Excitations of the Earth's Chandler wobble and length of day by the Southern Ocean

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Abstract

The Southern Ocean, embracing the strongest current on the Earth, is an important player in the climate system. In this paper, the effect of Southern Ocean on Chandler wobble and length of day excitations is investigated. To this end, the motion terms of excitations are calculated using the primitive equation ocean model, HYCOM (HYbrid Coordinate Ocean Model). The resulting excitations are analysed in time and frequency domains and compared to the previous studies for regional oceanic excitations of Chandler wobble and length of day. The excitations caused by the Southern Ocean are also compared with those caused by the global oceans in the same general circulation ocean model, HYCOM. Our results suggest that, amongst all oceanic regions, the Southern Ocean is a key contributor to both Chandler wobble and length of day excitations. The predicted excitations caused by the global oceans are also compared with geodetic observation of the Chandler wobble and length of day after subtraction of mass terms estimated from GRACE (Gravity Recovery and Climate Experiment) satellite gravimetry data.

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