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Frederik J. Simons (fjsimons@gmail.com), Guyot Hall 321b, Princeton, NJ 08544. *Planetary potential-field inversion from vectorial data: Using Slepian functions for varying satellite altitude.*

When inverting for a planet's gravity or magnetic field from satellite data, the space between the surface and the satellite is considered source-free. This renders the field outside of the planet harmonic, and the inversion a reevaluation of the field at a different altitude. If we express the field in a bandlimited spherical-harmonics basis, the reevaluation on the planet's surface from a single satellite altitude is an intrinsically poorly conditioned linear transformation. If the data are of strongly varying quality or only locally available, the method will become unstable and we need to find an alternative procedure. In this presentation we show how we can use the spatio-spectral concentration concept by Slepian, Landau, and Pollak to construct a potential-field inversion method for vector data on a sphere. In order to account for the poorly-conditioned reevaluation of the field on the planet's surface we incorporate the required transformation directly into the construction of our so-called Slepian functions. We present how the potential-field inversion emerging from this concept can stably estimate a crustal field within a target region from data only within that region while accounting for varying satellite altitude. (Received September 15, 2013)