ERRATUM

Erratum to: Reports of the IAU Working Group on Cartographic Coordinates and Rotational Elements: 2006 & 2009

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Abstract   The primary poles for (243) Ida and (134340) Pluto and its satellite (134340) Pluto : I Charon were redefined in the IAU Working Group on Cartographic Coordinates and Rotational Elements (WGCCRE) 2006 report (Seidelmann et al. in Celest Mech Dyn Astr **98**:155, 2007), and 2009 report (Archinal et al. in Celest Mech Dyn Astr **109**:101, 2011), respectively, to be consistent with the primary poles of similar Solar System bodies. However, the WGCCRE failed to take into account the effect of the redefinition of the poles on the values of the rotation angle W at J2000.0. The revised relationships in Table 3 of Archinal et al. (2011) are

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$$W = 274°05 + 1864°6280070\,d \quad \text{for } (243)\,\text{Ida,}$$
$$W = 302°695 + 56°3625225\,d \quad \text{for } (134340)\,\text{Pluto, and}$$
$$W = 122°695 + 56°3625225\,d \quad \text{for } (134340)\,\text{Pluto : I Charon}$$

where d is the time in TDB days from J2000.0 (JD2451545.0).

Erratum to: Celest Mech Dyn Astr (2007) 98:155–180
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**   Celest Mech Dyn Astr (2011) 109:101–135**
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The primary pole for Solar System bodies other than planets and their satellites is the pole about which the body appears to rotate in a counterclockwise direction. However, for planets, the primary pole is the one on the north side of the Solar System's invariable plane. The obliquities of the equators of (134340) Pluto and (134340) Pluto: I Charon to the orbit of their barycenter around the Sun are large enough that the poles they rotate about in a counterclockwise direction are on the south side of the invariable plane. Thus, the designation of Pluto as a dwarf planet required redefinition of the primary poles of Pluto and Charon to remain consistent with the definition of the primary pole. These redefinitions were made in Table 3 of the 2009 report of the IAU Working Group on Cartographic Coordinates and Rotational Elements (WGCCRE) (Archinal et al. 2011).

Similarly, the original (prior to 2003) definition of (243) Ida's primary pole—that used for planets and satellites—was the (north) pole it rotated about in a clockwise direction from

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above. Thus, to be consistent with the definition for other minor planets, the redefinition of Ida's primary was made in the 2006 report of the WGCCRE (Seidelmann et al. 2007).

Changing the definition of the primary pole requires not only a change in the pole position, but a change in the rotation angle, W. This angle is measured in an easterly direction along the body's equator from the node Q (Archinal et al. 2011) to the intersection of the body's prime meridian and its equator. Node Q is defined as the node at the intersection of the body's equator and the equator of the ICRF whose right ascension is $90° + \alpha_0$ where α_0 is the right ascension of the primary pole.

Switching the primary pole of a body is not a rotation, but a reflection with the body's equator as the plane of reflection. Performing this reflection results in the following changes:

1. The node designated as Q switches from its original position to the other intersection of the body's equator and the equator of the ICRF.
2. The easterly direction along the body's equator switches direction.
3. By item 2, the sign of the rate of change of W changes, but its absolute rate is unaffected.
4. By items 1 and 2, the value of W_0, W at the standard epoch, becomes its supplementary angle

$$W_0(new) = 180° - W_0(old) \tag{1}$$

Seidelmann et al. (2007) and Archinal et al. (2011) did change the sign of the rate of W, but failed to adjust the value of W_0. The corrected relations for Table 3 are

$$
\begin{aligned}
W &= 274°\!.05 + 1864°\!.6280070\,d \quad \text{for Ida,} \\
W &= 302°\!.695 + 56°\!.3625225\,d \quad \text{for Pluto, and} \\
W &= 122°\!.695 + 56°\!.3625225\,d \quad \text{for Pluto : I Charon,}
\end{aligned} \tag{2}
$$

where d is the time in TDB days from J2000.0 (JD2451545.0).

References

Archinal, B.A., A'Hearn, M.F., Bowell, E., Conrad, A., Consolmagno, G.J., Courtin, R., Fukushima, T., Hestroffer, D., Hilton, J.L., Krasinsky, G.A., Neumann, G., Oberst, J., Seidelmann, P.K., Stooke, P., Tholen, D.J., Thomas, P.C., Williams, I.P., Celest. Mech. Dyn. Astr. **109**, 101 (2011). doi:10.1007/s10569-010-9320-4
Seidelmann, P.K., Archinal, B.A., A'Hearn, M.F., Conrad, A., Consolmagno, G.J., Hestroffer, D., Hilton, J.L., Krasinsky, G.A., Neumann, G., Oberst, J., Stooke, P., Tedesco, E.F., Tholen, D.J., Thomas, P.C., Williams, I.P., Celest. Mech. Dyn. Astr. **98**, 155 (2007). doi:10.1007/s10569-007-9072-y