気圧変動による重力場の時間的変化について

Temporal variations of the gravity field caused by atmospheric redistributions

 # Lorant Foldvary [1]，福田 洋一 [1]
Lorant Foldvary [1], Yoichi Fukuda [1]

[1] 京大・院理・地物
[1] Geophysics, Kyoto Univ.

**気圧変動による重力場の時間的変化について
GRACEミッションによる衛星重力測定データを想定して，
大気の変動が重力場の変化におよぼす影響について調べた。
計算にはNCEP/NCARの再解析データから1995年の
地表気圧のデータを用い，球面調和関数に展開を行い，
重力への影響を計算した。この結果，van den Dool
and Saha (1993)と同様に，きれいな日周的な
重力変化が認められた。**

The GRACE mission will produce a new model of the Earth's gravity field every 12 to 24 days with unprecedented accuracy for a period of five years. The mission will be able to separate static and temporal gravity field components. Because of its high accuracy for case of seasonal terms, the contributors of the seasonal gravity variations get high interest. The main contributors of the variations are the redistributions of the oceans (ocean mass flux, ocean tides), of the atmosphere, and the hydrological processes (surface and ground waters, ice, snow). In this work we attempt to model the seasonal redistributions of the atmosphere, and estimate their effects on the gravity field.

The atmosphere has a clear annually-varying gravity signal, which has already identified by many investigations (e.g. Chao and Au, 1991; Dong et al., 1996). The lower order of magnitude interannual signals had been considered at first by Trenberth (1981), and later, e.g. by van den Dool end Saha (1993). Their results are, that at least three atmospheric redistributions can be identified: (1) between land and ocean, (2) between the southern and the northern hemispheres, and (3) between high elevations and low surroundings.

Our investigations considered about the interannual variations (diurnal and longer terms) and about the effects of the higher degrees. For computations, we used surface pressure data from the NCEP/NCAR Reanalysis project's database, during 1995. At first we subtract monthly averages from the 2.5*2.5 grid database (surface pressure) to remove the powerful annual signal. Second, we computed spherical harmonics, and then geoid. For diurnal variations we subtracted the daily average values, because of their small order of magnitude. We found a visible diurnal variation, similarly to the result of van den Dool and Saha (1993).