

## Time ephemeris

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The location-independent part of TCB–TCG, the difference between the two new time scales adopted by the IAU (1992), was integrated numerically for three JPL planetary/lunar ephemerides; DE102, DE200, and DE245. The differences among these three integrations were mostly explained by the difference in the adopted constants of the ephemerides. It was shown that the post-Newtonian correction and the perturbation by asteroids are negligible except for the mean rate.  $L_C$ . The comparison of these numerical integrations with the analytical formulas of Hirayama *et al.* (1987) and Fairhead and Bretagnon (1990) as well as their extended versions lead to the best estimate of  $L_C$  as

$$L_C = L_C^{(TE245)} + \Delta L_C^{(PN)} + \Delta L_C^{(A)} = 1.480\,826\,845\,7 \times 10^{-8} \pm 1.0 \times 10^{-17}. \quad (1)$$

Combining this with the recent value of the geoid potential in Bursa *et al.* (1992), we estimated the value of  $L_B$ , the scale difference between TCB and TT, as

$$L_B = 1.550\,519\,748 \times 10^{-8} \pm 4 \times 10^{-17}. \quad (2)$$

Table I summarizes these conclusions. These estimates of  $L_C$  and  $L_B$  are more reliable than the former values we gave (Fukushima *et al.* 1986). The new estimate of  $L_B$  will be useful in converting the numerical values of some precisely determined astronomical constants such as AU measured in meter from those in TDB to those in TCB. Also the numerically integrated TCB–TCG, which are to be called *Time Ephemeris*, will be useful when converting between TCB and TDB, i.e. the time scales themselves.

TABLE I  
Estimate of  $L_C$  and  $L_B$

Item	Meaning	Value	$\sigma$	Note
	Main part	1 480 826 856.21	0.50	TE245
	Post-Newtonian correction	-10.97	0.01	TE245PN
	Asteroid perturbation	+0.45	0.5	TE245A
$L_C$	Mean rate of TCB–TCG	1 480 826 845.7	1.0	Sub Total
$L_G$	Mean rate of TCG–TT	69 692 901.9	3	Bursa <i>et al.</i> (1992)
$L_B$	Mean rate of TCB–TT	1 550 519 748	4	Total

Notes: The unit is  $10^{-17}$ .

Fig. 2. Periodic part of TE200–TE245

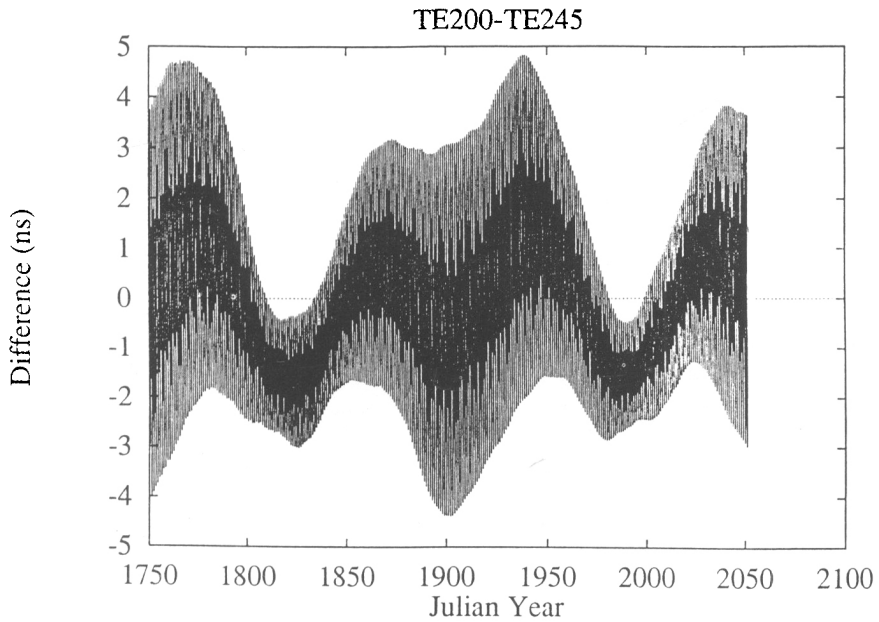


Fig. 10. Periodic part of TE245–FB2R for 1980-2000

