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Atmospheric and oceanic excitation of nutation: analysis of the nonharmonic component

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The atmospheric and nontidal oceanic contributions to nutation consist of two distinct parts. The first part, which is regular and predictable, comprises a sum of harmonic terms with space-referred frequencies 1+k cycles per year, with k=0,-1,+1,-2,+2, contributing to prograde annual nutation (k=0), to precession (k=-1) and prograde semiannual nutation (k=+1), to retrograde annual and prograde terannual nutations (k=-2 and k=+2, respectively). The second part, which is irregular and unpredictable, is a broad-band variability with excess of power around the spectral lines represented by the harmonic model. It is expected that this second part plays a key role in driving the observed free core nutation (FCN) signal. In this paper we study the irregular component of the geophysical excitation of nutation using a new consistent set of 20-year time series of the atmospheric and nontidal oceanic angular momenta (AAM, OAM) based on the ERA-Interim reanalysis fields and the corresponding simulation from the ocean model OMCT (Dobslaw et al., 2010, JGR, Vol.115, No.B10406). Atmospheric and oceanic excitations of nutation are compared to the VLBI-observed excitation derived from the time series of celestial pole offsets, as well as to our earlier results using data from alternative geophysical models.