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Excitation of Earth Orientation Variations by Surficial Fluids: Recent Developments

R. S. Gross

Jet Propulsion Laboratory, California Institute of Technology, Pasadena, USA
(Richard.Gross@jpl.nasa.gov; phone: 1-818-354-4010; fax: 1-818-393-4965)

It is widely accepted that variations in the Earth's rotation on subdaily to interannual time scales are excited mainly by variations in the motion and mass distribution of the atmosphere, oceans, and continental water, including glaciers and ice sheets. Since global measurements of the three-dimensional, time-dependent motion and mass fields of these surficial geophysical fluids are generally not available, studying their impact on the Earth's rotation relies heavily on models of their circulation. The demands of weather prediction stimulated the development of data assimilating models of the general circulation of the atmosphere. Similarly, the desire to predict ocean weather is stimulating the development of data assimilating oceanic general circulation models as part of oceanic forecast systems. And global models of the changing distribution of continental water are now available. With the availability of global atmospheric, oceanic, and hydrologic models, it is now possible to enforce a global mass balance on the surficial geophysical fluids, thereby linking their masses and allowing their impact on the Earth's rotation to be studied as a system rather than as just individual components. Recent developments in the excitation of Earth orientation variations by surficial geophysical fluids are reviewed in this presentation.