



Assimilation of Earth Rotation Parameters into a global ocean model: Governing physical mechanisms

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The presented study focuses on that Earth rotation anomalies that are induced by the oceans. Changes in the oceanic current system and in the oceanic mass distribution alter the state of the Earth's rotation which is characterized by the length of day and the tilt of the pole-to-pole axis. The aim of our study is to derive the respective governing physical mechanisms. Therefore, Earth rotation observations were assimilated with a global circulation model of the ocean.

Although assimilation is a well established tool in climate science the assimilation of Earth rotation observations with a global ocean model is done here for the first time. Prior to the assimilation, Earth rotation observations had to be projected onto the angular momentum of the ocean. Non-oceanic contributions had to be removed. The result of the subsequent assimilation procedure is a time varying ocean model state, i.e. a trajectory, that reproduces the projected Earth rotation observations well. Afterwards, this trajectory was studied to understand the generation of Earth rotation deviations by the ocean. The governing physical mechanisms could be identified: Changes in length of day correlate to changes in global ocean mass. Changes in the ocean current system and in the spatial distribution of ocean mass dominate the oceanic generation of polar movement.