



## **Revised datasets for atmospheric angular momentum studies related to Earth rotation**

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The Special Bureau for the Atmosphere of the International Earth Rotation Service has made a recent effort to unify its data sets so that they will be most appropriate for comparing with the motions of the Earth: length of day and polar motion.

Sets have been derived from the following operational meteorological centers: United States National Centers for Environmental Prediction, United Kingdom Meteorological Office, Japan Meteorological Agency, and European Centre for Medium-Range Weather Forecasts. Datasets of both the winds and pressures from these analyses are used to produce the angular momentum functions. When these are multiplied by appropriate geophysical constants related to Earth properties, excitations for length of day (l.o.d.) and polar motion are derived.

Besides the series from the operational centers, reanalyses of the atmosphere over lengthy periods are being derived, principally at NCEP. Significant differences appear in all data sets, which are a result of a number of issues including differences in archival procedures, grids, and vertical domain. The calculations at the bottom topography can play a significant role in the accuracy of the datasets. For example, the difference when topography is taken into account compared to integration from a set 1000 hPa bottom level is around equivalent of 4 milliarcseconds for both the chi-1 and chi-2 motion terms, in equivalent polar motion, and around 0.004 milliseconds for the chi-3 motion term in UT1/l.o.d. equivalent difference. Whereas the effect in length of day is very tiny, that in the polar motion terms appears significant.

We analyze which sets have the closest relationship to the l.o.d. and polar motion parameters, and make recommendations concerning the most up-to-date physical constants used to define excitations from angular momentum series.