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The effect of continental water storage on the reference frame

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The seasonal redistribution of water mass between the poles and the equator and the continents and the oceans represents the largest mass motion on the surface of the earth. The mass redistribution will have repercussions for the definition of the terrestrial reference frame, particularly if only secular station motions are considered in the reference frame definition. In this talk, we analyze the temporal and spatial variability of continental water storage to determine the periods and spatial wavelengths of water storage variability that are significant for the reference frame determination. We compare models and GRACE estimates of the water storage field with GPS coordinate time series. We also investigate the correlation between the spatial patterns of observed and predicted deformation, by performing an EOF analysis. We address the question of whether we understand the large-scale annual motions of water sufficiently to include them in the determination of the reference frame.