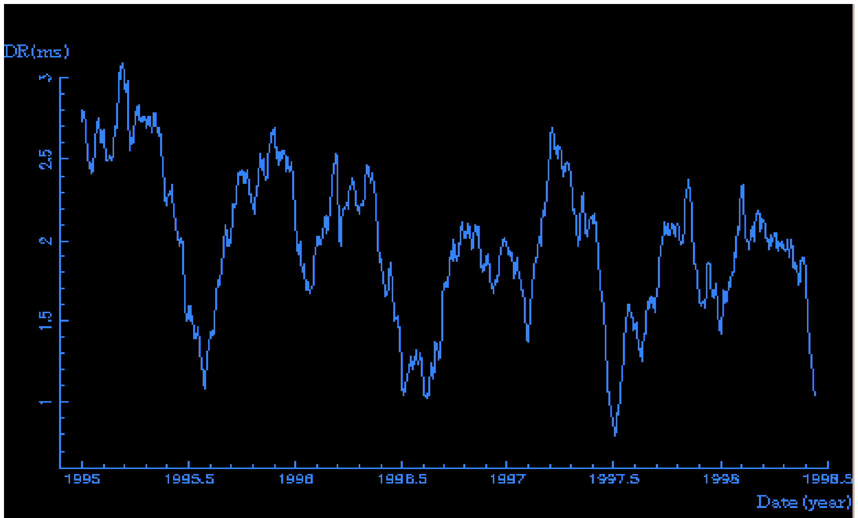


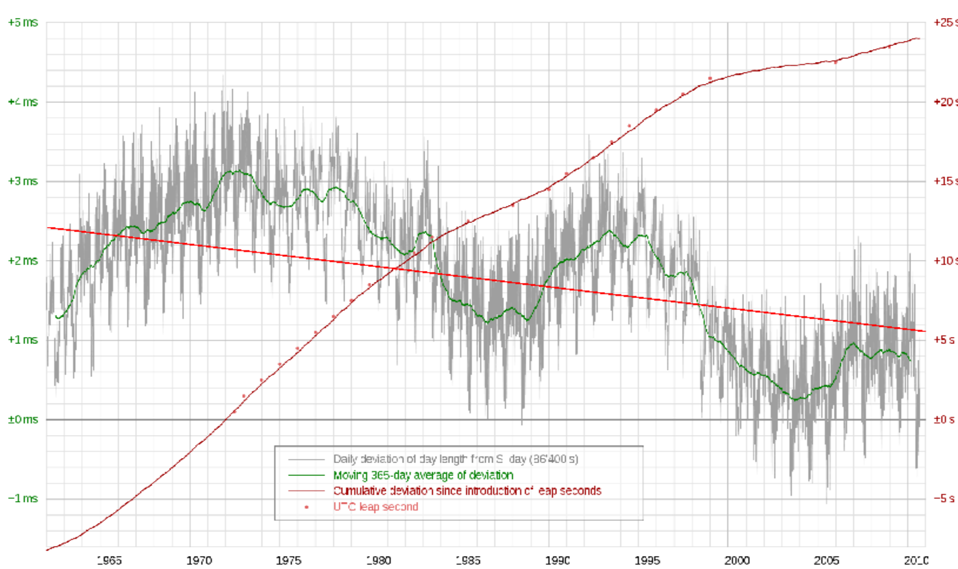
Figure O-4: Excess to 86400s of the duration of the days, combined GPS solution, 1995-1998.

Presently the excess length of each day (to SI reference) is about 1 millisecond seconds.

Accumulating through a year, the step-out between atomic time and Earth rotation time is about 0.55 seconds.

We calculated that the transfer of angular momentum to the Moon from the Earth's rotation causes a deceleration in the rotation rate equivalent to a lengthening of rotation period of about 21.4 x10^{-6} seconds/year. Then, during the next year, we might expect the Earth's rotation period of 1 day (86400 seconds) to have increased by roughly another 21 microseconds. It isn't, however, a regular increase as many other effects affect the rotation period.

From WikiPedia, a less detailed graph of the past 50 years shows:



The straight red line is our calculated 21.4 microsecond/year change in the rotation period; in 50 years, this has accumulated a 1.07 millisecond change of period. The gray line shows the change of rotation period (lod) during the past 50 years and the green line its yearly average. The upward trending redline shows the accumulating time difference between the atomic time standard clock and the Earth rotation clock. Since 1962, there has been an accumulated step out of about 32 seconds; 25 leap seconds have been added to correct away the continuing accumulation since 1972.

http://en.wikipedia.org/wiki/Earth%27s_rotation
http://en.wikipedia.org/wiki/File:Deviation_of_day_length_from_SI_day_.svg

Lambeck [http://rsta.royalsocietypublishing.org/content/287/1347/545.full.pdf+html] (first page) notes that a non-tidal acceleration of (1.8 +/- 1.0) x 10^{-22} s^{-2} is equivalent to a decrease in length of day of (0.7 +/- 0.4) x 10^{-3} seconds/century or (0.7 +/- 0.4) x 10^{-5} seconds/year. I don't immediately see how one converts from one to the other. Our calculations correspond to the latter measures. We calculate 2.14 x 10^{-5} seconds/year ***increase*** in the length of day (or rotation period). This deficit (which you are accounting for by a decrease in the Earth's moment of inertial due to polar glacial unloading) would account for about 1.44 x 10^{-5} seconds/year increase in the length of day. This is Peltier's story with somewhat different numbers... still I don't immediately see how to convert the “acceleration” measure into a LOD measure.

More:

Our class calculation obtained a change in period of the Earth's rotation of about dP/dt = 2.14x10^{-5} seconds/year or $P = 2\pi/\omega$ so that $\omega = 2\pi P^{-1}$ and so we obtained $d\omega/dt = -2\pi P^{-2}\, dP/dt$ where P = 86400 seconds.

Our $d\omega/dt = -8.42\text{x}10^{-10}\, dP/dt = -1.80\text{x}10^{-14}$ radians/(second year) = -5.68 x 10^{-22} radians/second^2. This, I suggest is our calculation of the “deceleration” of Earth's rotation rate in same units as Lambeck is using. He argues for a non-tidal acceleration of (1.8 +/- 1.0) x 10^{-22} s^{-2} which if added to our result would account for a deceleration of Earth's rotation rate of (-3.88 +/- 1.0) x 10^{-22} s^{-2}. I suggest that this corresponds to a dP/dt corrected for this non-tidal acceleration of dP/dt = (1.46 +/- 0.37) x10^{-5} s/yr.

Peltier and Wu (I suggest) claim to show that the non-tidal spin down is due to the post-glacial rebound change of the Earth's moment of inertia. This corrected value for dP/dt accords reasonably well with that described on the Wikipedia page: