATANGAN	MY	12.11	-0.130	-0.560	4.32	1947	1947	0.00	0.00	0.03	0.05	0.247	0.864	3.50
295	5553100	5	PURARI	PG	8.95	-0.365	-1.331	3.64	1950	1950	0.00	0.00	0.11	0.17	0.238	0.814	3.43
296	5606100	5	BLACKWOOD RIVER	AU	6.42	-0.068	-0.202	2.95	1968	1970	0.00	0.01	0.85	0.85	0.011	-0.067	-6.31
300	5607450	5	FORTESCUE RIVER	AU	6.88	0.111	0.399	3.60	1959	1959	0.03	0.02	0.31	0.50	0.181	0.445	2.46
301	5607500	5	DE GREY RIVER	AU	7.92	0.144	0.536	3.72	1972	1965	0.04	0.01	0.29	0.26	0.414	0.981	2.37
306	5708110	5	VICTORIA RIVER	AU	6.26	0.221	0.664	3.01	1971	1964	0.02	0.05	0.05	0.11	0.541	1.304	2.41
307	5708145	5	DALY	AU	5.22	0.209	0.717	3.43	1973	1972	0.03	0.03	0.13	0.06	0.618	2.309	3.74
308	5709100	5	ROPER RIVER	AU	6.01	0.238	0.680	2.86	1973	1973	0.02	0.05	0.15	0.13	0.556	1.940	3.49
334	6401701	6	JOEKULSA A FJOELLU	IS	7.58	-0.116	-0.401	3.45	1937	1937	0.00	0.00	0.71	0.34	-0.013	-0.095	7.47
335	6401800	6	LAGARFLJOT	IS	8.59	-0.136	-0.533	3.92	1953	1953	0.00	0.00	0.00	0.00	0.310	0.889	2.86

339	6604650	6	SPEY	GB	6.58	0.126	0.433	3.44	1973	1973	0.00	0.00	0.69	0.98	-0.048	0.014	-0.29
344	6688600	6	KIZILIRMAK	TR	8.69	-0.062	-0.260	4.16	1925	1925	0.00	0.00	0.40	0.94	0.015	0.004	0.24
345	6730500	6	TANA (NO, FI)	NO	7.35	0.040	0.113	2.80	1963	1950	0.04	0.07	0.95	0.79	-0.002	0.031	-14.31
349	6854100	6	KOKEMAENJOKI	FI	5.95	0.037	0.186	5.03	1976	1968	0.18	0.05	0.80	0.45	-0.024	0.186	-7.89
355	6934100	6	SKJERN A	DK	7.27	0.096	0.309	3.21	1958	1930	0.00	0.02	0.58	0.17	0.051	0.202	3.96
356	6934250	6	GUDENA	DK	6.37	0.070	0.207	2.97	1931	1931	0.03	0.08	0.34	0.63	0.035	0.067	1.94
367	6972800	6	KEM	RU	6.03	-0.037	-0.127	3.45	1941	1941	0.11	0.11	0.66	0.44	-0.012	-0.062	4.99
376	6983350	6	KUBAN	RU	5.92	0.058	0.241	4.13	1959	1960	0.03	0.03	0.22	0.72	0.075	0.110	1.46

Table 5. Watersheds in which trends in factors related to temperature polarization have been identified at a significance level of 0.05.

Lp	GRDC_NO	WMO	RIVER	COUNTRY	P1	sen_SD	sen_POL	P2	LOC_SD	LOC_POL	pvalP_SD	pvalP_POL	pval_SD_n	pval_POL_n	sen_SD_n	sen_POL_n	sen_POL1_n
15	1389090	1	MANGOKY	MG	3.64	-0.00182	-0.00609	3.35	1947	1942	0.003	0.001	0.520	0.365	-0.00067	0.00288	-4.282
22	1445100	1	KOUILOU	CG	5.36	-0.00147	-0.00377	2.56	1983	1983	0.002	0.009	0.260	0.066	-0.00479	-0.01666	3.481
23	1526300	1	PRA	GH	6.35	0.00110	0.00282	2.57	1968	1971	0.054	0.204	0.900	0.898	-0.00020	-0.00152	7.721
25	1531700	1	VOLTA	GH	4.67	0.00217	0.00457	2.11	1968	1978	0.000	0.008	0.090	0.840	0.00413	-0.00260	-0.628
45	2178300	2	YONGDING HE	CN	3.51	-0.00502	-0.01150	2.29	1972	1972	0.008	0.005	0.981	0.200	0.00064	0.02979	46.785
46	2178400	2	DALINGHE	CN	3.42	-0.00639	-0.01860	2.91	1971	1970	0.000	0.003	0.522	0.745	-0.00509	-0.01123	2.207
47	2178500	2	LUAN HE	CN	3.44	-0.00508	-0.01284	2.53	1972	1969	0.002	0.004	0.753	0.965	-0.00311	-0.00066	0.211
48	2179100	2	LIAO HE	CN	3.47	-0.00728	-0.02015	2.77	1957	1970	0.000	0.001	0.107	0.991	-0.00856	-0.00164	0.192
56	2260500	2	IRRAWADDY	MM	3.37	-0.00151	-0.00117	0.78	1983	1983	0.009	0.298	0.119	0.061	-0.00827	-0.02844	3.439
58	2335950	2	INDUS	PK	3.34	-0.00278	-0.00842	3.03	1950	1973	0.007	0.045	0.076	0.227	-0.00378	-0.01879	4.970
69	2588700	2	KITAKAMI	JP	3.58	-0.00354	-0.00999	2.82	1952	1955	0.009	0.044	0.440	0.416	-0.00268	-0.01211	4.525

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72	2589700	2	MOGAMI	JP	3.59	-0.00401	-0.01224	3.05	1952	1952	0.004	0.020	0.472	0.333	-0.00263	-0.01563	5.947
75	2651100	2	BRAHMAPUTRA	BD	3.39	-0.00167	-0.00216	1.30	1983	1985	0.027	0.240	0.138	0.134	-0.01091	-0.02456	2.252
78	2846800	2	GANGES	IN	3.74	-0.00282	-0.00605	2.14	1962	1965	0.007	0.142	0.485	0.955	-0.00178	0.00090	-0.507
80	2853200	2	NARMADA	IN	4.00	-0.00224	-0.00510	2.28	1954	1962	0.056	0.101	0.496	0.924	-0.00182	0.00107	-0.592
81	2853300	2	TAPTI RIVER	IN	4.05	-0.00237	-0.00536	2.26	1975	1955	0.062	0.112	0.470	0.949	-0.00379	-0.00123	0.323
82	2854050	2	DAMODAR RIVER	IN	4.01	-0.00359	-0.00643	1.79	1962	1962	0.008	0.185	0.883	0.737	-0.00078	0.00390	-5.015
87	2855800	2	MAHANADI RIVER (MA	IN	4.38	-0.00502	-0.01388	2.76	1961	1955	0.000	0.000	0.150	0.109	-0.00447	-0.01622	3.629
88	2856900	2	GODAVARI	IN	4.29	-0.00261	-0.00681	2.61	1955	1955	0.015	0.040	0.425	0.772	-0.00198	-0.00316	1.600
92	2906900	2	AMUR	RU	3.42	-0.00732	-0.02556	3.49	1956	1954	0.000	0.000	0.425	0.250	-0.00359	-0.01835	5.117
97	2919200	2	URAL	KZ	3.87	-0.00675	-0.01437	2.13	1957	1977	0.011	0.312	0.474	0.700	-0.00676	0.01863	-2.754
114	3102500	3	ATRATO	CO	6.56	0.00144	0.00459	3.19	1939	1939	0.002	0.000	0.942	0.973	-0.00009	-0.00008	0.894
123	3206720	3	ORINOCO	VE	6.10	0.00167	0.00582	3.48	1957	1957	0.001	0.001	0.720	0.788	-0.00051	-0.00153	3.025
130	3308400	3	CUYUNI	GY	6.30	0.00139	0.00589	4.25	1983	1971	0.000	0.000	0.567	0.096	0.00272	0.01479	5.440
131	3308600	3	ESSEQUIBO	GY	6.04	0.00102	0.00337	3.30	1971	1971	0.043	0.011	0.173	0.159	0.00322	0.00913	2.837
150	3650335	3	RIO MEARIM	BR	5.66	0.00104	0.00398	3.83	1958	1958	0.048	0.004	0.777	0.112	-0.00045	-0.01061	23.601
152	3650481	3	RIO PARNAIBA	BR	5.65	0.00135	0.00529	3.92	1958	1958	0.010	0.001	0.730	0.921	0.00056	-0.00078	-1.389
156	3651900	3	SAO FRANCISCO	BR	5.24	0.00172	0.00636	3.69	1932	1932	0.033	0.011	0.383	0.097	0.00088	0.00511	5.782
157	3652039	3	RIO ITAPICURU	BR	4.22	0.00140	0.00456	3.27	1932	1933	0.031	0.043	0.629	0.296	0.00037	0.00216	5.855
158	3652050	3	RIO VAZA-BARRIS	BR	4.47	0.00129	0.00353	2.73	1933	1933	0.035	0.161	0.938	0.599	0.00008	0.00157	18.577
160	3652220	3	RIO DE CONTAS	BR	5.76	0.00218	0.00834	3.83	1930	1930	0.008	0.002	0.451	0.235	0.00086	0.00414	4.834
161	3652320	3	RIO PRADO	BR	5.23	0.00148	0.00478	3.22	1930	1930	0.068	0.035	0.582	0.880	0.00044	0.00055	1.247
162	3652455	3	JEQUITINHONHA	BR	4.52	0.00142	0.00533	3.74	1980	1937	0.078	0.054	0.395	0.385	0.00358	0.00300	0.839

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168	3843100	3	MIRA	EC	5.65	-0.00206	-0.00601	2.92	1977	1977	0.000	0.000	0.066	0.116	-0.00499	-0.01346	2.699
169	3844100	3	ESMERALDAS	EC	6.97	-0.00121	-0.00409	3.37	1970	1970	0.002	0.007	0.694	0.465	-0.00057	-0.00407	7.160
171	3844450	3	VINCES	EC	6.24	-0.00107	-0.00468	4.36	1962	1955	0.014	0.000	0.750	0.362	0.00065	-0.00279	-4.298
232	4209402	4	COPPERMINE RIVER	CA	3.45	-0.00750	-0.02014	2.69	1976	1976	0.016	0.087	0.495	0.650	-0.01386	-0.02472	1.784
233	4209600	4	ELLICE RIVER	CA	3.99	-0.00765	-0.02281	2.98	1976	1966	0.005	0.015	0.182	0.080	-0.01694	-0.05337	3.150
237	4214025	4	HAYES RIVER (TRIB.	CA	3.64	-0.00725	-0.01971	2.72	1976	1984	0.011	0.044	0.074	0.453	-0.03471	-0.05878	1.693
263	4243300	4	ST. MAURICE (RIVIE	CA	3.72	-0.00524	-0.00957	1.83	1924	1925	0.062	0.452	0.714	0.952	-0.00100	-0.00094	0.940
264	4243400	4	SAGUENAY (RIVIERE)	CA	3.67	-0.00438	-0.01094	2.50	1949	1935	0.155	0.447	0.817	0.644	0.00170	-0.00713	-4.183
272	4356080	4	SAN PEDRO	MX	4.32	0.00195	0.00451	2.32	1927	1979	0.170	0.879	0.529	0.661	0.00093	0.01016	10.943
295	5553100	5	PURARI	PG	6.38	-0.00328	-0.01081	3.30	1946	1946	0.000	0.000	0.180	0.412	0.00100	0.00191	1.905
301	5607500	5	DE GREY RIVER	AU	3.66	-0.00260	-0.00480	1.85	1939	1939	0.064	0.342	0.576	0.865	-0.00095	0.00070	-0.737
311	5865300	5	WAIKATO RIVER	NZ	4.05	0.00216	0.00933	4.32	1953	1953	0.044	0.004	0.737	0.851	-0.00090	-0.00160	1.781
333	6401601	6	SVARTA, SKAGAFIROI	IS	5.17	-0.00347	-0.01143	3.30	1920	1920	0.016	0.081	0.907	0.430	0.00019	-0.00539	-28.674

Statistical characteristics of monthly precipitation totals are presented in Table 2. It sequentially contains the following information: sequence number, GRDC code of the catchment, WMO (World Meteorological Organization) region code, river name, country code, catchment area [km²], then 12 columns of average monthly totals calculated for calendar months [mm], successively minimum value [mm], maximum value [mm] and standard deviation [mm].

The results of the analyses of trends and possible change points for the sequences of monthly precipitation totals are shown in Table 3. The following are included sequentially: sequence number, GRDC code of the catchment, WMO region code, river name, country code, P_1 measure, trend using TKM at 5% significance level for STD, trend using TKM at 5% significance level for RANGE, P_2 measure. , the year of the STD trend change, the year of the RANGE trend change, the significance probabilities for the STD and RANGE trend change point, the significance probabilities of the new STD and RANGE trend, the values of the new trends from the change point for STD and RANGE, and the value of the P_2 post-trend change polarization measure. Assuming a significance level of 5% only for the LAGARFLJOT river catchment located in Iceland, the change point of the trend in both RANGE and STD was shown, followed by the parameters of the new trend. The RANGE trend, changed not only the value but also the direction, from negative to positive, from a value of -0.136

changed to a value of 0.310 in 1953 and the STD trend from a value of -0.533 changed to a value of 0.889 also in 1953.

Based on the analysis of the data of monthly precipitation totals in the analyzed catchments, it should be noted that for 93/377 catchments, i.e. in 25% of the analyzed catchments, the trends of polarization factors (RANGE and STD) in the area of monthly precipitation totals were proved at the significance level of 5%. Analyzing the values (Table 3 and background of factors Table 2) of P_1 polarization factor trends sequentially in the 10 largest catchments with an area from 244000 - 2900000 km^2, showed (P_1/ c_v): NILE: 4.26/0.71, YENISEI: 4.25/0.64, YANGTZE RIVER: 5.28/ 0.66, GANGES: 3.81/1.24, HUANG HE: 6.11/1.01, BRAHMAPUTRA: 5.42/0.94, AMU DARYA: 5.10/0.83, EUPHRATES: 5.93/0.84, SENEGAL: 4.95/1.34, and URUGUAY: 7.15/1.34. The highest value of this assumed polarization index, among the 93 catchments, was obtained at 12.78 for the COPPER RIVER river catchment, the lowest at 3.81 for the GANGES river catchment.

Statistical characteristics of average monthly temperatures are presented in Table 4. It successively contains the following information: sequence number, GRDC code of the catchment, WMO (World Meteorological Organization) region code, river name, country code, catchment area [km^2], then 12 columns of average monthly temperatures calculated for calendar months [°C], successively minimum value [°C], maximum value [°C] and standard deviation [°C].

Table 4. Characteristics calculated based on monthly mean temperatures in analyzed watersheds in terms of temperature polarization.

Lp	GRDC_NO	WMO	RIVER	CNT	AREA	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	MIN	MAX	MEAN	STD	Cv
2	1147010	1	CONGO	CD	3475000	23.7	24.1	24.4	24.2	23.9	23.0	22.6	23.2	23.9	24.0	23.7	23.5	21.5	26.0	23.69	0.67	0.03
3	1159100	1	ORANGE	ZA	850530	24.2	23.5	21.5	18.0	13.9	10.6	10.3	12.8	16.4	19.7	21.6	23.5	7.8	26.3	18.01	4.97	0.28
4	1160580	1	GROOT-VIS	ZA	29745	20.8	20.6	18.9	16.0	12.7	9.9	9.4	11.4	13.6	15.8	17.8	19.8	7.5	22.6	15.56	4.02	0.26
5	1160880	1	TUGELA	ZA	28920	20.7	20.4	19.0	16.6	13.2	10.4	10.3	13.0	15.7	17.7	18.8	20.2	7.6	22.6	16.34	3.73	0.23
6	1286900	1	RUFIJI	TZ	158200	22.9	22.8	22.6	22.1	20.9	19.6	18.9	19.8	21.3	22.9	23.8	23.5	17.6	26.2	21.78	1.66	0.08
7	1289200	1	PANGANI	TZ	25110	22.5	22.8	22.5	21.6	20.0	18.8	18.0	18.5	19.8	21.1	22.0	22.3	16.1	24.9	20.83	1.77	0.09
8	1289450	1	RUVU	TZ	15190	26.8	26.8	26.6	25.5	24.4	22.8	22.2	22.8	23.8	25.0	26.1	26.9	20.7	28.5	24.99	1.75	0.07
9	1309700	1	SEBOU	MA	17250	7.0	8.2	10.3	12.6	15.6	19.9	23.9	24.3	20.7	16.1	11.0	7.9	4.2	27.0	14.81	6.08	0.41
10	1336500	1	CROSS	CM	6810	22.9	23.6	23.8	23.1	22.9	22.1	20.9	20.5	21.3	21.4	22.3	22.5	18.7	25.5	22.27	1.16	0.05
11	1338050	1	SANAGA	CM	131520	23.7	24.7	24.9	24.4	23.7	22.9	22.1	22.2	22.5	23.0	23.4	23.3	20.9	26.3	23.40	1.02	0.04
12	1339100	1	NYONG	CM	26400	23.9	24.6	24.8	24.5	24.2	23.4	22.6	22.6	23.1	23.4	23.7	23.8	21.1	26.2	23.70	0.87	0.04
13	1340500	1	NTEM	CM	18100	23.9	24.4	24.4	24.4	24.1	23.3	22.4	22.5	23.2	23.4	23.5	23.7	20.9	26.4	23.58	0.86	0.04
14	1362100	1	NILE	EG	2900000	21.9	23.1	25.2	27.0	27.8	27.5	26.4	26.1	26.4	26.1	24.2	22.2	19.4	29.5	25.32	2.08	0.08
15	1389090	1	MANGOKY	MG	53225	25.4	25.2	24.7	23.5	20.5	18.5	18.1	19.3	21.6	24.0	25.6	25.5	16.7	27.0	22.65	2.83	0.12
16	1389230	1	TSIRIBIHINA	MG	45000	23.3	23.1	22.9	22.0	19.6	17.7	17.1	18.2	20.2	22.3	23.3	23.2	15.8	24.9	21.07	2.37	0.11

18	1426380	1	BANDAMA	CI	95500	26.5	28.2	28.5	28.2	27.3	26.1	25.1	24.8	25.4	26.1	26.5	25.9	23.6	30.5	26.55	1.29	0.05
19	1427500	1	SASSANDRA	CI	62000	24.7	26.6	26.9	26.9	26.3	25.3	24.3	24.1	24.7	25.3	25.3	24.3	22.7	28.5	25.40	1.10	0.04
20	1427600	1	DAVO	CI	6600	26.0	27.2	27.2	27.2	26.6	25.6	24.7	24.5	25.1	25.9	26.1	25.7	23.4	28.7	25.96	1.02	0.04
21	1428500	1	COMOE	CI	69900	26.4	28.5	29.4	29.0	28.1	26.6	25.5	25.1	25.7	26.7	27.1	26.1	23.8	31.0	27.01	1.44	0.05
22	1445100	1	KOUILOU	CG	55010	24.7	25.2	25.5	25.5	24.8	22.7	21.5	22.1	23.4	24.6	24.7	24.6	19.8	27.4	24.11	1.42	0.06
23	1526300	1	PRA	GH	22714	26.1	27.2	27.4	27.3	26.9	25.7	24.8	24.4	25.2	25.9	26.4	26.1	22.3	29.4	26.11	1.13	0.04
24	1530100	1	TANO	GH	15800	26.0	27.2	27.4	27.1	26.6	25.3	24.4	24.0	24.7	25.5	26.1	25.9	22.1	29.4	25.85	1.18	0.05
25	1531700	1	VOLTA	GH	394100	26.1	28.4	30.3	30.7	29.7	27.7	26.3	25.7	26.2	27.6	27.6	26.2	24.1	32.2	27.70	1.75	0.06
26	1643100	1	OGOOUE	GA	205000	24.1	24.5	24.8	24.9	24.4	23.0	22.0	22.4	23.5	24.0	23.9	23.9	20.6	26.5	23.80	1.03	0.04
27	1644100	1	NYANGA	GA	20000	25.0	25.3	25.6	25.7	24.9	22.7	21.6	21.9	23.1	24.5	24.6	24.7	19.9	27.4	24.12	1.47	0.06
28	1732100	1	MONO	BJ	21575	26.3	27.9	28.2	27.7	26.9	25.5	24.5	24.3	24.9	25.7	26.6	26.1	23.2	29.9	26.22	1.35	0.05
29	1733600	1	OUEME	BJ	46990	27.0	28.6	29.1	28.6	27.5	26.1	25.0	24.5	25.1	26.1	27.0	26.6	23.6	30.5	26.78	1.53	0.06
30	1789300	1	TANA	KE	42220	22.7	23.7	24.2	23.8	23.0	21.8	21.0	21.3	22.4	23.4	23.1	22.3	19.8	26.0	22.72	1.12	0.05
31	1812100	1	SENEGAL	SN	268000	23.4	26.1	29.0	31.8	33.4	32.4	29.9	28.5	29.0	29.6	27.1	23.8	20.3	35.5	28.67	3.13	0.11
32	1813200	1	GAMBIA	SN	42000	25.2	27.7	30.1	31.8	31.5	29.0	26.8	26.1	26.3	27.1	26.4	24.8	21.5	33.5	27.73	2.35	0.08
33	1814070	1	GEBA	SN	7340	23.4	26.2	28.9	30.5	30.7	28.8	26.9	26.5	26.4	27.1	26.0	23.5	20.0	32.6	27.09	2.36	0.09
34	1815020	1	CORUBAL	SN	23840	24.1	26.1	28.1	29.3	28.7	27.0	25.5	25.2	25.4	25.8	25.3	23.6	20.7	30.9	26.18	1.79	0.07
37	1880100	1	JUBA	SO	179520	24.1	25.0	25.7	24.9	24.3	23.9	23.1	23.3	24.0	23.6	23.3	23.3	19.9	28.2	24.05	1.09	0.05
38	1891500	1	ZAMBEZI	MZ	940000	22.9	22.8	22.5	21.7	19.2	16.8	16.6	19.0	22.6	24.8	24.2	23.1	14.5	26.7	21.35	2.77	0.13
39	1894200	1	BUZI	MZ	26314	25.2	24.9	24.0	22.9	20.7	18.6	18.3	19.9	22.2	24.3	24.9	25.0	15.5	27.3	22.57	2.63	0.12
40	1895500	1	SAVE	MZ	100885	24.2	23.9	23.0	21.7	19.1	16.8	16.5	18.3	21.2	23.5	24.2	24.1	14.8	26.9	21.37	2.98	0.14
41	1896500	1	LIMPOPO	MZ	342000	24.3	23.8	22.6	20.2	16.9	14.1	13.9	16.4	20.0	22.7	23.5	24.1	11.6	27.2	20.21	3.89	0.19
42	1897500	1	INCOMATI	MZ	37600	22.9	22.6	21.6	19.8	16.9	14.5	14.3	16.2	18.7	20.7	21.4	22.5	11.9	25.4	19.34	3.14	0.16
43	1899100	1	MAPUTO	MZ	28500	21.6	21.5	20.4	18.4	15.7	13.2	13.1	15.0	17.3	19.2	20.1	21.2	10.3	23.7	18.06	3.12	0.17
44	1992900	1	SHIRE	MW	149500	23.0	22.8	22.6	21.9	20.1	18.0	17.7	19.0	21.4	24.0	24.6	23.6	15.4	26.9	21.55	2.38	0.11
45	2178300	2	YONGDING HE	CN	42500	-11.6	-8.3	-0.9	7.3	14.3	19.1	21.3	19.6	14.1	6.8	-2.5	-9.7	-16.1	24.8	5.79	11.68	2.02

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46	2178400	2	DALINGHE	CN	17687	-11.9	-7.8	-0.4	9.3	16.3	21.3	23.9	22.9	16.6	9.3	-0.7	-8.9	-16.2	26.9	7.48	12.58	1.68
47	2178500	2	LUAN HE	CN	44100	-13.9	-10.0	-2.7	6.9	13.5	18.6	21.1	19.7	13.7	6.3	-3.3	-11.4	-17.8	24.5	4.87	12.31	2.53
48	2179100	2	LIAO HE	CN	120764	-14.9	-11.2	-2.8	7.1	14.1	19.8	22.8	21.2	14.6	6.9	-3.5	-12.2	-20.3	25.7	5.15	13.24	2.57
49	2180800	2	HUANG HE (YELLOW R	CN	730036	-9.3	-5.5	0.9	7.5	13.2	17.4	19.5	18.2	13.1	6.8	-1.2	-7.7	-14.4	21.4	6.07	10.04	1.66
50	2181900	2	YANGTZE RIVER (CHA	CN	1705383	0.3	2.3	6.6	11.6	16.0	19.0	21.3	20.9	17.3	12.3	6.6	1.8	-2.4	23.0	11.34	7.40	0.65
51	2181950	2	HUAI HE	CN	121330	1.5	3.4	8.5	15.3	20.7	25.3	27.6	26.8	22.0	16.4	9.6	3.4	-3.0	31.0	15.05	9.25	0.61
52	2186800	2	XI JIANG	CN	329705	9.8	11.3	15.1	19.5	22.8	24.5	25.3	25.0	23.3	19.7	15.3	11.3	5.9	26.6	18.56	5.66	0.31
53	2186901	2	BEI JIANG	CN	38363	9.1	10.8	14.0	18.9	23.5	25.8	27.6	27.3	25.4	20.9	15.8	11.1	4.8	29.6	19.19	6.66	0.35
55	2260100	2	CHINDWIN RIVER	MM	27420	12.4	14.3	17.8	20.4	22.9	24.0	24.3	24.3	23.9	21.7	17.9	13.2	10.9	25.8	19.76	4.38	0.22
56	2260500	2	IRRAWADDY	MM	117900	10.7	12.6	16.1	19.1	21.3	21.9	22.0	21.8	21.6	19.3	15.6	11.6	9.3	23.4	17.79	4.19	0.24
57	2261500	2	SITTANG RIVER	MM	14660	20.3	22.5	26.2	29.1	28.1	26.1	25.7	25.5	25.9	25.7	23.6	20.5	18.0	31.9	24.93	2.69	0.11
58	2335950	2	INDUS	PK	832418	4.4	7.0	12.2	17.9	22.9	25.8	25.5	24.4	22.2	17.5	11.4	6.3	1.7	27.3	16.46	7.65	0.47
61	2423450	2	KARKHEH	IR	45882	3.7	4.7	8.4	12.8	18.2	24.1	28.2	28.2	24.3	18.6	12.3	6.7	-3.6	30.2	15.86	8.74	0.55
62	2423500	2	KARUN	IR	60769	2.6	4.6	8.6	13.6	19.5	24.9	28.1	27.6	23.9	18.1	11.5	5.4	-3.1	30.5	15.69	8.95	0.57
63	2569005	2	MEKONG	KH	635000	15.1	17.2	20.1	22.3	23.2	23.5	23.4	23.0	22.3	20.6	17.9	15.3	12.5	24.8	20.33	3.09	0.15
65	2588200	2	YODO	JP	7281	2.2	2.6	5.6	11.3	16.1	20.3	24.9	25.8	21.9	15.6	9.9	4.9	-0.5	28.1	13.43	8.29	0.62
66	2588301	2	KISO	JP	4683.8	-1.7	-0.8	2.8	9.2	13.9	18.2	22.5	23.3	19.4	12.8	6.8	1.4	-4.7	25.2	10.65	8.73	0.82
67	2588320	2	TENRYU	JP	4880	-3.3	-2.1	1.4	7.4	12.1	16.1	20.5	20.9	17.1	11.0	5.3	0.0	-6.3	23.2	8.86	8.40	0.95
68	2588551	2	TONE	JP	12458	0.3	1.0	4.3	10.3	15.0	19.0	23.4	24.2	20.6	14.2	8.5	3.1	-2.8	26.6	11.98	8.38	0.70
69	2588700	2	KITAKAMI	JP	7869.4	-3.7	-2.9	0.8	7.2	12.7	17.1	21.6	22.9	18.3	11.6	5.5	-0.5	-7.3	25.7	9.23	9.21	1.00
72	2589700	2	MOGAMI	JP	6270.9	-2.0	-1.5	1.6	8.1	13.9	18.5	22.9	24.1	19.4	12.7	6.6	1.0	-5.9	27.0	10.45	9.16	0.88
73	2595400	2	EUPHRATES	IQ	274100	3.2	5.2	9.4	15.2	20.6	25.4	28.9	28.6	24.5	18.4	11.2	5.3	-1.6	32.0	16.33	9.12	0.56
74	2595700	2	TIGRIS	IQ	134000	2.8	4.4	8.5	13.9	19.9	25.5	29.5	29.4	25.0	18.6	11.2	5.2	-2.6	32.1	16.17	9.54	0.59
75	2651100	2	BRAHMAPUTRA	BD	636130	0.2	2.2	5.8	9.0	12.0	14.6	15.1	14.8	13.5	9.8	5.0	1.2	-1.7	16.5	8.60	5.38	0.63
78	2846800	2	GANGES	IN	835000	12.7	15.2	20.2	25.3	28.5	28.4	25.7	24.9	24.6	22.1	17.4	13.6	10.3	30.8	21.56	5.47	0.25

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79	2853150	2	MAHI RIVER	IN	33670	19.1	21.7	26.4	30.7	33.2	31.5	27.9	26.7	27.2	26.8	22.9	20.2	16.7	35.7	26.18	4.37	0.17
80	2853200	2	NARMADA	IN	89345	18.7	21.0	25.7	30.3	33.2	30.9	26.8	25.9	26.2	25.2	21.4	18.6	16.3	34.8	25.31	4.63	0.18
81	2853300	2	TAPTI RIVER	IN	61575	20.9	23.1	27.3	31.3	33.2	30.5	27.0	26.2	26.4	26.1	22.3	20.5	18.7	34.8	26.24	3.97	0.15
82	2854050	2	DAMODAR RIVER	IN	19220	17.3	20.1	25.5	30.2	31.9	30.4	27.7	27.4	27.3	25.4	21.1	17.8	14.8	34.2	25.18	4.84	0.19
84	2854300	2	KRISHNA	IN	251355	22.9	24.9	28.0	30.1	30.5	27.6	25.7	25.3	25.5	25.6	23.6	22.2	20.5	31.9	25.99	2.58	0.10
85	2854500	2	PENNER RIVER	IN	53290	23.4	25.8	28.9	31.2	31.7	29.5	28.0	27.4	27.2	26.5	24.4	22.9	21.5	33.2	27.24	2.78	0.10
86	2854800	2	CAUVERY RIVER	IN	74004	22.1	24.0	26.2	27.6	27.3	25.4	24.6	24.5	24.4	24.3	23.1	22.0	20.7	28.9	24.63	1.78	0.07
87	2855800	2	MAHANADI RIVER (MA	IN	132090	19.7	22.5	26.9	31.1	34.0	31.2	27.1	26.8	27.0	25.7	21.7	19.1	16.8	36.7	26.07	4.53	0.17
88	2856900	2	GODAVARI	IN	299320	21.1	23.6	27.6	31.1	33.2	30.2	26.6	26.1	26.2	25.6	22.3	20.3	18.6	35.3	26.16	3.89	0.15
89	2901202	2	ANADYR	RU	156000	-26.3	-26.2	-23.5	-15.3	-3.9	6.7	10.0	7.8	2.0	-8.2	-17.9	-24.2	-38.6	13.0	-9.92	13.84	-1.40
90	2902850	2	KAMCHATKA	RU	51600	-19.8	-17.1	-12.4	-5.2	1.7	8.0	11.7	10.8	5.7	-1.3	-10.3	-17.2	-27.6	14.9	-3.77	11.19	-2.96
91	2903420	2	LENA	RU	2430000	-36.3	-31.5	-20.7	-8.1	2.9	11.8	15.3	11.8	3.8	-8.7	-25.3	-34.2	-44.5	18.1	-9.93	18.48	-1.86
92	2906900	2	AMUR	RU	1730000	-25.1	-20.4	-10.7	1.2	9.4	15.9	19.1	17.1	10.0	0.5	-12.7	-22.8	-32.2	21.4	-1.56	15.67	-10.07
93	2909150	2	YENISEI	RU	2440000	-27.7	-24.4	-14.8	-4.4	4.2	12.0	15.4	12.3	5.3	-4.4	-17.2	-25.4	-36.2	18.8	-5.75	15.32	-2.66
94	2912600	2	OB	RU	2949998	-19.0	-17.5	-9.9	0.3	8.4	15.2	17.9	14.9	8.9	0.3	-9.6	-16.6	-30.1	20.7	-0.59	13.30	-22.69
96	2917100	2	AMU DARYA	UZ	450000	-6.0	-3.7	1.9	8.9	14.4	19.2	21.8	20.4	15.0	8.2	1.7	-3.6	-13.5	24.2	8.17	9.72	1.19
97	2919200	2	URAL	KZ	190000	-14.7	-14.4	-7.7	5.1	13.9	19.0	21.0	18.9	12.5	3.7	-4.6	-11.5	-25.7	25.8	3.44	13.30	3.87
99	2964998	2	MAE KLONG	TH	26449	22.3	24.4	26.3	27.5	26.5	25.5	25.0	24.8	24.8	24.5	23.3	21.7	19.1	29.5	24.72	1.77	0.07
100	2998110	2	YANA	RU	224000	-44.7	-41.1	-30.3	-15.8	-1.1	9.1	12.0	8.3	0.1	-16.0	-34.8	-41.8	-51.5	17.0	-16.34	20.91	-1.28
101	2998150	2	OMOLOY	RU	10800	-47.3	-43.3	-31.5	-16.4	-1.9	8.7	11.6	7.6	-0.7	-16.9	-36.9	-44.2	-54.7	17.2	-17.61	21.63	-1.23
102	2998400	2	INDIGIRKA	RU	305000	-43.8	-40.5	-30.3	-16.1	-1.0	9.5	12.1	8.6	0.4	-15.8	-33.6	-41.6	-50.1	17.3	-16.00	20.71	-1.29

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103	2998450	2	ALAZEYA	RU	29000	-37.7	-35.2	-27.4	-15.6	-0.9	10.7	13.2	9.5	2.5	-11.7	-27.3	-35.1	-44.4	18.9	-12.92	18.75	-1.45
104	2998510	2	KOLYMA	RU	526000	-37.5	-34.3	-26.3	-13.9	0.3	10.4	12.9	9.4	2.0	-12.5	-28.1	-35.6	-44.4	17.9	-12.77	18.61	-1.46
105	2998702	2	ANYUY (TRIB. KOLYM	RU	30000	-35.0	-33.9	-28.4	-18.3	-4.0	7.7	10.4	7.0	-0.2	-13.9	-27.1	-33.4	-47.1	15.1	-14.09	17.16	-1.22
106	2998720	2	BOL. ANYUY (TRIB.	RU	49600	-35.4	-34.0	-27.6	-16.8	-2.4	8.8	11.1	7.8	0.7	-12.9	-26.6	-33.4	-47.0	16.0	-13.39	17.49	-1.31
107	2998800	2	PALYAVAAM	RU	6810	-26.2	-26.4	-25.3	-17.3	-8.9	0.9	3.7	3.6	-0.1	-7.0	-15.9	-22.6	-34.8	8.7	-11.79	11.77	-1.00
108	2999150	2	ANABAR	RU	78800	-38.5	-35.4	-27.3	-16.0	-4.5	7.7	12.7	8.8	1.2	-13.3	-30.0	-35.6	-47.9	17.8	-14.19	18.49	-1.30
109	2999200	2	NADYM	RU	48000	-23.7	-22.7	-14.8	-7.5	0.2	10.3	15.8	12.2	6.1	-4.1	-14.8	-21.0	-34.2	20.4	-5.33	14.03	-2.63
110	2999250	2	TAZ	RU	100000	-26.0	-24.3	-16.6	-8.2	0.2	10.6	16.0	12.3	5.7	-5.4	-17.7	-24.1	-39.5	20.1	-6.46	15.08	-2.33
111	2999500	2	PUR	RU	95100	-24.5	-23.3	-16.0	-8.3	-0.1	10.5	16.0	12.4	6.0	-4.4	-16.2	-22.4	-37.1	20.1	-5.87	14.53	-2.48
112	2999850	2	KHATANGA	RU	275000	-36.0	-33.9	-26.9	-16.4	-5.9	5.0	11.7	8.6	0.8	-13.3	-27.8	-32.7	-46.1	16.3	-13.90	17.18	-1.24
113	2999910	2	OLENEK	RU	198000	-39.1	-35.5	-26.1	-14.6	-2.9	8.5	13.1	9.3	1.7	-12.5	-29.8	-35.9	-48.7	17.7	-13.64	18.77	-1.38
114	3102500	3	ATRATO	CO	9432	24.6	24.9	25.1	25.0	24.9	24.8	24.5	24.7	24.5	24.3	24.4	24.4	22.6	27.3	24.67	0.72	0.03
115	3103300	3	MAGDALENA	CO	257438	22.7	23.0	23.1	23.1	23.0	22.9	22.9	22.9	22.8	22.5	22.2	22.4	20.6	24.9	22.79	0.69	0.03
119	3178900	3	HUASCO	CL	7187	2.8	2.8	1.2	-1.2	-3.1	-4.9	-5.2	-4.4	-3.2	-1.6	-0.3	1.8	-7.5	5.4	-1.27	2.94	-2.31
122	3181500	3	BAKER	CL	23736	13.2	13.0	11.2	8.6	5.9	4.0	3.6	4.2	6.2	8.3	10.1	12.1	-1.4	17.6	8.36	3.60	0.43
123	3206720	3	ORINOCO	VE	836000	24.9	25.5	25.8	25.3	24.7	24.0	23.7	24.1	24.5	24.8	24.9	24.8	22.1	27.7	24.75	0.92	0.04
124	3258200	3	SALADO	AR	29000	23.7	22.5	19.9	16.0	12.1	8.7	8.4	10.0	13.1	16.3	19.8	22.4	4.7	26.0	16.08	5.47	0.34
125	3265601	3	PARANA	AR	2346000	25.0	24.6	23.7	21.4	18.7	16.9	16.6	18.5	20.7	22.5	23.7	24.7	13.1	26.4	21.43	3.10	0.14
126	3275750	3	COLORADO (ARGENTIN	AR	223000	19.8	18.6	15.8	11.6	7.7	4.4	4.1	6.0	9.0	12.6	15.9	18.8	1.3	21.5	12.03	5.61	0.47
127	3275990	3	NEGRO (ARGENTINIA)	AR	95000	18.1	17.0	14.0	9.9	6.3	3.5	2.9	4.2	6.9	10.4	13.7	16.6	0.1	20.4	10.30	5.38	0.52
128	3276200	3	CHUBUT	AR	16400	14.7	14.1	11.7	7.9	4.4	1.4	0.9	2.6	5.1	7.9	10.8	13.3	-4.5	17.8	7.90	4.91	0.62

129	3276800	3	SANTA CRUZ	AR	15550	9.1	8.6	6.5	3.8	0.1	-2.2	-2.6	-1.3	1.1	4.0	6.2	8.0	-6.1	11.5	3.46	4.25	1.23
130	3308400	3	CUYUNI	GY	53400	24.2	24.4	24.9	25.5	25.4	24.9	24.8	25.4	25.8	25.8	25.4	24.5	22.6	27.9	25.08	0.83	0.03
131	3308600	3	ESSEQUIBO	GY	66600	25.6	25.6	25.9	25.9	25.7	25.5	25.7	26.3	27.0	27.3	27.0	25.9	24.1	28.8	26.10	0.77	0.03
132	3410500	3	CORANTIJN	SR	51600	25.7	25.8	26.0	26.3	26.1	26.0	26.2	26.8	27.6	28.0	27.4	26.5	24.6	29.3	26.52	0.86	0.03
133	3411300	3	COPPENAME	SR	12300	25.1	25.2	25.5	25.7	25.7	25.6	25.8	26.5	27.1	27.4	26.9	25.8	23.9	28.8	26.02	0.86	0.03
134	3412800	3	MARONI	SR	63700	24.9	25.0	25.2	25.6	25.5	25.4	25.5	26.1	26.5	26.8	26.5	25.6	23.6	28.6	25.72	0.78	0.03
135	3469050	3	URUGUAY	UY	244000	23.9	23.3	21.8	18.4	15.3	13.3	12.8	14.1	15.9	18.1	20.6	22.9	9.6	25.6	18.35	4.07	0.22
136	3469100	3	NEGRO (URUGUAY)	UY	63000	23.8	23.0	21.3	17.4	13.8	11.3	11.0	12.3	14.0	16.7	19.6	22.2	7.2	26.0	17.20	4.66	0.27
137	3514800	3	OYAPOCK	GF	25120	24.5	24.4	24.6	24.9	24.8	24.8	24.9	25.4	25.8	26.0	25.8	25.0	23.0	29.0	25.07	0.80	0.03
138	3629000	3	AMAZONAS	BR	4640300	25.1	25.0	25.0	24.8	24.3	23.8	23.7	24.6	25.3	25.6	25.5	25.3	22.4	26.9	24.84	0.76	0.03
139	3629150	3	RIO TAPAJOS	BR	358657	24.8	25.0	24.9	24.9	24.7	24.3	24.0	24.8	25.4	25.5	25.2	25.0	21.7	28.0	24.89	0.87	0.03
140	3629204	3	RIO JAMANXIM	BR	40400	25.6	25.6	25.9	26.1	26.3	26.0	25.9	26.8	26.8	26.5	26.3	25.8	24.3	29.5	26.14	0.75	0.03
141	3630050	3	XINGU	BR	446570	24.6	24.6	24.7	24.7	24.4	23.8	23.8	24.7	25.3	25.2	25.0	24.8	22.0	27.6	24.63	0.76	0.03
142	3630300	3	RIO MAICURU	BR	17072	24.7	24.3	24.3	24.5	24.5	24.4	24.4	25.2	25.8	26.2	26.0	25.4	22.8	28.2	24.98	0.86	0.03
143	3631050	3	RIO ARAGUARI	BR	23373	24.8	24.6	24.7	24.9	25.0	25.3	25.5	26.1	26.6	26.8	26.6	25.8	23.2	28.9	25.58	0.94	0.04
144	3631100	3	RIO JARI	BR	51343	25.2	25.0	25.1	25.4	25.4	25.5	25.6	26.2	26.7	26.9	26.8	26.1	23.6	28.7	25.81	0.84	0.03
145	3631210	3	RIO PARU DE ESTE	BR	30945	25.2	25.0	25.1	25.3	25.3	25.4	25.4	26.0	26.6	27.1	26.8	26.0	23.7	28.7	25.77	0.86	0.03
146	3649950	3	TOCANTINS	BR	742300	24.5	24.4	24.4	24.5	24.0	23.2	23.1	24.5	25.7	25.5	24.9	24.5	21.0	28.3	24.43	1.00	0.04
147	3650150	3	RIO CAPIM	BR	38178	25.8	25.6	25.7	26.0	26.3	26.3	26.3	26.8	27.0	27.1	26.9	26.4	24.1	28.8	26.36	0.71	0.03
148	3650202	3	RIO GURUPI	BR	31850	25.4	25.2	25.1	25.2	25.4	25.2	25.1	25.7	26.2	26.3	26.3	26.0	23.6	27.8	25.58	0.70	0.03
149	3650285	3	RIO PINDARE	BR	34300	25.4	25.3	25.3	25.5	25.5	25.1	25.0	25.9	26.9	26.8	26.5	26.0	23.7	28.7	25.76	0.85	0.03
150	3650335	3	RIO MEARIM	BR	25500	25.2	25.0	25.0	25.1	25.0	24.6	24.5	25.7	27.0	27.0	26.6	26.0	22.9	29.0	25.55	1.07	0.04
151	3650359	3	RIO ITAPECURU	BR	50800	25.4	25.0	25.0	25.1	25.2	24.9	24.7	25.9	27.4	27.1	26.6	26.3	22.6	29.2	25.71	1.06	0.04
152	3650481	3	RIO PARNAIBA	BR	322823	25.4	25.2	25.1	25.2	25.1	24.7	24.7	25.8	27.2	27.3	26.7	26.0	23.2	29.2	25.71	1.06	0.04
153	3650525	3	RIO ACARAU	BR	11160	26.0	25.3	24.6	24.5	24.5	24.5	24.6	25.2	25.8	26.1	26.3	26.4	22.8	27.6	25.31	1.00	0.04
154	3650649	3	RIO JAGUARIBE	BR	48200	26.8	25.9	25.2	24.9	24.6	24.2	24.3	25.2	26.3	27.0	27.3	27.3	22.2	28.7	25.75	1.31	0.05
155	3650885	3	RIO PARAIBA	BR	19244	25.0	24.8	24.7	24.1	23.1	22.0	21.2	21.4	22.6	23.8	24.5	24.8	19.8	26.6	23.50	1.44	0.06

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156	3651900	3	SAO FRANCISCO	BR	622600	24.4	24.4	24.2	23.7	22.4	21.1	20.7	21.9	23.8	24.8	24.5	24.3	19.2	27.1	23.35	1.52	0.07
157	3652039	3	RIO ITAPICURU	BR	35150	25.3	25.3	25.1	24.4	23.0	21.6	20.6	21.0	22.5	24.3	25.0	25.4	19.5	27.2	23.63	1.83	0.08
158	3652050	3	RIO VAZA-BARRIS	BR	15740	25.7	25.7	25.6	24.9	23.5	22.1	21.2	21.5	22.9	24.6	25.5	25.8	19.9	28.0	24.07	1.80	0.07
160	3652220	3	RIO DE CONTAS	BR	42245	24.2	24.4	24.1	23.5	22.2	21.2	20.4	21.2	22.9	24.1	23.6	24.1	18.8	27.8	22.99	1.56	0.07
161	3652320	3	RIO PRADO	BR	30360	23.7	23.8	23.4	22.6	21.0	19.8	19.0	20.2	21.6	22.9	22.8	23.4	17.7	26.8	22.02	1.74	0.08
162	3652455	3	JEQUITINHONHA	BR	67769	23.5	23.6	23.2	22.2	20.4	19.0	18.4	19.6	21.5	22.9	22.7	23.1	17.0	25.7	21.67	1.93	0.09
163	3652500	3	MUCURI	BR	14174	24.7	24.6	24.4	23.2	21.4	19.8	19.0	19.8	21.7	23.3	23.7	24.3	17.5	26.6	22.48	2.11	0.09
164	3652600	3	RIO DOCE	BR	78456	23.2	23.2	22.9	21.4	19.3	17.9	17.1	18.2	19.9	21.4	22.0	22.6	15.4	25.3	20.77	2.26	0.11
166	3653120	3	RIO RIBEIRA DO IGU	BR	12450	21.7	21.7	21.0	19.0	16.1	14.8	14.2	15.3	16.5	17.9	19.6	21.0	10.6	24.2	18.23	2.91	0.16
168	3843100	3	MIRA	EC	4960	17.1	16.9	17.4	17.4	17.5	16.9	16.1	15.9	16.8	17.2	17.2	17.4	14.1	23.9	16.99	1.73	0.10
169	3844100	3	ESMERALDAS	EC	18800	18.2	18.4	18.6	18.6	18.5	17.9	17.7	17.7	17.9	17.9	17.9	18.1	15.1	20.3	18.11	0.75	0.04
170	3844400	3	DAULE	EC	8690	25.1	25.4	25.6	25.7	25.1	24.2	23.7	23.6	23.9	24.1	24.2	24.8	20.7	27.5	24.62	1.02	0.04
171	3844450	3	VINCES	EC	4400	23.4	23.7	23.9	24.0	23.5	22.5	22.0	22.2	22.6	22.7	22.9	23.3	20.0	25.8	23.06	0.93	0.04
174	3948800	3	CANETE	PE	4900	8.7	8.9	8.7	8.0	6.4	5.2	4.7	5.1	6.0	6.9	7.4	7.9	2.7	12.3	6.99	1.64	0.23
176	4101500	4	COLVILLE RIVER	US	53535.3	-28.2	-27.4	-25.3	-15.5	-2.8	7.7	10.5	7.0	0.0	-11.6	-21.6	-26.7	-40.0	13.5	-11.15	14.66	-1.31
177	4101800	4	NOATAK RIVER	US	31080	-25.9	-23.4	-21.3	-12.0	0.0	9.0	10.8	7.5	1.1	-9.5	-19.3	-23.6	-38.7	14.7	-8.89	13.71	-1.54
178	4101900	4	KOBUK RIVER	US	24656.8	-24.8	-22.7	-19.0	-9.9	2.1	10.5	12.2	9.1	2.9	-8.0	-18.3	-23.4	-37.7	14.9	-7.44	14.02	-1.88
179	4102100	4	KUSKOKWIM RIVER	US	80549	-19.2	-15.0	-11.3	-2.6	5.4	11.2	12.8	10.6	5.3	-3.9	-13.1	-17.9	-29.8	15.3	-3.16	11.84	-3.75
180	4102710	4	COPPER RIVER	US	62678	-21.8	-17.2	-12.6	-4.7	2.1	7.1	8.9	7.1	2.1	-5.8	-15.8	-20.2	-33.9	12.9	-5.91	11.19	-1.89
181	4102740	4	NUSHAGAK RIVER	US	25511.5	-12.9	-10.5	-8.4	-1.9	4.8	10.0	11.9	10.9	6.6	-0.8	-7.6	-11.9	-23.3	14.8	-0.81	9.44	-11.67
182	4102800	4	SUSITNA RIVER	US	50246	-17.2	-14.2	-10.8	-3.7	3.5	9.1	10.9	9.0	3.9	-4.4	-12.6	-16.2	-28.3	14.3	-3.57	10.44	-2.92
183	4103200	4	YUKON RIVER	US	831390	-24.9	-21.0	-15.7	-5.5	4.3	11.2	12.7	9.8	3.6	-6.3	-17.7	-22.7	-37.4	14.9	-6.02	13.80	-2.29
184	4115201	4	COLUMBIA RIVER	US	665371	-5.1	-2.8	0.8	5.0	9.3	13.2	17.4	16.7	12.1	6.2	-0.2	-4.4	-13.8	20.5	5.68	7.90	1.39

185	4126700	4	OUACHITA RIVER	US	39621.8	6.3	8.1	12.5	17.2	21.4	25.6	27.4	27.1	23.8	17.7	11.8	7.2	0.2	30.2	17.17	7.74	0.45
186	4126800	4	RED RIVER	US	174825	5.1	7.2	11.7	16.6	21.0	25.6	27.8	27.5	23.5	17.5	11.0	6.1	-1.0	30.7	16.72	8.24	0.49
187	4127800	4	MISSISSIPPI RIVER	US	2964255	-4.2	-2.2	3.1	9.5	15.0	20.0	23.0	22.1	17.4	11.0	3.5	-2.4	-11.0	26.5	9.64	9.67	1.00
188	4145081	4	SKAGIT RIVER	US	7088.8	-3.8	-2.1	0.1	3.5	7.1	10.0	13.3	13.3	10.2	4.8	-0.4	-3.4	-12.5	17.0	4.38	6.27	1.43
189	4145900	4	ROGUE RIVER	US	10202	2.2	3.8	5.4	7.7	11.2	14.6	18.6	18.3	15.3	10.3	5.1	2.2	-3.5	21.5	9.55	5.95	0.62
191	4146180	4	EEL RIVER (CALIF.)	US	8062.7	5.1	6.6	8.1	10.3	13.4	16.8	20.6	20.1	17.8	13.4	8.4	5.4	1.1	22.7	12.16	5.55	0.46
192	4146280	4	SACRAMENTO RIVER	US	60885.7	3.2	4.7	6.7	9.3	13.5	17.6	21.5	20.7	17.8	12.7	7.0	3.3	-3.1	24.1	11.49	6.60	0.57
193	4146360	4	SAN JOAQUIN RIVER	US	35058.2	5.8	7.4	9.4	11.9	15.9	20.0	23.5	22.8	20.1	15.2	9.7	5.9	0.7	26.9	13.96	6.39	0.46
194	4146400	4	SALINAS RIVER	US	10764	8.2	9.3	10.9	12.7	15.6	18.7	21.2	21.0	19.3	15.8	11.4	8.3	3.6	23.9	14.35	4.83	0.34
195	4147011	4	PENOBSCOT RIVER	US	19463.9	-10.9	-9.8	-3.7	3.5	10.4	15.8	18.8	17.6	13.0	6.9	0.3	-7.3	-16.9	21.7	4.56	10.50	2.30
196	4147060	4	ST. CROIX RIVER	US	3558.7	-9.5	-8.4	-2.6	4.2	10.7	15.8	18.9	18.0	13.4	7.3	1.3	-6.0	-15.4	22.3	5.24	10.03	1.91
197	4147380	4	MERRIMACK RIVER	US	12004.7	-6.2	-5.5	-0.2	6.4	12.7	17.7	20.5	19.3	15.0	9.0	2.9	-3.8	-11.8	22.9	7.31	9.55	1.31
198	4147460	4	CONNECTICUT RIVER	US	25019.4	-8.4	-7.5	-1.8	5.1	11.7	16.6	19.3	18.1	13.9	7.7	1.4	-5.5	-14.4	21.7	5.88	9.90	1.68
199	4147500	4	HUDSON RIVER	US	20953	-7.2	-6.8	-1.2	5.9	12.6	17.4	19.9	18.8	14.8	8.6	2.3	-4.5	-13.7	22.8	6.71	9.86	1.47
200	4147600	4	DELAWARE RIVER	US	17560.2	-4.4	-3.9	1.3	7.5	13.6	18.4	20.9	19.8	16.0	9.9	3.8	-2.3	-10.5	23.7	8.40	9.16	1.09
201	4147703	4	SUSQUEHANNA RIVER	US	70189	-3.9	-3.3	1.7	8.1	14.0	18.7	21.1	20.2	16.4	10.2	4.1	-1.9	-10.3	23.8	8.79	9.13	1.04
202	4147900	4	POTOMAC RIVER	US	29940.4	-0.8	0.1	5.0	10.6	15.8	20.3	22.5	21.7	18.1	11.9	6.1	0.6	-7.6	24.9	11.00	8.50	0.77
203	4148050	4	JAMES RIVER	US	17503.2	0.9	2.0	6.6	11.9	16.7	21.0	23.1	22.4	18.8	12.7	7.0	2.1	-5.6	25.4	12.10	8.11	0.67
204	4148090	4	ROANOKE RIVER	US	21714.6	3.1	4.1	8.6	13.7	18.5	22.7	24.7	24.0	20.5	14.4	8.9	4.1	-3.4	26.8	13.96	7.94	0.57
205	4148232	4	CAPE FEAR RIVER	US	13610.5	5.5	6.5	10.9	15.8	20.2	24.3	26.0	25.4	22.3	16.3	10.8	6.4	-1.0	28.1	15.86	7.58	0.48
206	4148300	4	PEE DEE RIVER	US	22869.7	4.9	6.1	10.6	15.3	19.8	23.9	25.5	25.0	21.8	15.9	10.4	5.9	-1.5	28.0	15.42	7.60	0.49
207	4148550	4	SANTEE RIVER	US	38073	5.8	6.9	11.1	15.7	20.3	24.2	25.8	25.2	22.2	16.3	10.7	6.4	-0.4	28.4	15.86	7.45	0.47
208	4148650	4	SAVANNAH RIVER	US	25511.5	6.7	8.0	12.0	16.5	21.0	24.8	26.3	25.8	22.9	17.0	11.6	7.4	0.3	28.8	16.66	7.30	0.44
209	4148720	4	ALTAMAHA RIVER	US	35224	8.2	9.5	13.6	17.6	22.0	25.7	27.0	26.6	24.0	18.3	12.9	8.9	1.8	29.3	17.86	7.03	0.39
211	4149120	4	PEARL RIVER	US	17024.1	8.4	9.9	14.0	18.0	22.0	25.7	27.0	26.8	24.2	18.4	13.0	9.2	0.7	28.8	18.06	6.98	0.39
212	4149400	4	ALABAMA RIVER	US	56894.5	6.7	8.2	12.3	16.7	21.0	24.8	26.2	26.0	23.2	17.1	11.5	7.5	-0.4	28.7	16.76	7.30	0.44

213	4149413	4	TOMBIGBEE RIVER	US	47700	6.7	8.2	12.5	16.9	21.3	25.3	26.8	26.5	23.6	17.4	11.7	7.5	-1.0	29.5	17.03	7.51	0.44
215	4149781	4	SUWANNEE RIVER	US	24320.1	11.4	12.7	16.1	19.5	23.4	26.3	27.3	27.1	25.3	20.5	15.5	12.0	5.6	28.8	19.76	6.03	0.31
216	4150283	4	NUECES RIVER	US	43822.8	11.4	13.4	17.4	21.5	25.0	28.1	29.2	29.4	26.6	21.9	16.2	12.0	6.9	31.3	21.01	6.66	0.32
217	4150330	4	SAN ANTONIO RIVER	US	10155.4	10.7	12.6	16.5	20.3	23.9	27.1	28.4	28.5	25.8	21.1	15.6	11.5	5.9	30.4	20.17	6.57	0.33
218	4150450	4	COLORADO RIVER (CA	US	108788	7.1	9.2	13.3	17.9	22.1	26.1	27.5	27.3	23.7	18.4	12.1	7.8	2.1	29.8	17.70	7.51	0.42
219	4150500	4	BRAZOS RIVER	US	116827.1	6.7	8.7	12.9	17.6	21.9	26.2	27.9	27.8	24.0	18.4	12.2	7.6	0.9	30.3	17.65	7.77	0.44
220	4150600	4	TRINITY RIVER (TEX	US	44511.7	7.9	9.8	14.0	18.5	22.7	26.9	28.8	28.9	25.2	19.6	13.6	8.8	2.0	31.8	18.73	7.67	0.41
221	4150700	4	SABINE RIVER	US	24162.1	8.3	10.2	14.2	18.4	22.5	26.3	28.0	27.9	24.7	19.2	13.4	9.2	2.0	30.9	18.53	7.24	0.39
222	4152050	4	COLORADO RIVER (PA	US	618715	0.1	2.3	5.9	10.1	15.0	20.2	23.4	22.3	18.4	12.2	5.4	0.6	-6.8	25.8	11.33	8.28	0.73
223	4202100	4	ALSEK RIVER	CA	16200	-22.4	-18.2	-12.3	-4.6	2.3	7.2	9.1	7.3	2.7	-4.6	-14.7	-20.8	-35.0	12.4	-5.75	11.50	-2.00
224	4202601	4	TAKU RIVER	CA	17700	-15.6	-12.8	-6.8	-0.8	4.3	8.4	9.7	8.9	5.2	-0.1	-7.9	-12.9	-26.3	12.8	-1.70	9.16	-5.40
225	4204900	4	STIKINE RIVER	US	51592.8	-16.5	-12.7	-7.4	-1.6	3.5	7.6	9.5	8.7	4.5	-1.2	-9.7	-14.8	-27.6	12.3	-2.51	9.35	-3.72
226	4206100	4	NASS RIVER	CA	19200	-9.9	-7.2	-3.7	0.7	5.2	8.8	10.7	10.3	6.5	1.2	-4.8	-8.5	-20.6	13.4	0.79	7.45	9.49
227	4206250	4	SKEENA RIVER	CA	42200	-12.8	-9.0	-4.5	0.5	5.1	8.7	10.9	10.4	6.2	0.8	-6.0	-10.9	-27.6	14.2	-0.05	8.40	-156.82
228	4207900	4	FRASER RIVER	CA	217000	-11.4	-7.6	-3.1	2.1	6.9	10.5	13.0	12.4	8.1	2.5	-4.4	-9.5	-27.3	16.4	1.63	8.63	5.28
229	4208025	4	MACKENZIE RIVER	CA	1660000	-24.2	-20.8	-14.8	-4.1	4.8	11.3	14.0	12.1	6.1	-1.7	-13.6	-21.2	-33.9	16.4	-4.35	13.77	-3.16
230	4208040	4	PEEL RIVER (TRIB.	CA	70600	-27.4	-24.6	-19.5	-8.7	1.8	9.9	11.9	8.7	2.0	-8.8	-20.3	-24.9	-41.5	14.4	-8.31	14.50	-1.74
231	4209150	4	ANDERSON RIVER	CA	56300	-28.6	-26.9	-23.6	-11.7	0.0	9.5	12.9	10.1	3.4	-6.6	-19.2	-25.5	-37.5	16.8	-8.84	15.33	-1.73
232	4209402	4	COPPERMINE RIVER	CA	50700	-29.3	-28.7	-24.6	-15.1	-4.4	5.8	10.7	8.7	2.3	-6.8	-19.0	-25.9	-36.9	13.9	-10.52	14.72	-1.40
233	4209600	4	ELLICE RIVER	CA	16900	-24.6	-24.2	-20.4	-11.9	-2.5	6.8	12.0	10.4	4.0	-4.5	-15.7	-22.1	-38.3	15.7	-7.72	13.57	-1.76
234	4209800	4	BACK RIVER	CA	98200	-30.0	-29.2	-25.0	-15.3	-4.7	6.2	11.7	9.7	2.8	-6.6	-18.8	-26.4	-38.1	15.0	-10.46	15.21	-1.45

235	4209850	4	HAYES RIVER (TRIB.	CA	18100	-34.7	-35.2	-30.6	-20.8	-10.1	0.4	6.7	4.8	-1.8	-11.3	-22.8	-30.3	-44.3	11.6	-15.47	15.17	-0.98
236	4213711	4	NELSON RIVER	CA	1060000	-17.1	-14.1	-7.3	2.4	9.7	14.8	17.9	16.6	10.9	4.4	-5.5	-13.7	-28.0	21.3	1.58	12.45	7.87
237	4214025	4	HAYES RIVER (TRIB.	CA	103000	-24.4	-21.5	-14.3	-3.6	5.2	11.9	16.6	14.8	8.6	1.3	-10.1	-19.9	-32.9	19.6	-2.96	14.43	-4.88
238	4214035	4	AUX MELEZES	CA	42700	-24.9	-23.4	-17.3	-8.9	-0.2	6.6	10.8	9.9	5.5	-0.7	-8.6	-18.8	-32.7	14.8	-5.84	12.68	-2.17
239	4214040	4	CANIAPISCAU	CA	86800	-24.2	-22.4	-15.7	-7.0	1.3	8.5	12.6	11.3	6.1	-0.5	-8.8	-18.8	-30.9	14.7	-4.79	12.91	-2.70
240	4214051	4	THELON RIVER	CA	152000	-30.6	-29.4	-24.0	-14.4	-3.3	6.6	12.4	10.7	3.6	-5.8	-18.1	-26.1	-39.2	16.1	-9.86	15.51	-1.57
241	4214070	4	THLEWIAZA RIVER	CA	27000	-28.4	-26.2	-20.0	-9.9	0.8	8.4	13.6	12.4	5.4	-3.2	-14.9	-23.7	-37.0	16.8	-7.14	15.03	-2.10
242	4214075	4	FERGUSON RIVER	CA	12400	-32.0	-31.5	-26.1	-16.5	-6.3	3.6	9.9	9.0	2.7	-6.2	-18.7	-26.8	-41.0	13.9	-11.57	15.26	-1.32
243	4214080	4	ATTAWAPISKAT RIVER	CA	36000	-22.5	-20.2	-12.7	-2.0	5.9	13.3	16.7	14.7	9.1	2.2	-7.3	-17.2	-29.9	20.2	-1.66	13.73	-8.27
244	4214090	4	KAZAN RIVER	CA	72300	-31.3	-30.3	-24.8	-15.2	-4.6	5.2	11.7	10.1	3.4	-6.0	-18.7	-26.6	-39.6	15.4	-10.58	15.46	-1.46
245	4214100	4	QUOICH RIVER	CA	30100	-33.3	-33.2	-29.0	-18.1	-8.7	3.0	8.0	6.7	0.2	-7.7	-20.2	-29.2	-43.5	13.3	-13.46	15.31	-1.14
246	4214105	4	SEAL RIVER	CA	48100	-23.4	-21.4	-14.8	-4.7	4.1	11.8	15.7	14.3	8.3	0.6	-10.5	-19.6	-32.5	18.3	-3.31	14.11	-4.26
247	4214270	4	CHURCHILL RIVER	CA	287000	-22.5	-18.9	-11.9	-1.3	6.7	12.8	16.1	14.6	8.4	1.5	-9.8	-18.8	-33.6	18.4	-1.93	13.72	-7.11
248	4214440	4	SEVERN RIVER (TRIB	CA	94300	-22.0	-19.4	-12.1	-2.1	6.0	12.8	16.8	15.4	9.3	2.7	-7.8	-17.8	-30.9	20.0	-1.52	13.78	-9.06
249	4214450	4	WINISK RIVER	CA	50000	-21.7	-19.0	-11.6	-1.8	6.3	13.1	17.0	15.3	9.4	2.6	-7.6	-17.3	-29.6	20.4	-1.28	13.59	-10.62
250	4214520	4	ALBANY RIVER	CA	118000	-20.0	-17.5	-10.6	-0.6	7.2	13.7	16.8	15.2	9.8	3.3	-6.1	-15.2	-27.9	20.3	-0.34	12.96	-37.68
251	4214551	4	MOOSE RIVER (TRIB.	CA	60100	-18.1	-16.1	-9.3	0.1	8.2	14.2	17.0	15.5	10.6	4.2	-4.4	-13.6	-25.8	20.6	0.70	12.44	17.89
252	4214650	4	NOTTAWAY	CA	57500	-18.4	-16.7	-9.2	-0.4	7.6	13.6	16.3	14.9	10.1	4.0	-4.2	-13.6	-26.5	20.2	0.32	12.28	37.93

253	4214680	4	RUPERT RIVER	CA	40900	-19.7	-17.8	-10.8	-1.8	6.5	12.9	15.9	14.6	9.9	3.4	-4.6	-14.7	-27.8	19.4	-0.52	12.61	-24.15
254	4214700	4	EASTMAIN	CA	44300	-21.2	-19.7	-12.7	-3.5	4.8	11.4	14.7	13.4	8.5	2.1	-5.9	-16.0	-28.6	18.1	-2.01	12.73	-6.33
255	4214770	4	GRANDE RIVIERE	CA	96300	-23.3	-21.8	-14.9	-5.4	2.9	10.0	13.6	12.3	7.2	0.8	-7.2	-17.8	-30.5	16.8	-3.63	13.05	-3.60
257	4214900	4	BALEINE, GRANDE RI	CA	29800	-24.5	-23.2	-16.9	-8.5	0.0	7.0	11.4	10.2	5.2	-1.0	-8.9	-18.3	-31.6	14.1	-5.62	12.64	-2.25
258	4214930	4	ARNAUD	CA	26900	-22.5	-22.3	-18.0	-10.1	-2.3	3.5	8.0	7.7	3.8	-1.2	-7.7	-16.0	-33.4	12.8	-6.42	11.12	-1.73
259	4214940	4	FEUILLES (RIVIERE	CA	41700	-22.7	-22.2	-17.2	-9.1	-1.3	4.6	8.7	8.2	4.6	-0.6	-7.6	-16.4	-31.7	13.4	-5.91	11.40	-1.93
260	4214950	4	GEORGE RIVER	CA	35200	-23.9	-22.6	-16.2	-8.0	-0.3	6.5	10.8	9.6	4.7	-1.6	-9.2	-17.7	-30.8	13.3	-5.67	12.13	-2.14
263	4243300	4	ST. MAURICE (RIVIE	CA	42000	-16.5	-15.1	-8.0	0.8	8.4	14.0	16.6	15.1	10.5	4.4	-3.4	-12.6	-23.7	20.1	1.18	11.80	10.00
264	4243400	4	SAGUENAY (RIVIERE)	CA	73000	-19.3	-17.3	-10.1	-1.0	6.8	13.0	15.8	14.3	9.5	3.1	-4.8	-14.7	-26.3	19.1	-0.39	12.36	-31.44
265	4243610	4	MANICOUAGAN (RIVIE	CA	45800	-20.6	-18.2	-11.6	-3.2	4.2	11.0	14.3	12.8	7.6	1.1	-6.7	-16.3	-26.7	16.4	-2.13	12.17	-5.71
267	4244635	4	NATASHQUAN (RIVIER	CA	15600	-18.6	-17.0	-10.2	-2.5	3.7	10.0	14.2	13.3	8.4	1.6	-5.5	-14.6	-25.3	18.2	-1.43	11.50	-8.01
268	4244660	4	LITTLE MECATINA RI	CA	19100	-17.9	-16.4	-10.3	-3.0	2.9	8.6	12.9	12.4	7.8	1.6	-5.0	-13.5	-24.7	15.4	-1.66	10.79	-6.48
269	4351900	4	BRAVO	MX	450902	6.5	8.7	12.3	16.5	20.6	24.2	25.0	24.5	21.6	16.8	10.9	6.8	3.7	27.1	16.21	6.82	0.42
270	4353300	4	YAQUI	MX	57908	8.5	10.1	12.9	16.5	20.5	24.9	24.7	23.5	22.4	18.2	12.7	8.9	5.5	26.9	17.00	6.07	0.36
272	4356080	4	SAN PEDRO	MX	25800	10.8	12.4	14.5	17.3	20.1	21.8	20.4	20.0	19.0	17.2	13.8	11.3	7.4	23.8	16.55	3.80	0.23
273	4356100	4	SANTIAGO	MX	128943	13.2	14.7	16.9	19.1	21.1	21.2	19.8	19.7	19.2	18.0	15.6	13.8	10.4	23.3	17.68	2.77	0.16
275	4356700	4	VERDE	MX	17617	16.0	17.4	18.9	20.2	20.8	20.2	19.5	19.6	19.3	18.5	17.1	16.4	13.9	23.1	18.66	1.71	0.09
276	4358300	4	PANUCO	MX	58115	13.1	14.6	16.8	18.7	19.8	19.5	18.7	18.8	18.1	16.8	14.7	13.5	10.6	22.3	16.92	2.45	0.14
277	4359220	4	PAPALOAPAN	MX	21419	16.6	17.6	19.4	21.4	22.3	21.7	20.8	21.0	20.7	19.6	18.0	17.1	14.3	24.6	19.67	2.03	0.10
278	4362201	4	GRISALVA	MX	37702	19.4	20.4	22.1	23.7	24.4	23.4	23.0	23.1	22.7	22.0	20.5	19.7	17.6	26.5	22.04	1.74	0.08
279	4362600	4	USUMACINTA	MX	50743	20.1	20.9	22.6	23.9	24.9	24.4	23.6	23.9	23.8	22.9	21.5	20.5	18.1	27.1	22.75	1.78	0.08

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280	4664800	4	LEMPA	SV	18176	20.8	21.7	23.0	24.0	23.9	23.2	23.0	23.2	22.6	22.4	21.4	20.8	18.3	26.6	22.50	1.35	0.06
281	4772300	4	GRANDE DE MATAGALP	NI	14646	23.5	24.1	25.1	25.9	26.4	25.3	25.0	25.2	25.3	25.0	24.3	23.8	20.3	28.5	24.91	1.14	0.05
283	5101201	5	BURDEKIN	AU	129760	27.1	26.5	25.3	22.9	19.6	16.8	16.0	17.8	20.7	23.8	26.0	27.1	14.0	29.5	22.47	4.06	0.18
285	5109170	5	GILBERT RIVER	AU	11800	27.3	26.8	25.9	24.2	21.5	19.1	18.4	19.9	22.9	26.2	27.8	28.0	15.7	30.2	24.01	3.51	0.15
287	5141100	5	BRANTAS	ID	8650	24.2	24.3	24.4	24.5	24.4	23.9	23.5	23.7	24.4	24.9	24.9	24.5	21.7	26.6	24.30	0.72	0.03
289	5223100	5	KELANTAN	MY	11900	24.6	25.1	25.9	26.4	26.5	26.2	25.9	25.9	25.7	25.6	25.3	24.8	22.5	28.0	25.64	0.71	0.03
290	5224500	5	PAHANG	MY	19000	23.7	24.3	24.9	25.3	25.4	25.1	25.0	24.8	24.7	24.6	24.3	23.8	21.7	27.2	24.65	0.68	0.03
291	5230300	5	RAJANG	MY	34053	23.9	24.1	24.4	24.8	25.1	24.9	24.8	24.8	24.6	24.4	24.4	24.1	22.3	26.6	24.52	0.56	0.02
292	5231700	5	KINABATANGAN	MY	10800	23.7	23.8	24.3	24.9	25.0	24.8	24.5	24.6	24.5	24.3	24.2	23.9	22.2	27.2	24.38	0.60	0.02
294	5550500	5	SEPIK	PG	40922	24.0	23.7	24.0	24.4	24.4	24.1	23.7	23.6	23.9	24.2	24.4	24.2	15.3	25.8	24.04	1.01	0.04
295	5553100	5	PURARI	PG	11100	20.7	20.7	20.7	20.8	20.5	19.6	19.2	19.3	19.8	20.1	20.5	20.7	17.2	22.5	20.22	0.84	0.04
296	5606100	5	BLACKWOOD RIVER	AU	20500	21.8	21.6	19.8	16.6	13.3	11.1	10.2	10.6	12.0	14.2	17.4	20.1	8.5	24.9	15.74	4.31	0.27
297	5607100	5	MURCHISON RIVER	AU	82300	30.1	29.6	27.2	22.8	17.7	14.1	13.0	14.5	17.6	21.1	24.9	28.2	10.8	32.7	21.73	6.12	0.28
299	5607400	5	ASHBURTON RIVER	AU	70200	32.5	31.4	29.8	26.2	21.0	17.4	16.4	18.4	21.8	25.5	28.8	31.3	14.4	34.7	25.05	5.70	0.23
300	5607450	5	FORTESCUE RIVER	AU	48900	31.7	30.6	29.1	25.5	20.4	16.8	16.0	18.1	21.9	25.8	29.0	31.1	13.6	34.1	24.67	5.70	0.23
301	5607500	5	DE GREY RIVER	AU	49600	32.4	31.4	30.3	26.9	21.9	18.4	17.6	19.7	23.5	27.2	30.3	32.0	15.0	34.9	25.98	5.42	0.21
302	5608024	5	FITZROY RIVER	AU	45300	30.4	29.6	29.0	26.9	23.1	20.2	19.6	21.9	26.0	29.6	31.4	31.2	16.8	33.6	26.58	4.30	0.16
303	5608090	5	ORD	AU	46100	30.5	29.8	29.1	27.2	23.7	20.8	20.3	22.7	26.8	30.1	31.4	31.1	17.5	33.7	26.96	4.08	0.15
304	5608400	5	DURACK RIVER	AU	4150	29.5	28.7	28.3	26.7	23.4	20.5	20.1	22.3	26.3	29.4	30.6	30.1	17.5	32.6	26.33	3.79	0.14
306	5708110	5	VICTORIA RIVER	AU	44900	30.2	29.6	28.7	26.7	23.4	20.3	20.0	22.3	26.6	29.8	31.1	30.9	17.1	33.1	26.63	4.10	0.15
307	5708145	5	DALY	AU	47000	28.9	28.5	28.4	27.4	24.9	22.3	22.2	24.0	27.8	30.4	30.7	29.8	18.8	32.3	27.11	3.03	0.11
308	5709100	5	ROPER RIVER	AU	47400	29.7	29.1	28.5	27.1	24.4	21.6	21.3	23.2	26.9	30.0	31.1	30.6	18.5	33.1	26.97	3.51	0.13
309	5709110	5	MACARTHUR RIVER	AU	10400	29.7	29.3	28.3	26.7	23.7	20.5	20.2	22.0	25.4	28.7	30.4	30.6	17.4	32.9	26.30	3.83	0.15
310	5803180	5	SOUTH ESK RIVER	AU	3278	15.9	15.9	14.1	11.3	8.8	6.6	6.1	7.0	8.7	10.5	12.5	14.3	4.4	18.2	10.97	3.53	0.32
311	5865300	5	WAIKATO RIVER	NZ	11395	16.4	16.7	14.9	12.2	9.6	7.1	6.3	7.3	9.2	11.1	13.0	14.8	4.8	19.5	11.55	3.64	0.32
312	5868100	5	CLUTHA	NZ	20306	12.6	12.4	10.5	7.5	3.8	1.2	0.4	2.5	5.2	7.6	9.4	11.3	-2.6	15.4	7.03	4.26	0.61
313	6112090	6	DOURO	PT	91491	3.2	4.4	7.0	9.1	12.7	16.9	19.9	19.9	16.6	11.6	6.6	3.8	-0.8	23.1	10.97	6.11	0.56

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314	6113050	6	TEJO	PT	67490	5.6	6.8	9.4	11.6	15.2	19.9	23.3	23.2	19.4	14.2	9.1	6.1	2.0	25.9	13.65	6.44	0.47
315	6116200	6	GUADIANA	PT	60883	6.7	8.1	10.7	13.0	16.7	21.6	25.2	25.0	21.3	15.8	10.5	7.3	3.4	27.9	15.15	6.65	0.44
316	6122100	6	SEINE	FR	65000	2.3	3.3	6.1	9.2	13.3	16.2	18.3	17.8	14.8	10.4	5.6	3.1	-5.8	22.6	10.05	5.93	0.59
317	6123100	6	LOIRE	FR	110000	2.8	3.8	6.5	9.3	13.3	16.4	18.5	18.1	15.3	10.9	6.1	3.6	-5.3	23.3	10.38	5.82	0.56
318	6125100	6	GARONNE	FR	52000	3.0	4.1	6.8	9.3	13.1	16.6	19.0	18.8	15.9	11.6	6.7	3.8	-4.8	23.7	10.72	5.86	0.55
319	6139100	6	RHONE	FR	95590	-0.1	1.1	4.4	7.7	11.9	15.3	17.7	17.2	13.9	9.2	4.0	0.8	-7.8	22.2	8.59	6.46	0.75
320	6217100	6	GUADALQUIVIR	ES	46995	7.1	8.6	11.0	13.3	17.0	21.7	25.3	25.3	21.6	16.3	11.1	7.8	3.9	27.8	15.51	6.53	0.42
321	6226800	6	EBRO	ES	84230	3.5	4.8	7.5	9.7	13.4	17.4	20.3	20.3	17.0	12.3	7.2	4.1	-1.8	24.0	11.46	6.10	0.53
322	6229500	6	VAENERN-GOETA (GOE	SE	46886	-5.6	-5.2	-1.8	3.1	8.8	13.1	15.3	14.0	9.7	4.9	-0.3	-4.1	-14.6	19.5	4.31	7.70	1.79
323	6233650	6	ANGERMANAELVEN	SE	30638	-10.4	-9.7	-5.7	-0.4	5.3	10.5	13.2	11.4	6.7	1.1	-4.9	-8.6	-19.7	16.3	0.71	8.55	12.04
324	6233750	6	LULEAELVEN	SE	24924	-13.0	-12.7	-8.7	-3.0	2.9	8.6	11.9	9.9	4.9	-1.3	-7.8	-11.6	-22.7	15.1	-1.66	9.06	-5.45
326	6233900	6	MUONIO	SE	14408.5	-14.1	-13.9	-9.5	-3.6	2.9	9.4	12.6	10.3	5.0	-1.9	-8.5	-12.2	-24.1	16.1	-1.95	9.73	-4.98
327	6335020	6	RHINE RIVER	DE	159300	-0.4	0.6	3.9	7.6	12.2	15.2	17.0	16.4	13.2	8.6	3.7	0.7	-9.6	21.6	8.21	6.43	0.78
328	6337200	6	WESER	DE	37720	-0.3	0.4	3.5	7.4	12.2	15.0	16.8	16.2	13.0	8.5	3.8	0.8	-9.9	21.2	8.12	6.42	0.79
329	6340110	6	ELBE RIVER	DE	131950	-1.4	-0.5	3.0	7.3	12.5	15.5	17.3	16.6	13.0	8.1	3.1	-0.1	-11.4	21.7	7.87	6.95	0.88
332	6401120	6	THJORSA	IS	7380	-5.0	-5.0	-3.9	-1.7	2.2	5.6	7.4	6.6	3.8	-0.1	-2.7	-4.4	-12.8	9.6	0.24	4.74	19.59
333	6401601	6	SVARTA, SKAGAFIROI	IS	393	-5.7	-5.7	-4.7	-2.5	1.9	5.5	7.1	6.3	3.6	-0.6	-3.4	-5.0	-15.8	10.1	-0.24	5.00	-21.05
334	6401701	6	JOEKULSA A FJOELLU	IS	7074	-5.5	-5.2	-4.3	-2.0	2.1	5.7	7.6	6.8	4.1	-0.1	-3.1	-4.7	-15.0	10.5	0.10	5.01	47.92
336	6421100	6	MAAS	NL	29000	1.2	2.0	4.9	8.0	12.5	15.1	16.9	16.4	13.7	9.5	4.9	2.3	-7.9	22.4	8.96	5.89	0.66
337	6457010	6	ODER RIVER	PL	109729	-2.2	-1.2	2.7	7.8	13.1	16.1	18.2	17.2	13.5	8.4	3.2	-0.5	-12.9	22.5	8.01	7.48	0.93
338	6458010	6	WISLA	PL	194376	-3.8	-2.9	1.4	7.6	13.2	16.3	18.3	17.4	13.2	8.0	2.6	-1.8	-14.3	21.5	7.45	8.15	1.09
341	6605600	6	TRENT	GB	7486	3.5	3.7	5.5	7.8	10.9	14.0	15.9	15.5	13.2	9.7	6.2	4.0	-2.2	19.4	9.16	4.67	0.51
342	6607650	6	THAMES	GB	9948	4.1	4.2	6.1	8.4	11.8	14.7	16.6	16.3	13.9	10.4	6.7	4.5	-2.7	20.6	9.83	4.77	0.49
345	6730500	6	TANA (NO, FI)	NO	14165	-14.6	-14.6	-10.3	-4.3	2.1	8.5	11.9	9.8	4.8	-2.2	-8.9	-12.8	-24.8	15.8	-2.54	9.75	-3.84
346	6731310	6	DRAMSELV	NO	16020	-9.0	-8.1	-4.4	0.4	5.8	10.2	12.5	11.0	6.7	1.4	-4.1	-8.0	-16.7	16.4	1.20	7.85	6.54

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347	6731400	6	GLOMA	NO	40243	-9.6	-8.7	-4.8	0.2	5.8	10.1	12.5	10.9	6.6	1.3	-4.2	-8.4	-17.8	16.9	0.97	8.05	8.31
349	6854100	6	KOKEMAENJOKI	FI	26025	-7.4	-7.8	-3.9	2.1	8.4	13.3	16.3	14.4	9.5	4.0	-1.0	-5.0	-19.7	20.5	3.58	8.68	2.42
350	6854500	6	OULUJOKI	FI	22841	-11.1	-11.4	-6.8	-0.1	6.3	12.2	15.4	12.9	7.6	1.3	-4.1	-8.6	-23.1	18.9	1.14	9.61	8.46
354	6855400	6	VUOKSI	FI	61061	-10.1	-10.3	-5.5	1.0	7.7	13.4	16.4	14.1	8.8	2.9	-2.6	-7.5	-21.7	20.8	2.36	9.60	4.07
355	6934100	6	SKJERN A	DK	1040	0.1	-0.1	1.9	5.9	10.8	14.0	15.9	15.4	12.2	8.1	4.0	1.2	-7.3	19.6	7.47	6.07	0.81
357	6970100	6	ONEGA	RU	55770	-12.6	-11.5	-6.1	1.1	7.8	13.6	16.3	13.9	8.3	1.9	-4.4	-9.5	-22.8	21.9	1.55	10.33	6.68
358	6970250	6	NORTHERN DVINA(SEV	RU	348000	-14.8	-13.1	-6.7	1.2	7.9	14.0	16.6	13.7	7.9	0.9	-6.2	-11.8	-24.6	20.8	0.79	11.12	14.00
359	6970500	6	MEZEN	RU	56400	-16.6	-14.5	-8.6	-1.1	5.2	12.1	15.4	12.3	6.5	-0.5	-7.8	-13.5	-27.5	20.0	-0.94	11.24	-12.01
360	6970700	6	PECHORA	RU	312000	-18.9	-17.6	-11.9	-4.6	1.8	9.7	13.8	11.0	5.5	-2.3	-10.5	-15.9	-29.7	18.9	-3.32	11.66	-3.52
361	6971130	6	TULOMA	RU	17500	-12.7	-12.7	-8.3	-2.3	3.7	9.9	13.2	11.0	5.9	-0.6	-6.6	-10.4	-22.6	18.1	-0.82	9.39	-11.42
364	6972130	6	NIZHNY VYG (SOROKA	RU	27000	-11.7	-11.4	-6.6	-0.2	6.3	12.5	15.6	13.3	7.9	1.8	-4.0	-9.1	-22.6	20.3	1.20	9.83	8.18
365	6972350	6	NARVA	EE	56000	-7.4	-7.1	-2.8	4.3	10.8	15.0	17.2	15.7	10.7	5.1	-0.5	-4.9	-17.6	22.2	4.69	9.08	1.94
366	6972430	6	NEVA	RU	281000	-9.6	-9.0	-4.3	2.7	9.4	14.3	16.8	14.8	9.6	3.8	-1.9	-6.8	-21.3	22.2	3.31	9.56	2.89
367	6972800	6	KEM	RU	27900	-12.3	-12.1	-7.4	-1.1	5.2	11.8	14.9	12.4	7.1	0.9	-4.9	-9.7	-24.5	18.6	0.40	9.77	24.70
369	6973300	6	WESTERN DVINA (DAU	LV	64500	-8.0	-7.2	-2.7	4.9	11.8	15.6	17.3	15.9	10.9	5.0	-0.8	-5.6	-18.2	22.7	4.75	9.39	1.98
370	6974150	6	NEMAN	LT	81200	-5.4	-4.9	-0.9	6.0	12.4	15.7	17.6	16.5	11.9	6.6	1.3	-3.2	-16.1	21.6	6.13	8.58	1.40
371	6977100	6	VOLGA	RU	1360000	-12.5	-11.6	-5.5	3.9	11.5	16.4	18.4	16.2	10.3	3.1	-4.1	-9.8	-22.0	23.4	3.02	11.28	3.74
372	6978250	6	DON	RU	378000	-8.3	-7.8	-2.3	7.5	14.9	19.0	21.1	19.7	13.7	6.5	-0.3	-5.6	-19.1	26.4	6.50	10.97	1.69
373	6980300	6	SOUTHERN BUG	UA	46200	-5.2	-4.1	0.6	8.2	14.7	17.9	19.5	18.9	14.0	8.0	2.0	-2.5	-15.5	24.3	7.67	9.18	1.20
374	6980800	6	DNIEPR	UA	463000	-6.3	-5.4	-0.6	7.4	14.0	17.3	19.0	17.9	12.9	6.8	0.9	-3.7	-16.3	23.5	6.69	9.39	1.40
375	6981800	6	DNIESTR	MD	66100	-4.6	-3.2	1.3	8.0	14.0	17.1	18.8	18.1	13.7	8.2	2.4	-2.1	-13.9	22.8	7.64	8.59	1.12
377	6990700	6	KURA	AZ	178000	-3.6	-2.4	1.8	8.0	13.0	17.1	20.5	20.2	16.0	10.1	4.2	-1.1	-9.3	23.7	8.67	8.62	0.99

The results of the trend anaAnalyzing the value (Table 3) of the trends of polarization factors (trend(RANGE) and trend(STD)) P_2 were shown at a significance level of 5%. The following values were obtained from the next 10 largest catchments ranging from 244000 - 2900000 km², such as NILE: 2.28, YENISEI: 3.66, YANGTZE RIVER: 4.69, GANGES: 3.20, HUANG HE: 4.02, BRAHMAPUTRA: 5.17, AMU DARYA: 3.31, EUPHRATES: 3.81, SENEGAL: 3.00, and URUGUAY: 3.55. The highest value of this assumed polarization index, among 93 catchments, was obtained at 5.17 for the BRAHMAPUTRA river catchment, the lowest at 2.28 for the NILE river catchment.lyses and possible change points of the sequences of monthly average temperatures are shown in Table 5. The following are included sequentially: sequence number, GRDC code of the catchment, WMO region code, river name, country code, P_1 measure, trend using TKM at 5% significance level for STD, trend using TKM at 5% significance level for RANGE, P_2 measure. , the year of the STD trend change, the year of the RANGE trend change, the significance probabilities for the STD and RANGE trend change point, the significance probabilities of the new STD and RANGE trend, the values of the new trends from the change point for STD and RANGE, and the value of the P_2 post-trend change polarization measure.

Based on the analysis of the data of monthly average temperatures in the analyzed catchments, it should be noted that for 46/377 catchments, i.e., in 12.2% of the analyzed catchments, trends of polarization factors in the area of temperatures at the significance level of 5% have been proven. Analyzing the values (Table 5 and background of factors Table 4) trends of polarization factors (P_1/c_v) sequentially in the 10 largest catchments with an area of 190000 - 1730000 km2, such as, it is shown: AMUR: 3.42/-10.07, ORINOCO: 6.10/0.04, GANGES: 3.74/0.25, INDUS: 3.34/0.47, BRAHMAPUTRA: 3.39/0.63, SAO FRANCISCO: 5.24/0.07, VOLTA: 4.67/0.06, RIO PARNAIBA: 5.65/0.04, GODAVARI: 4.29/0.15, URAL: 3.87/3.87. The highest value of this assumed polarization index, among the 93 catchments, was obtained at 6.97 for the ESMERALDAS River catchment, the lowest at 6.10 for the ORINOCO River catchment.

Analyzing the value (Table 5) of the trends of the P_2 polarization factors for the next 10 largest catchments ranging from 190000 - 1730000 km2, showed: AMUR: 3.42, ORINOCO: 6.10, GANGES: 3.74, INDUS: 3.34, BRAHMAPUTRA: 3.39, SAO FRANCISCO: 5.24, VOLTA: 4.67, RIO PARNAIBA: 5.65, GODAVARI: 4.29, URAL: 3.87. The highest value of this assumed polarization index, among the 93 catchments, was obtained at 6.97 for the ESMERALDAS River catchment, the lowest at 6.10 for the ORINOCO River catchment.

Figure 1, shows the spatial location of the analyzed catchments in which significant polarization trends for monthly precipitation totals from 1901 to 2010 were recognized at the 5% significance level. The largest P_2polarization values of 4 to 5.17 were recognized in catchments located in Asia in China- YANGTZE, India- BRAHMAPUTRA and Russia- YENISEI, Mid-West Africa- NIGER and in the Middle East: Iraq, TIGER river catchment.

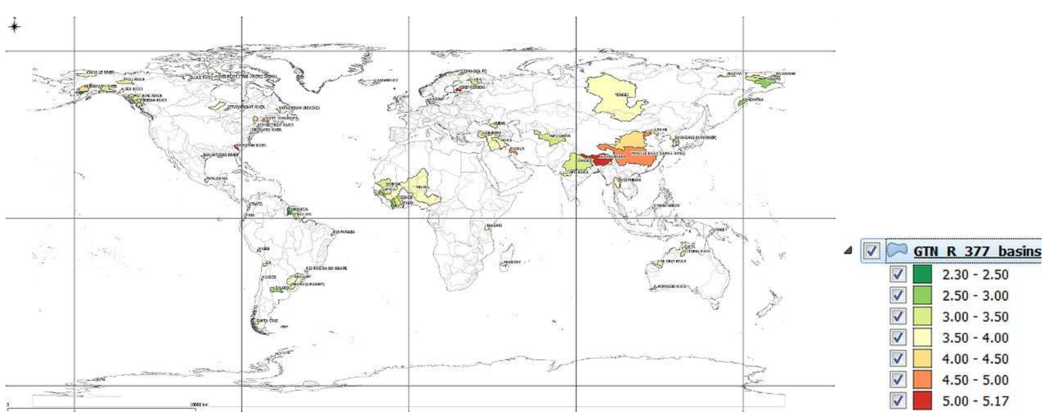

Figure 1. Watersheds in which significant polarization trends were identified for monthly precipitation sums during the period from 1901 to 2010 at a significance level of 5%.

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Figure 2, shows the spatial location of the analyzed catchments in which significant trend change points in the P_2 polarity factors of monthly precipitation from 1901 to 2010 were recognized at the 5% significance level. Headline years of trend change were recognized from 1950 to 1980 in catchments located in the Asian area of China - YANGTZE, India - BRAHMAPUTRA and Russia - YENISEI, Midwest Africa- NIGER and the Middle East: Iraq, TIGER River catchment.

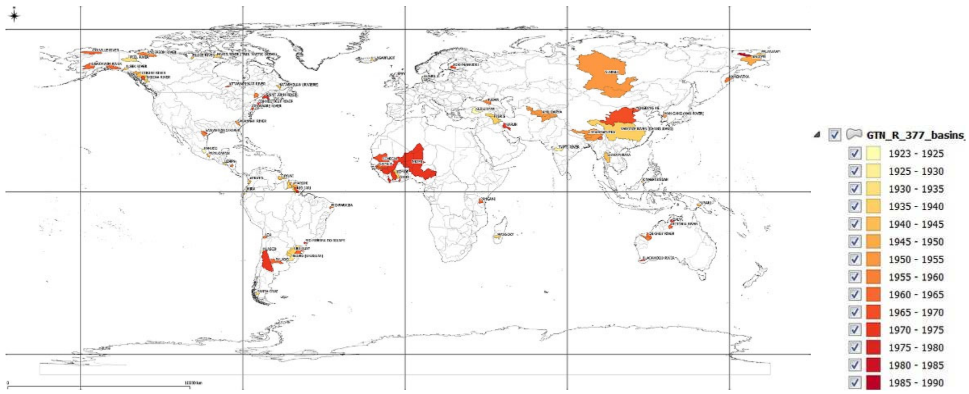

Figure 2. Watersheds in which change points in the trend of factors related to precipitation polarization for monthly precipitation sums during the period from 1901 to 2010 were identified at a significance level of 5%.

Figures 3-9 and Figures 11-16 show the results of the P_2 trend analyses paired with the trend(STD) value. This arrangement makes it possible to classify the analyzed catchments into four areas (quadrants) of the trend(STD)- P_2 arrangement showing the locations of catchments with the highest polarization indices of phenomena in both precipitation and temperature areas. Quadrant I is the area indicating an increase in the trend in amplitude and the trend in standard deviation (variability), quadrant II is the area with a negative trend in amplitude and a positive trend in variability, quadrant III is the area of catchment locations with a positive trend in amplitude and a negative trend in variability. Quadrant IV gathers catchments in which both trends are negative.

Figure 3, shows the polarity of P_2 in catchments on the continent of Africa. The location in quadrant IV indicates decreasing trends in the polarization factors in all the catchments indicated. Figure 4, shows the polarization of P_2 in the catchments of the continent of Asia. The largest values are in the BRAHMAPUTRA catchment. For this catchment, the trends of polarization factors are decreasing. In the case of the KARUN River catchment located in the 1st quadrant, both the trend of amplitude and variability are positive - the phenomena are increasing. Figure 5, shows the polarity of P_2 in the catchments of the South American continent. The largest values are in the RIO PARU DE ESTE catchment. For this catchment, the trends of polarization factors are decreasing. In the VINCES River catchment located in the 1st quadrant, both trends are increasing. Figure 6, shows the polarization of P_2 in the catchments of the North American continent. The largest values are in the SAVANNAH catchment, but both trends are decreasing. In the SAINT JOHN River catchment, on the other hand, both trends are increasing. Figure 7, shows the polarity of P_2 in the catchments of the continent of Australia and Oceania. The largest values are in the KINABATANGGAN catchment. For this catchment, the trends are decreasing. In the DE GREY River catchment, both trends are increasing. Figure 8, shows the polarity of P_2 in the catchments of continental Europe. The largest values are in the KIZILIRMAK catchment in Turkey. For this catchment, the trends are decreasing. In the KOKEMAENJOKI river catchment, both trends are increasing.

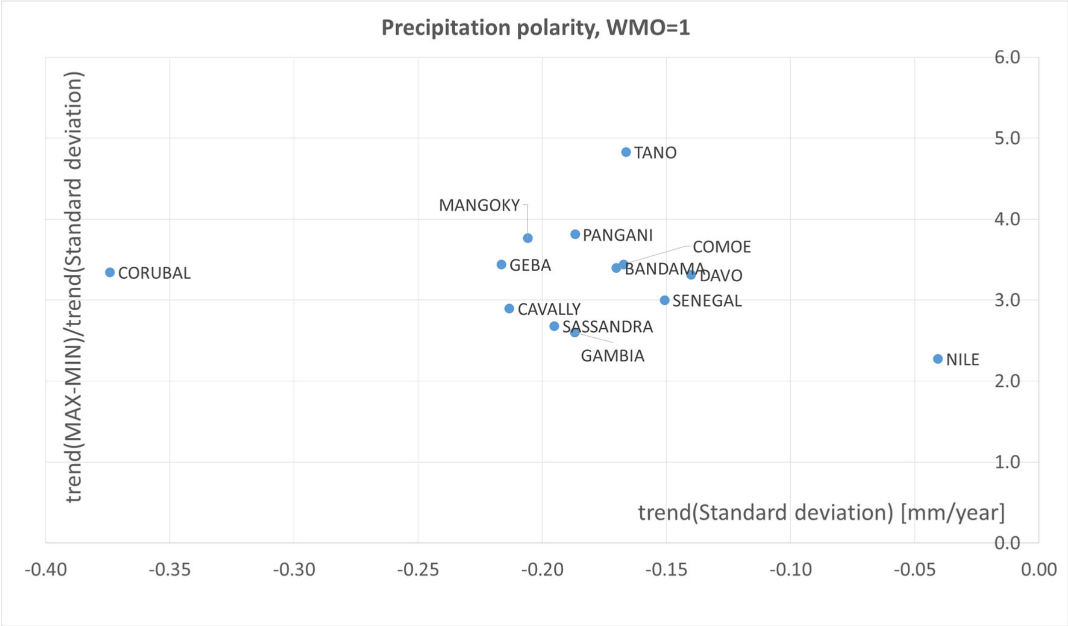

Figure 3. Watersheds in the region for which WMO_REG=1, in which significant polarization trends were identified for monthly precipitation sums during the period from 1901 to 2010 at a significance level of 5%.

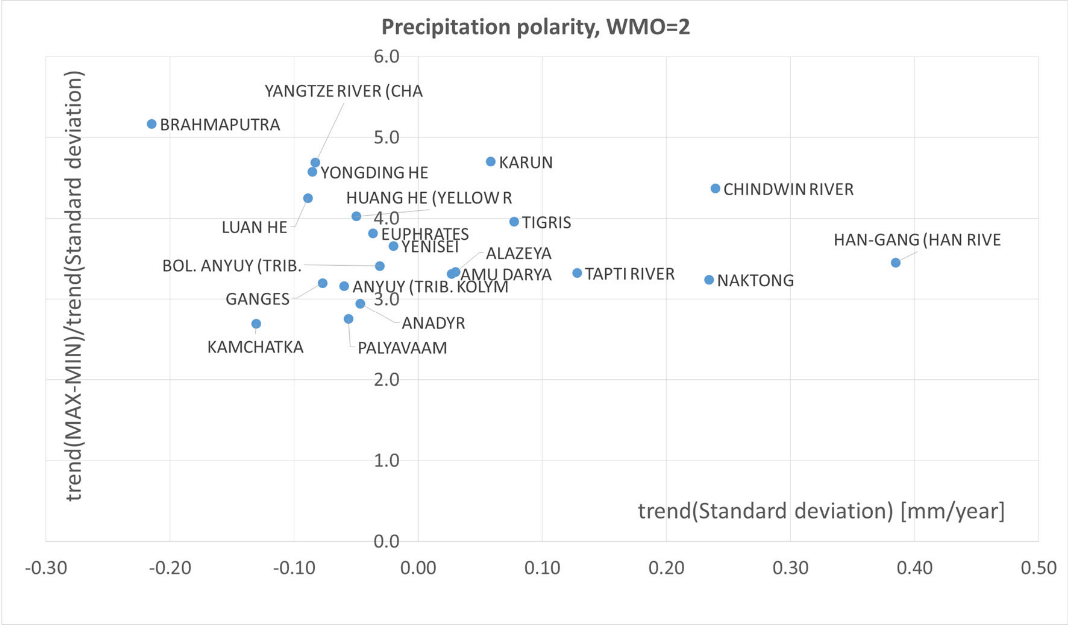

Figure 4. Watersheds in the region for which WMO_REG=2, in which significant polarization trends were identified for monthly precipitation sums during the period from 1901 to 2010 at a significance level of 5%.

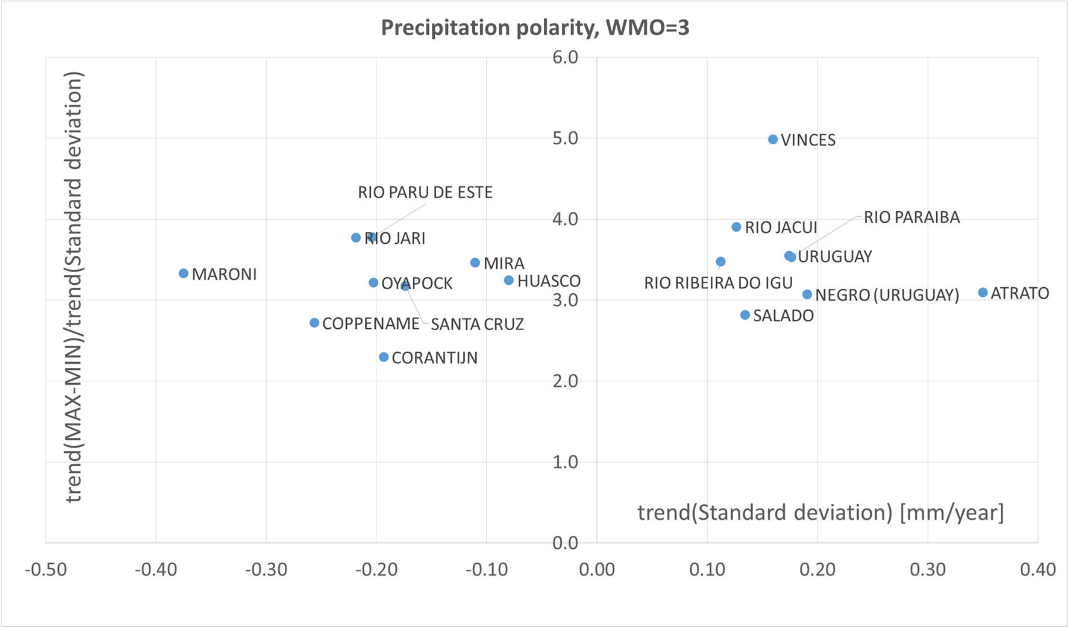

Figure 5. Watersheds in the region for which WMO_REG=3, in which significant polarization trends were identified for monthly precipitation sums during the period from 1901 to 2010 at a significance level of 5%.

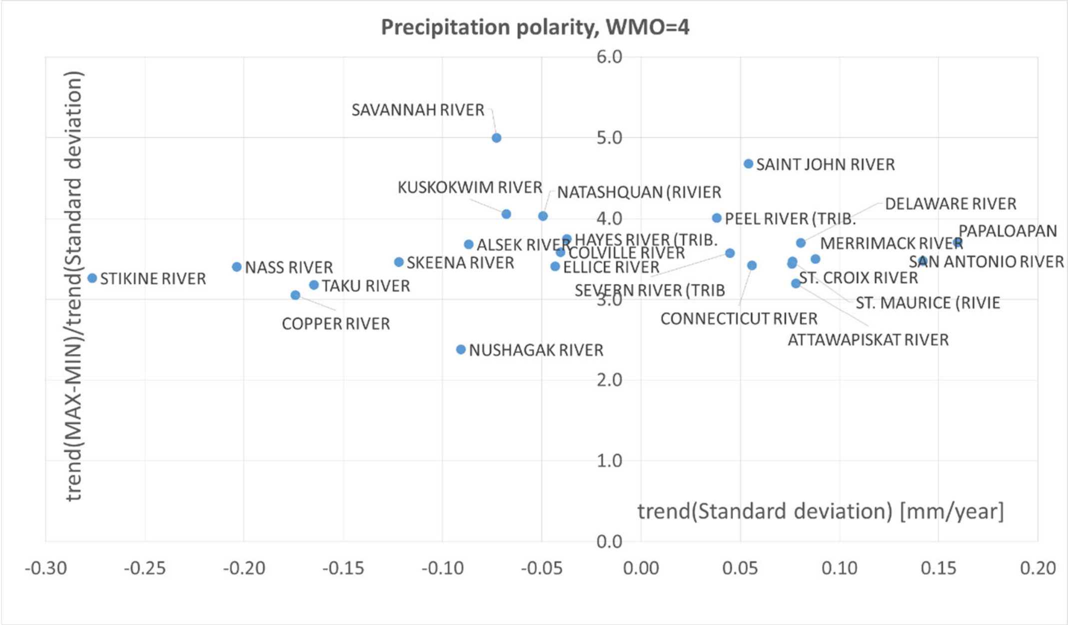

Figure 6. Watersheds in the region for which WMO_REG=4, in which significant polarization trends were identified for monthly precipitation sums during the period from 1901 to 2010 at a significance level of 5%.

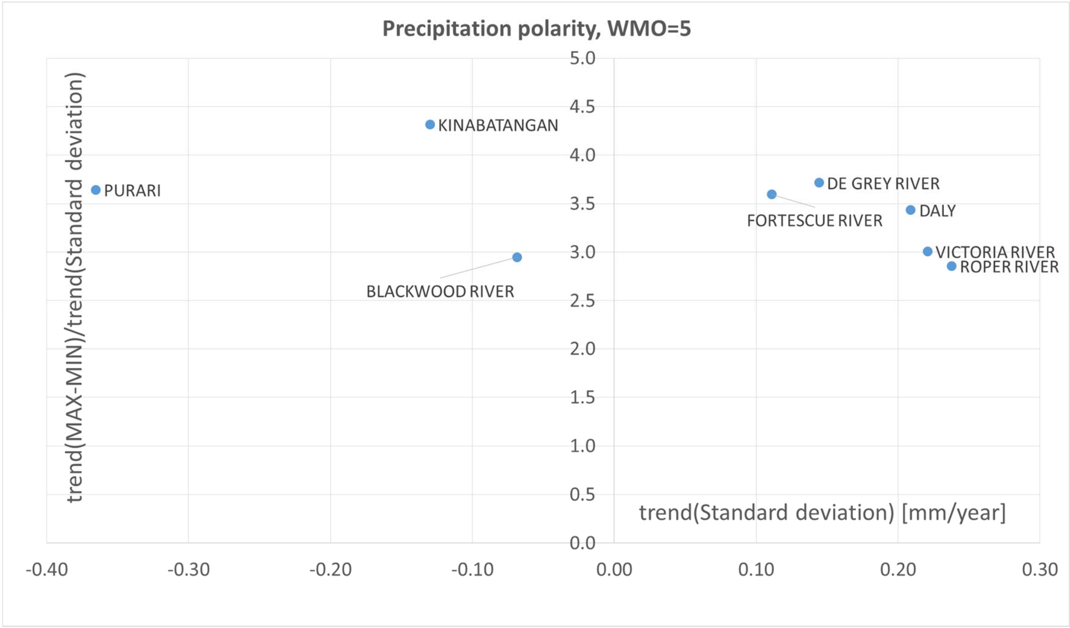

Figure 7. Watersheds in the region for which WMO_REG=5, in which significant polarization trends were identified for monthly precipitation sums during the period from 1901 to 2010 at a significance level of 5%.

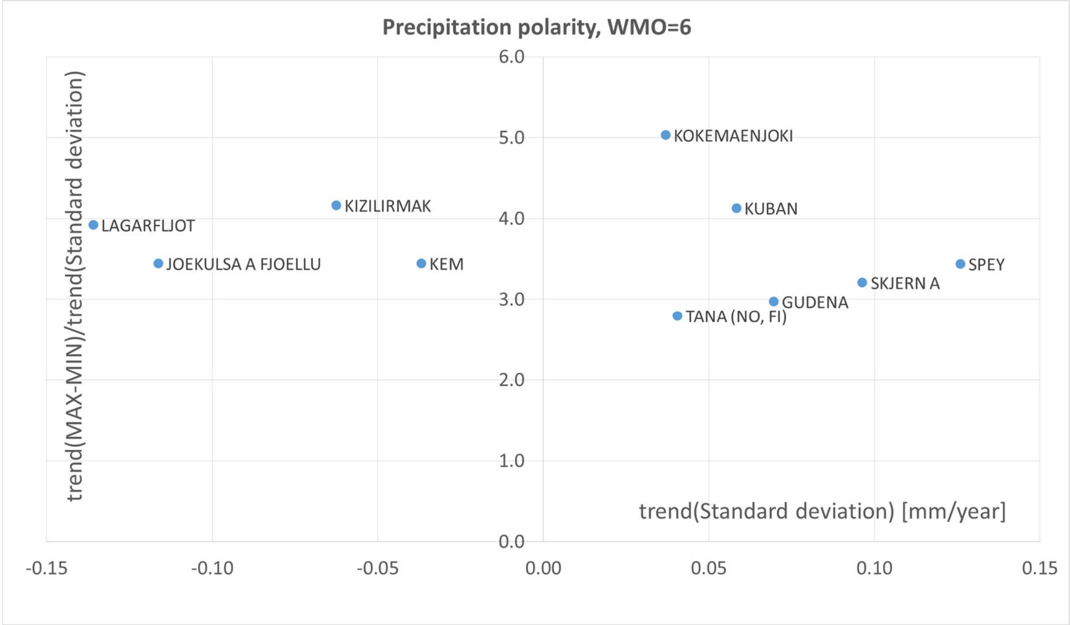

Figure 8. Watersheds in the region for which WMO_REG=6, in which significant polarization trends were identified for monthly precipitation sums during the period from 1901 to 2010 at a significance level of 5%.

Figure 9, shows the spatial location of the analyzed catchments in which significant polarization trends were recognized at the 5% significance level for monthly average temperatures. from the period 1901 to 2010. The largest P_2 polarization values of more than 6.0 were recognized in the catchment located in the area of central West Africa- NIGER. Figure 10, shows the spatial location of the analyzed catchments in which significant trend change points in the P_2 polarization factors of monthly average temperatures from 1901 to 2010 were recognized at a significance level of 5%. Headline years of trend change were recognized in the period from 1940 to 1980 in catchments located in East Asia, India , central western Africa, central eastern South America and central North America.

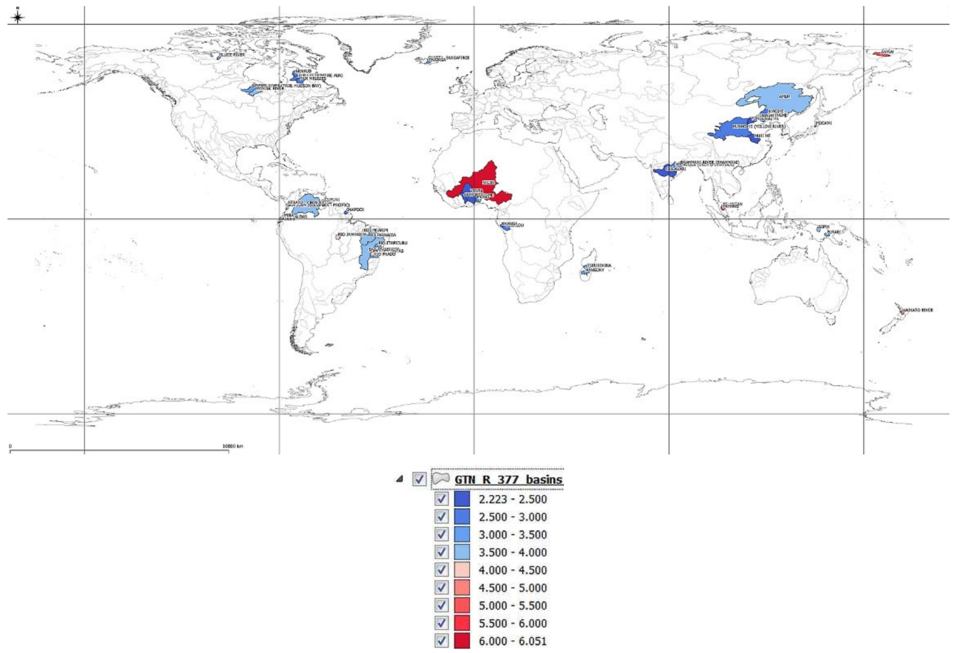

Figure 9. Watersheds in which significant polarization trends were identified for monthly mean temperatures during the period from 1901 to 2010 at a significance level of 5%.

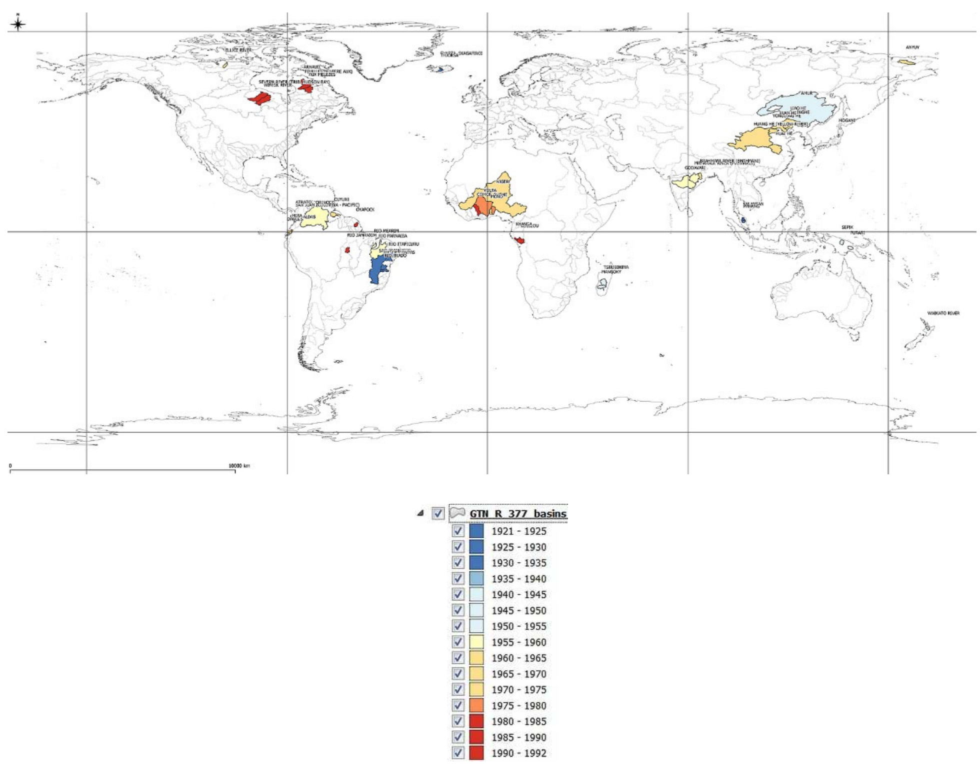

Figure 10. Watersheds in which change points in the trend of factors related to temperature polarization for monthly mean temperatures during the period from 1901 to 2010 were identified at a significance level of 5%.

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Figure 11, shows the polarization of P_2 in the area of average monthly temperatures in the catchments of the African continent. The largest values are in the MANGOKY and KOUILOU catchments with both trends decreasing.In the PRA and VOLTA river left, both trends are increasing. Figure 12, shows the polarity of P_2 in the area of average monthly temperatures in the catchments of the Asian continent. All catchments are in the area of negative trends of temperature polarization factors. The highest value is found in the AMUR catchment. Figure 13, shows the P_2 polarization in the area of average monthly temperatures in the catchments of the South American continent. The VINCES, ESMERALDAS and MIRA catchments located in quadrant IV are highlighted, i.e. both trends are decreasing. In quadrant I, the highest value of the index is found in the CUYUNI River catchment. Figure 14, shows the polarity of P_2 in the area of average monthly temperatures in the catchments of the North American continent. The catchment of the SAN PEDRO River shows increasing trends in the polarization factors. In the other catchments, both decreasing. Figure 15, shows the polarization of P_2 in the area of average monthly temperatures in the catchments of the continent of Australia and Oceania. The WAIKATO River catchment showed increasing trends in polarization factors. In the PURARI and DE GREY catchments, both show decreasing trends. Figure 16, shows P_2 polarization in the area of average monthly temperatures in the catchments of the European continent. The SVARTA river catchment showed decreasing trends of polarization factors.

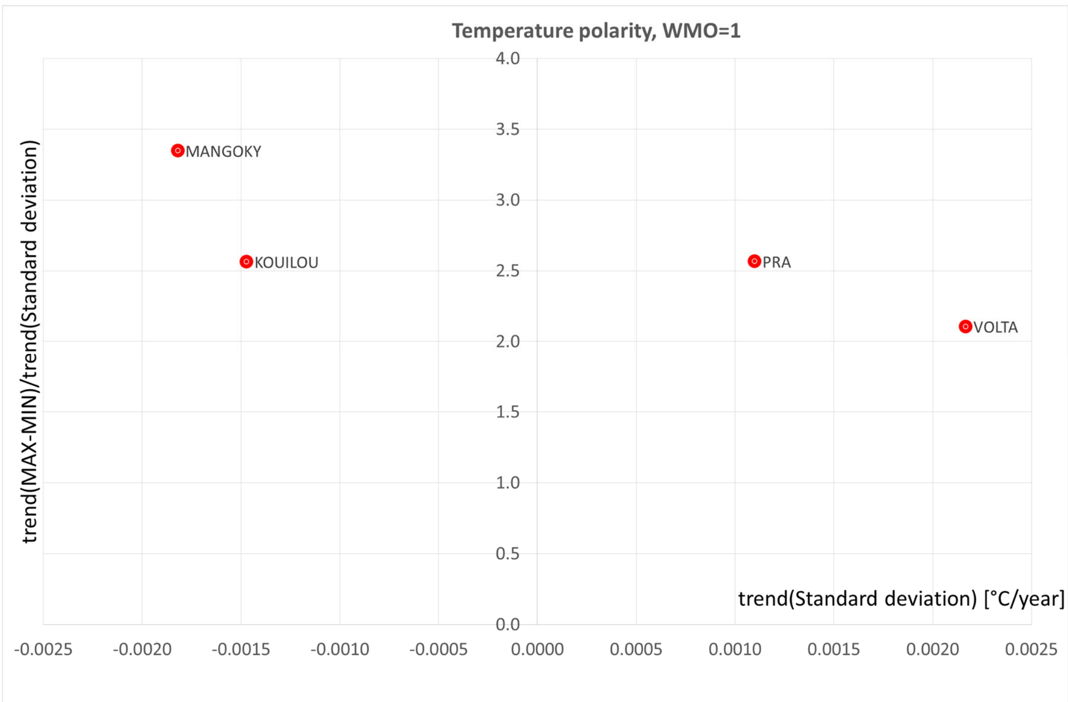

Figure 11. Watersheds in the region for which WMO_REG=1, in which significant polarization trends were identified for monthly mean temperatures during the period from 1901 to 2010 at a significance level of 5%.

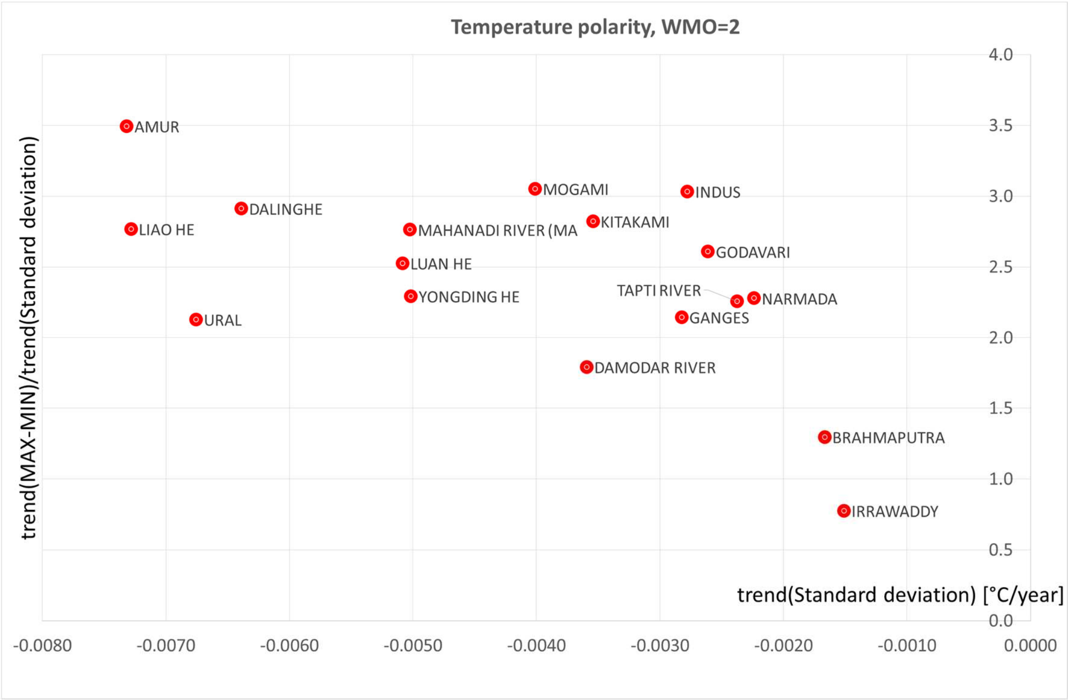

Figure 12. Watersheds in the region for which WMO_REG=2, in which significant polarization trends were identified for monthly mean temperatures during the period from 1901 to 2010 at a significance level of 5%.

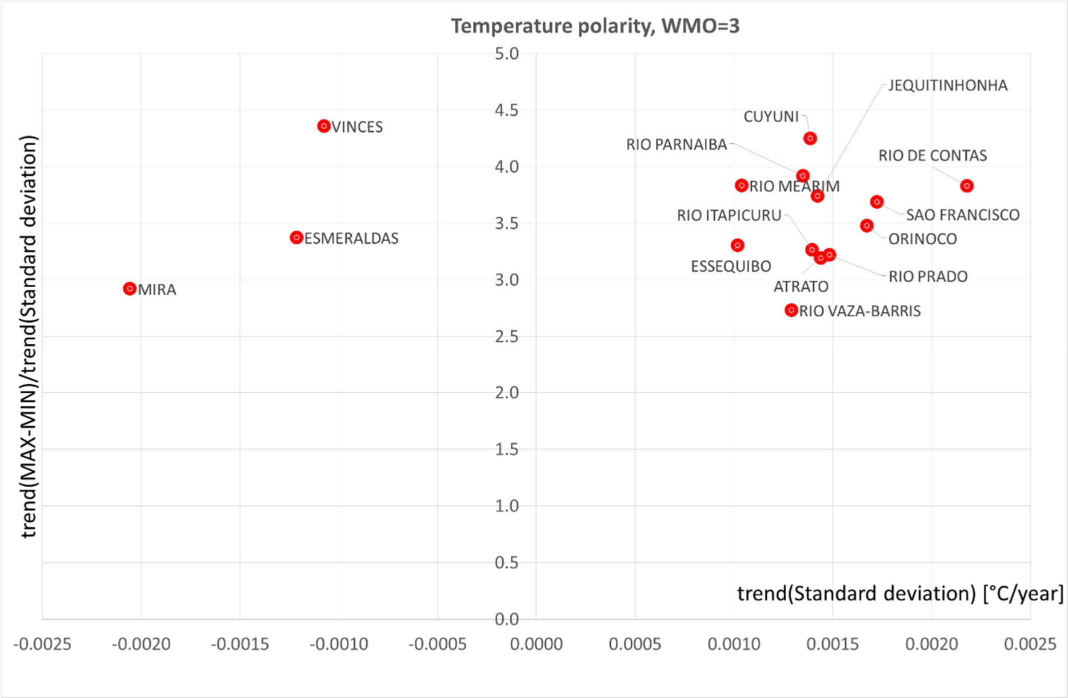

Figure 13. Watersheds in the region for which WMO_REG=3, in which significant polarization trends were identified for monthly mean temperatures during the period from 1901 to 2010 at a significance level of 5%.

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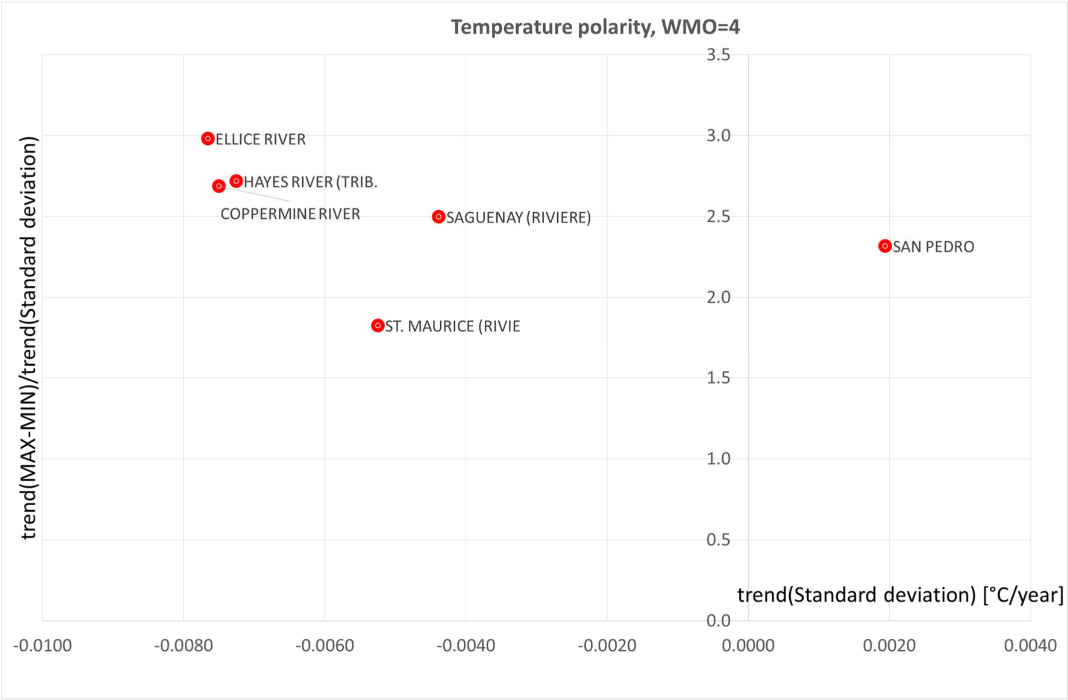

Figure 14. Watersheds in the region for which WMO_REG=4, in which significant polarization trends were identified for monthly mean temperatures during the period from 1901 to 2010 at a significance level of 5%.

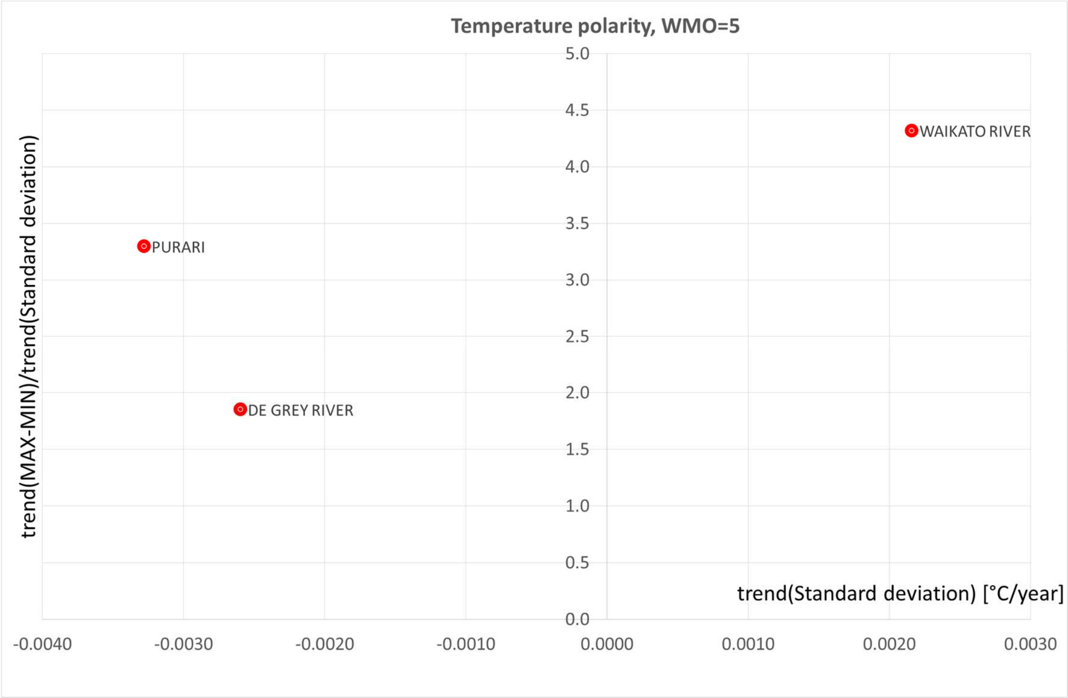

Figure 15. Watersheds in the region for which WMO_REG=5, in which significant polarization trends were identified for monthly mean temperatures during the period from 1901 to 2010 at a significance level of 5%.

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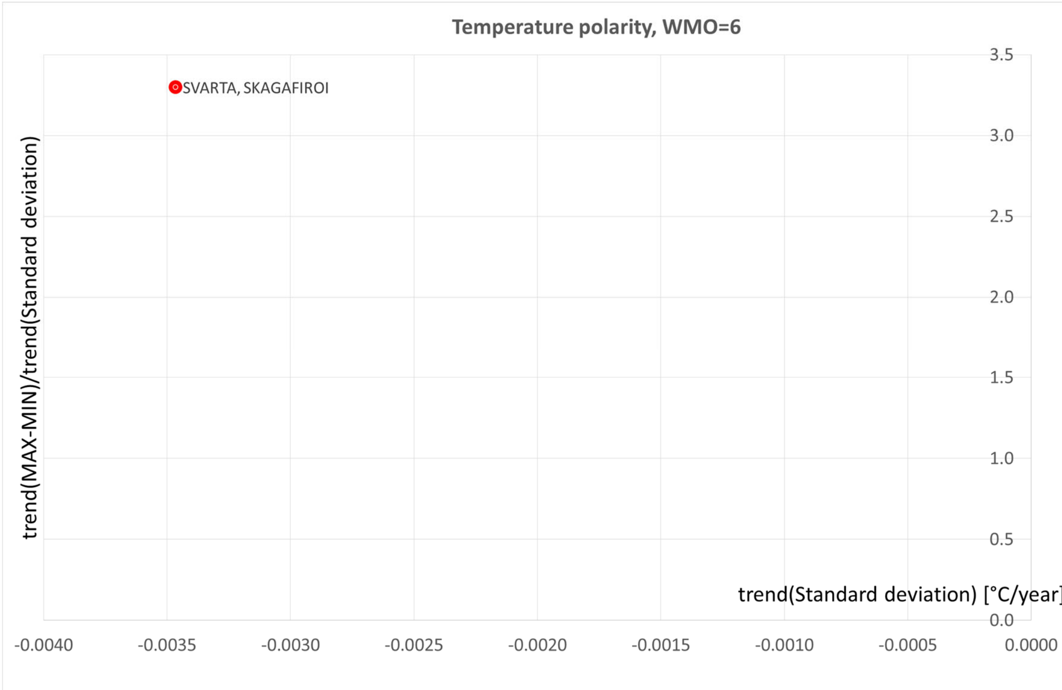

Figure 16. Watersheds in the region for which WMO_REG=6, in which significant polarization trends were identified for monthly mean temperatures during the period from 1901 to 2010 at a significance level of 5%.

9. Conclusions

The article presents a multi-country analysis of monthly precipitation totals based on the GPCC database, and monthly mean temperatures (NOAA data) for 377 catchments distributed across the globe. Land area coverage reaches 13%. 110-year data sequences from 1901 to 2010 calculated from grid data with a spatial resolution of 0.5°x 0.5° longitude and latitude were analyzed. The data were analyzed in cross sections of calendar year months. In the study, 377 catchments x110 years x 12 months = 497640 precipitation data strings and as many temperature data strings were created and analyzed, for a total of about 1 million long-term strings characterizing climatic phenomena in the area of precipitation and temperature variability. Statistical characteristics in terms of calendar months were calculated and the min, max, standard deviation values were given. The indices of the adopted measures of polarization were calculated based on the factors of amplitude and standard deviation, and based on the trends of these characteristics. Non-parametric TMK and TP trends were used in the analysis.

The polarization index taking into account both precipitation and temperature phenomena is shown in Figure 17. On the horizontal axis is the polarization index P_2 of monthly precipitation totals, while on the vertical axis is the polarization index P_2 of monthly average temperatures. The points depicting the polarization phenomenon furthest from the center of the system indicate a high intensity of polarization. The highest values are found in the VINCES (South America) catchment with positive values of both trends of precipitation polarization factors and negative values of both trends of temperature polarization factors. This indicates an increase in precipitation factor anomalies. Calming of precipitation and temperature anomalies (negative trends in both precipitation and temperature factors) are expected in the BRAHMAPUTRA and YONGDING HE catchments. For the PURARI (Australia and Oceania) and MANGOKY - Africa catchments, calculations indicate a calming of anomalies in both the temperature and precipitation variability area. Temperature and precipitation anomalies are to be expected in the ATRATO: South America catchments.

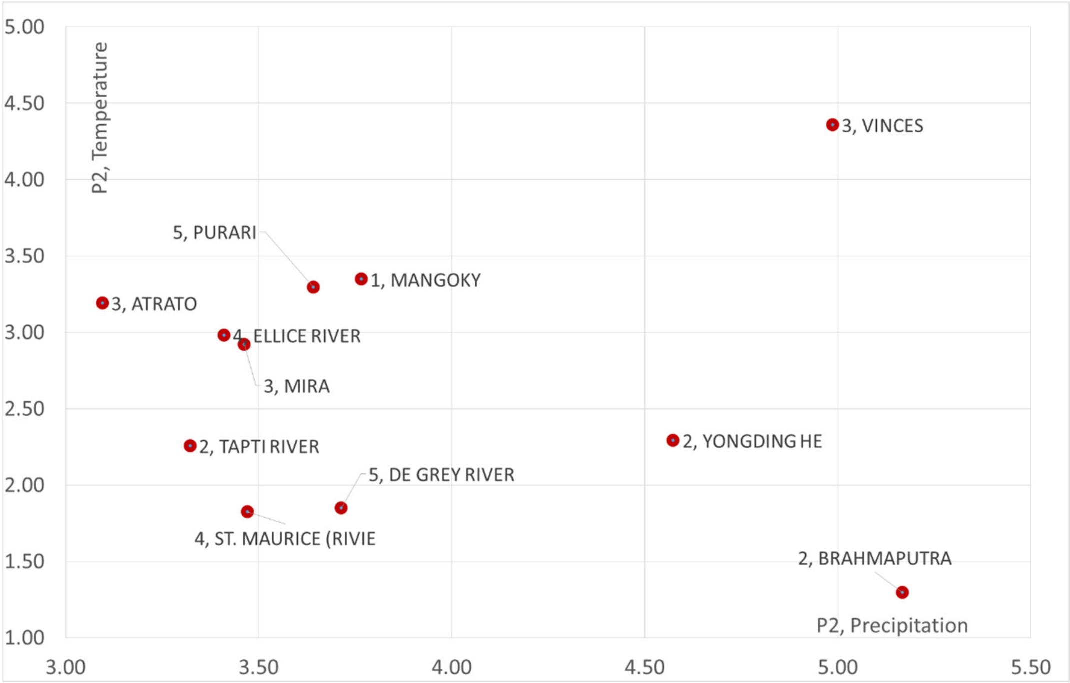

Figure 17. A picture of polarization phenomena in the area of precipitation and temperature, taking into account WMO regions.

In the calculations carried out in determining the P_2 polarity index, in addition to cases of trends with a concordant sign (both polarity factors positive or both negative), there were also cases where catchments showed opposite signs of trends in the P_2 polarity factors in both precipitation and temperature sequence analysis. However, adopting a 5% significance level for the MKT test resulted in the rejection of these cases. The concordance of the trend sign (max-min) and trend (STD) for precipitation is due to the fact that in most cases the variability of precipitation is correlated with changes in its maximum and minimum values. In other words, when there are periods of increased precipitation, we usually also observe higher maximum and minimum values of precipitation, and thus an increase in variability relative to the average value. Similarly, when there are periods of increased drought, there tend to be lower maximum and minimum values of precipitation, and variability relative to the average is also lower. However, it should be remembered that there are also periods when maximum and minimum values of precipitation may increase or decrease, but the variability relative to the average remains constant or changes in the opposite direction.

Analysis of temperature and precipitation polarities is necessary because of their impact on many aspects of the natural and human environment. Based on long-term sequences of precipitation and temperature, the article shows that the polarization process is present and can lead to significant changes in the local environment. Such changes can affect the distribution of plant and animal species, weather patterns, agriculture and the economy, and more. In addition, precipitation and temperature play a key role in the global energy and water cycles, and their variability can lead to floods, droughts and other natural disasters. For this reason, knowledge of the nature of changes and time scales is used to reduce the risk of floods and droughts. A proper understanding of the polarization of extreme events is also crucial for developing strategies related to mitigation and minimizing the impact of anthropogenic factors. The article shows the possibilities of assessing polarization in the area of precipitation variability and temperatures, which can help develop such strategies. The following climate changes suggest that polarization is becoming more entrenched, and the associated extremes are becoming more intense and unevenly distributed. Therefore, analysis of temperature and precipitation polarization is important for understanding climate change and its impact on our environment, as well as for developing effective strategies to manage risk and minimize human impact on the environment.

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Conflicts of Interest: The author declare no conflict of interest.

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