Correction to "A Comparison of Methods for Computing Gravimetric Quantities from High Degree Spherical Harmonic Expansions" by C.C. Tscherning, R.H. Rapp, C. Goad, published in Vol. 8 (1983), pp. 249-272.

An error has been detected in the subroutine GPOTDR, published in the paper mentioned in the title of this note. The error occurs in the computation of one of the second order derivatives of the potential, V,

$$\frac{1}{r^2} \frac{\partial}{\partial\phi} \left(\frac{1}{\cos\phi} \frac{\partial}{\partial\lambda} V(\phi,\lambda,r)\right), \qquad (*)$$

where r is the radial distance, ϕ the geocentric latitude and λ the longitude.

In order to compute this quantity, the sum of the derivatives of the series

$$\frac{1}{r^3} \sum_{n=1}^{m} \sum_{j=m}^{n} \left(\frac{a}{r}\right)^n \frac{1}{\cos\phi} P_{nm} (\sin\phi)(-a_{nm} \sin m\lambda + b_{nm} \cos m\lambda)\cdot m$$

with respect to ϕ are computed. (Here P_{nm} are the associated Legendre functions and a the semi-major axix). Clenshaw summation is used twice, once for fixed order (m) and once with respect to the degree (n).

In the final step (eq. (19) in the paper), the result of the recursion in multiplied by the polynomial of lowest degree, which normally is $P_{oo} = 1$. However, when computing (*) the polynomial associated with the lowest degree is

$$\left(\frac{a}{r}\right) \frac{1}{\cos\phi} P_{11}(\sin\phi) = \left(\frac{a}{r}\right) \qquad (**)$$

for unnormalized coefficients, and (cf. eq. (20))

$$(\frac{a}{r})\ \frac{1}{\cos\phi}\ P_{11}(\sin\phi)\ \frac{1}{\sqrt{2}} = (\frac{a}{r})\ \frac{\sqrt{2}}{2}$$

for quasi-normalized quantities. This fact was not taken into account in the original version of the algorithm, in which the statement just after label 2000 must be changed from

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G2(1,2) = S*VXYM
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to

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G2(1,2) = S*VXYM*M21
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