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Earth Expansion – Caused by Cosmological Factors?

Volkmar Müller

Independent Researcher, Germany, 08428 Langenbernsdorf, Trünziger Str. 20;
v.mueller@sternwarte-crimmitschau.de

Abstract

Based on highly accurate measurements of the Earth's radius at various times, it is assumed that it is approximately constant in numerical terms. However, little attention has been paid to the scale drift observed in these measurements. The drift rate found is of the same order of magnitude as the rate of cosmological expansion, which may have important implications for geophysics and cosmology.

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1. Introduction

The velocity of expansion of the universe is characterised by the parameter discovered by Hubble and Lemaître (the Hubble constant) and refers to a distance of one megaparsec (Mpc). It is approximately 70 ± 4 (km/s)/Mpc. One Mpc corresponds to approximately 3.26×10^{6} light-years or 3.09×10^{24}cm. By comparison, the Earth's radius is 6.4×108cm, which is approximately 4.8×10^{15} times smaller. If we convert the increase in velocity per Mpc to the Earth's radius, we get ~0.05 (cm/a)/R_{Earth}, which corresponds to H_0 = 73 (km/s)/Mpc. However, according to current cosmological assumptions, this is not permissible, as cosmic expansion is assumed only for cosmologically relevant distances. It is therefore assumed that the Earth's radius is not cosmologically relevant.

Occasionally, instead of the Hubble constant (H_0), the resulting cosmological expansion rate (here: α) is used. This is derived from the Hubble constant to

α **= Δr x(r x t)-1** (1)

Δr = distance travelled during time period t, r = distance, t = time period

For a distance of, say, 1 Mpc, the following can then be written for H0 = 73 (km/s)/Mpc

α = 73 km x (3.1 x 1019 km x 1s)-1= 2.35 x10-18s-1.

For a Hubble constant of 73 (km/s)/Mpc, the cosmological expansion rate is 2.35 × 10−18 s−1.

About 40 years ago, S.W. Carey came up with the idea that the expansion of the universe could be explained cosmologically [1]. The reason for this is not known. Perhaps the findings of L. Egyed played a part, as he assumed that the Earth's radius was expanding at a rate of approximately 0.5 mm per year, which corresponds to the rate of cosmological expansion. It now appears that X. Wu et al. [2] have refuted the notion that the Earth is expanding. Although the study presents strong arguments in favour of Earth expansion, the measurement results indicated an expansion of the Earth's radius of 0.1±0.2 mm/year. Wu's results thus confirm that Earth expansion—that is, a significant relative velocity between the centre of mass and the Earth's surface—can be ruled out. We concur with this conclusion.

2. Arguments

In addition to the assumptions put forward by S.W. Carey and L. Egyed, there are many other arguments in favour of the expansion of the universe; here, we shall confine ourselves to a few cosmological arguments. A cosmological argument in favour of the expansion of the Earth can be put forward if, for example, the results of a study show that the expansion of the Earth's radius is close to 2.35 × 10−18 s−1, i.e. close to the Hubble constant. Here are a few examples:

1

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The value for the expansion of the Earth's radius, found by L. Egyed to be approximately 0.5–0.66 mm/year, yields an expansion rate of $\alpha \approx 2.49 \times 10{-}18$ s−1 when equation (1) is applied, and can be interpreted as having a cosmological origin. The result agrees with the cosmological expansion rate to 18 decimal places.

2

In 1990, H. Ruder, M. Schneider and M. Soffel carried out measurements of the Earth's body using the Wettzell geodetic fundamental station [3]. Among other things, this yielded a result for the polar distance between the Earth's poles. This distance is apparently increasing by 1 mm/year. The polar radius of the Earth is increasing by 0.5 mm/year, which corresponds to an expansion rate a as given by (1).

α = 0.05 cm x (6370 x 105 cm x 31.56 x106 s)-1 = 2.49 x10-18 s-1. Although this value corresponds to the rate of cosmic expansion (the Hubble constant), post-glacial uplift was assumed. The resulting deceleration of the Earth's rotation is given as approximately 8 × 10−11 per year. This corresponds to 2.53 x 10-18 s-1.

3

Records of eclipses and the discovery of fossils have shown that the length of the day is subject to a secular delay, in addition to sporadic and periodic changes. As early as 1959, P. Ahnert stated that this secular delay amounts to 29.95 seconds per Julian century. Meanwhile, in 2008, N. A. Bär [4] stated this difference in the length of the day as follows:

Δt = 29.2208 x T2 (2)

(Δt = in seconds, T = number of Julian centuries)

Taking into account the length of the Julian century, which is 31.56 × 108 seconds, equation (2) gives the rate of deceleration α of the Earth's rotation

$\alpha \approx$ 29.22 x(1/31.56 x108)2 = 2.93 x10-18 s-1

The Earth's rotation is slowing down at roughly the same rate as the expansion of the universe.

4

The marine crust is approximately 200×10^6 years old, whilst the continental crust is approximately 4 to 4.2×10^9 years old, which is ~30% of the so-called age of the Earth. As H_0 has remained approximately constant over the past 4.1×10^9 years, distances in the universe have expanded by ~30% during this period.

If the Earth had expanded along with the universe, then 4.1×10^9 years ago – disregarding other factors – it would have had a radius of 70% of its current radius, i.e. approximately 4,459 km. The radius would have increased by ≈ 1,911 km. Applying equation (1) gives

Δr = 6370 km x 4.1 x 109 x 31.56 x 106 s x 2.35 x 10-18 s-1= 1937 km.

According to (1), the resulting value for radial expansion differs by only 26 km. The agreement between the two growth values is remarkable, and it appears that the Earth's radius is expanding along with the universe. However, this is not possible within the framework of standard cosmology, a fact that appears to be confirmed by the measurement results of Wu et al [2].

The problem of a very high density at that time ceases to apply once the next point is accepted. Consequently, the Earth's radius remained numerically constant, and with it the density.

5

Wu's results, as reported in [2], are not being questioned here. However, it seems to be generally overlooked that this study yielded a further result: a origin shift or scale shift was observed. The scale used for measurement drifts by approximately 0.05 cm over the course of a year, relative to the Earth's radius. This means that, whilst the Earth's radius remains numerically constant, its value changes by this amount due to scale drift. It should be noted that equation (1) yields a drift rate a for the Earth's radius (6370×10^5 cm) over the course of a year (31.56×10^6 s), which is equal to the cosmological expansion rate! It should be noted here that even for cosmic distances z > 2, the recession velocity cannot be a relative velocity of the observed objects because v > c. Therefore, scale drift must also be present in these cases.

3. Conclusions

The Earth is expanding without changing its numerical radius or density. This may seem strange, but the same must be assumed for the radius of distant galaxies, which are evidently expanding at the same rate of expansion without any apparent cause, as the author explains in [5]. In this case too, cosmological expansion is generally ruled out. Reference [5] also lists further examples in which the same expansion rate or scale drift is observed. This includes, for example, the Moon's orbit. Tidal friction is likely to be negligible in this case because the rate of expansion or drift corresponds exactly to other drift rates. The fact that this expansion, observed in many places, is not a numerical expansion but rather scale drift can also be inferred from the fact that, for very distant galaxies, the recession velocity exceeds the speed of light. It is therefore not a matter of relative velocity but of scale drift, as is the case with the Earth's radius. For intermediate distances, such as the distance to the Moon or the radius of a galaxy, scale drift can also be assumed to account for their expansion. Since the distance to the Moon is approximately 60 times greater than the Earth's radius, the annual drift value is calculated as 60 × 0.05 cm/a = 3.0 cm/a. To this drift value must be added a small value for relative velocity due to tidal friction, and the LLR measurement of 3.82 ± 0.07 cm/a provides a margin of error: With a relative velocity of ~0.8 cm/a, the Earth's Roche limit was not a problem for the Moon's existence, even in the early days. This becomes problematic at a relative velocity of 3.82 ± 0.07 cm/a.

Galaxy radii appear to have been smaller with increasing distance, suggesting they have expanded [6]. According to conventional wisdom, they cannot be undergoing cosmological expansion, yet according to V. Müller [5] they are. The drift of peripheral parts away from the centre resolves these issues. It appears that the drift always increases with the distance from the respective gravitational centre at the rate of cosmological expansion α, provided there are no forces other than gravitational attraction at play

As the distance increased, the spatial and temporal units become smaller and approach zero at 13.8×10^9 light-years: The days and UT seconds were shorter, the galaxies were smaller [6], the distance to galaxies was shorter, the cosmological distance scale z encompassed shorter time scales, our lunar orbit was smaller, as were other lunar orbits [7], etc. All these examples relate to spaces and objects whose internal structure is dominated by gravity. According to T. v Flandern, these objects behave 'dynamically'. One can assign them their own scale, which differs from the SI scale by the cosmological expansion rate (~2.35 × 10−18 s−1). Cosmic expansion and the Big Bang do not occur on this scale. Objects dominated by other fundamental forces are not included: Continental plates, small asteroids <200 km, everyday objects, pendulums, etc. are prevented from expanding or drifting by stronger internal forces (electromagnetism).

Mars is undoubtedly one of the objects dominated by gravity. In our view, it should therefore rotate with a deceleration of approximately 2.35 × 10−18 per second, just like these objects and the Earth. Given the current state of technology, demonstrating a joint delay in rotation should pose no problem, which amounts to proving that the Earth is expanding along with the universe.

Conflicts of Interest: There are no conflicts of interest.

References

1. Wikipedia " Expanding Earth" https://en.wikipedia.org/wiki/Expanding_Earth (accessed 2026 Jan.25.)
2. X.Wu, X.Collilieux, Z. Altamimi, B.L.A.Vermeersen, R.S.Gross, I.Fukumori,[Online]"Accuracy of the International Terrestrial Reference Frame origin and Earth expansion",Geophysical Research Letters,v 38,(2011) L13304.5 PP, https://agupubs.onlinelibrary.wiley.com/doi/full/10.1029/2011GL047450 (accessed 2026 Jan.25.)
3. H.Ruder,M.Schneider,M.Soffel [Online] „ Geodäsie und Physik" Phys. BI. 46 (1990) Nr. 2 p 41 https://onlinelibrary.wiley.com/doi/pdf/10.1002/phbl.19900460204 (accessed 2026 Jan.25.)

 doi:10.20944/preprints202603.2166.v1

4. N.A.Bär [Online] „Die Akzeleration“,(Dated:Apr 11,2013) http://www.nabkal.de/akzel.html (accessed 2026 Jan.25.)
5. V.Müller [Online]" Kosmologische Expansionsrate - Diverse Meßergebnisse und Interpretation III” https://www.researchgate.net/publication/393484360_Cosmological_Expansion_Rate-Various_Measurements_and_Interpretation_III
6. P.v Dokkum, M.Franx, M.Kriek [Online] „A high stellar velocity dispersion for a compact massive galaxy at z = 2.2“. (2009) http://arxiv.org/abs/0906.2778v1 (accessed 2026 Jan.25.)
7. Lainey V.,Gomez L.C.,Jim Fuller J.,et al. [Online] "New tidal paradigm in giant planets supported by rapid orbital expansion of Titan" *https://arxiv.org/ftp/arxiv/papers/2006/2006.06854.pdf* (accessed 2021 Sep 04.)