OPTIMAL MANTLE GIA RESPONSE FOR SLR-DERIVED SECULAR GRAVITY FIELDS AND INFERENCES FOR BOUNDING CONTINENT-OCEAN HYDROLOGICAL EXCHANGE

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Late 20th Century water mass transport on Earth's surface can produce measurable changes in Earth rotation and long-wavelength gravity. However, the geodetic signal associated with long-term variability (i.e., longer than several Chandler wobble periods) is largely superseded by a purely secular signal (on geodetic observational time spans) owing to deep mantle deformation associated with gravitational relaxation from a former quasi-equilibrated state that was achieved during Last Glacial Maximum 22,000 years ago. Seeking an optimum match between glacial isostatic adjustment (GIA) predictions for $\dot{J}_{1-6}$ and polar wander with the observations, thus, provides a first order estimate of the bounds that can be placed upon climate and/or anthropogenic related net transport of water during 1976-2003. As the spatial resolutions of modern satellite gravity data improve, determining secular non-zonal harmonic variation may be key to deriving constraints on ocean-continent transport, especially as it may relate to long-term desertification trends or to striking changes in oceanic circulation patterns [e.g., *Serreze, et al., 2000, Climate Change, 46, 159-207*]. The lowest 20 degree and order secular gravity harmonics associated with GIA (440 Stokes coefficients) are relatively well-constrained by global and regional studies. A ranking of those harmonics in terms of sensitivity to present-day environmental change is undertaken. The latter harmonics may be especially useful for analysis of GRACE satellite data. The implications for sourcing the present-day non-GIA secular sealevel rise is also discussed. Current estimates of the odd and even $\dot{J}_n$ chained harmonics may in-

dicate upper bounds for polar continental-to-ocean transport at about 0.5 ± 0.4 mm/yr equivalent of eustatic sealevel rise.