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Global modeling of the ice stripping correction in terms of the ice thickness spherical functions

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We model globally the ice stripping correction using techniques for a spherical harmonic analysis of the gravity field. The discrete data of ice thickness with a 2×2 arc-degree geographical resolution from the global crustal model CRUST 2.0 (http://mahi.ucsd.edu/Gabi/rem.dir/crust/crust2.html) are used to generate the Global Ice Thickness Model coefficients. The 5×5 arc-minute global elevation data from the ETOPO5 (provided by the NOAA's National Geophysical Data Centre) are used to generate the Global Elevation Model coefficients. The ice thickness and elevation spectral coefficients are utilized to compute globally the ice stripping correction with a spectral resolution complete to degree and order 90. The mean value of the ice density contrast -1757 kg/m3 (i.e., the difference between the mean ice density 913 kg/m3 and the reference crustal density 2670 kg/m3) is adopted. The expressions for computing the ice stripping corrections to the gravity field quantities are introduced in spectral domain. The results reveal that the ice stripping correction to the gravity disturbances varies globally between 2 and 300 mGal with the mean of 22 mGal and the standard deviation of 56 mGal. The complete ice stripping correction to the gravity anomalies (which comprises the direct and secondary indirect ice density contrast effects) varies from -53 to 199 mGal with the mean of -1 mGal and the standard deviation of 37 mGal. The gravitational potential generated by the ice density contrast varies from -3498 to -319 m2/s2 with the mean of -743 m2/s2 and the standard deviation of 733 m2/s2.