Supplement of "Formulation of a new explicit tidal scheme in revised LICOM2.0" #1

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Supplemental materials

1 Functions of φ_m and λ_m with respect to universal time

The projected position and distance of the sun and the moon on the earth are obtained by polynomial expansion, and the specific formula is given by Sun and moon, Satellite Orbits: Models, Methods and Applications (Montenbruck and Gill, 2000).

Firstly, the following relations allow the computation of lunar longitude and latitude with a typical accuracy of several arcminutes and about 500 km in the lunar distance. The calculation of the perturbations is based on five fundamental arguments: the mean longitude L_0 of the Moon, the Moon's mean anomaly l, the Sun's mean anomaly l', the mean angular distance of the Moon from the ascending node F and the difference D between the mean longitudes of the Sun and the Moon.

$$L_0 = 218.31617 + 481267.88088 \cdot T - 1.3972 \cdot T$$
$$l = 134.96292 + 477198.86753 \cdot T$$
$$l' = 357.52543 + 35999.04944 \cdot T$$
$$F = 93.27283 + 483202.01873 \cdot T$$
$$D = 297.85027 + 445267.11135 \cdot T$$

Where $T = (\mathrm{JD} - 2451545.0)/36525.0$ is the number of Julian centuries since 1.5 January 2000 (J2000), and JD is the Julian Date. Using these values the Moon's longitude with respect to the equinox and ecliptic of the year 2000 may be expressed as

$$\lambda_m = L_0 + 6.28889\sin l + 0.21361\sin 2l - 1.27389\sin(l-2D) + 0.65833\sin 2D - 0.18556\sin l' - 0.11444\sin 2F - 0.05889\sin(2l-2D) - 0.05722\sin(l+l'-2D) + 0.05333\sin(l+2D) + 0.04583\sin(l'-2D) + 0.04111\sin(l-l') - 0.03472\sin D - 0.03056\sin(l+l') - 0.01527\sin(2F-2D)$$

Here, the first two terms describe the motion in an ellipse of eccentricity e=0.055. whereas the remaining terms denote the various perturbations. The lunar latitude is given by

$$\varphi_m = 5.14444\sin(F+\lambda-L_0+0.11444\sin 2F + 0.14278\sin l' - 0.14611\sin(F-2D) + 0.01222\sin(l+F-2D) - 0.00861\sin(-l+F-2D) - 0.00694\sin(-2l+F) - 0.00639\sin(l'+F-2D) + 0.00583\sin(-l+F) + 0.00306\sin(-l'+F-2D)$$

2 Figure R1. Spatial patterns of the spring tides for Exp1 (left) and Exp2 (right). The red boxes in Exp1 mean the closed minimums. The units are cm.

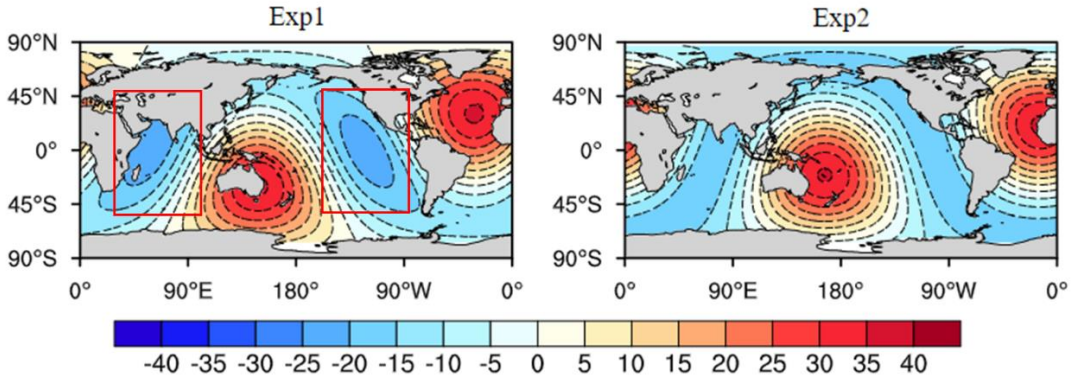

Figure R1. Spatial patterns of the spring tides for Exp1 (left) and Exp2 (right). The red boxes in Exp1 mean the closed minimums. The units are cm.