

ATMOSPHERIC SIMULATIONS OF EARTH ROTATION PARAMETER VARIATIONS

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ABSTRACT.

Atmospheric general circulation models are able to explain variations in the Earth rotation parameters to a certain extent. Their ability to simulate mass movements and mass concentrations on a global scale in a realistic way allows for analyzing their impact on Earth rotation. Due to enormous mass displacements and relative movements (to the rotating Earth) the atmosphere has an important impact on Earth rotation parameters. On a subdaily to decadal scale the atmosphere and the oceanic hydrosphere explain nearly all variance of Earth rotation parameters.

An Earth system model has been developed by our interdisciplinary project group which has realized an entire coupling of the subsystems atmosphere, ocean and continental hydrosphere with respect to conservation of mass, energy and momentum. Tides are implemented as well. The coupled model consists of the ECHAM 5.3 GCM, OMCT 3.0 ocean model and HDM hydrospheric dispersion model. This talk will focus on the atmospheric model. A detailed structure analysis of observed and simulated Earth rotation parameters and atmospheric forcing factors like solar variability, ENSO or greenhouse gas will be presented.

To examine a possible future increase in the length of day associated with a decrease in Earth angular velocity, future long term trends have been calculated under a climate change scenario.