



Decadal variation in C20 from Satellite Laser Ranging (SLR) data

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Studies have shown evidence for significant water redistribution in the climate system at interannual to decadal time scales, in particular during El Niño-Southern Oscillation (ENSO) events. For four decades, satellite laser ranging (SLR) has recorded the global nature of these long-wavelength mass changes that result in significant variations in the Earth's dynamical oblateness, characterized by the second degree zonal geopotential spherical harmonic C20. Time series of C20 (or J2) show significant variations related to strong ENSO events with periods of ~ 2.5 and 5.4 years, as well as longer term variations with a time scale of ~ 10 years. In particular, the variation related to the powerful 2015-2016 El Niño that developed in 2015 and peaked during Nov-Dec of 2015 was one of the strongest on record, comparable with the 1997-1998 and 1982-1983 events.