

Precision of GPS Point Positioning -part3-Possibility of atmospheric tide

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<http://home.att.ne.jp/iota/bluedoor2001/index33.html>

Analysis of GPS point positioning data at a fixed point in Odawara-city, Kanagawa Prefecture, from December of 2002 to now of 2004 suggested some possibilities, i.e. 1. Influence of Atmospheric tide, 2. Fluctuation of earth rotation axis by polar motion, 3. Action of geomagnetism, 4. Meteorological condition, 5. Influence of air pollution. In this 'part 3' the influence of atmospheric tide is picked-up and discussed.

Each component of tidegenerating force was calculated using moon and sun data of Rika-nenpyo (edited by National Astronomical Observatory, Japan), because atmospheric tide was supposed a factor of one-month cycle, one-day cycle and seasonal variation observed in time interval data of GPS point positioning.

Correlation analysis between each component of tidegenerating force and GPS data as well as marine tidal data (by GSI, Aburatubo and Ito) resulted the vertical component correlated GPS data as well as marine tidal data, but the North-South and East-West components naturally had less correlation with GPS data and marine tidal data than the differences of each component in North-South direction and East-West direction, respectively.

However the correlation with marine tidal data was observed through the year, the correlation with GPS data differed by season and time of day. This reason was supposed time lag due to atmospheric inertia. Therefore, it was confirmed that calculation with time lag 2-24 hours resulted the seasonal variation of peaks of coefficient of correlation. That is, the difference of atmospheric viscosity due to temperature etc. is supposed to cause time lag of atmospheric tide.

From above results it is possible that the atmospheric tide influences GPS point positioning data, but other factors are expected to have relation to. It is early to draw a conclusion about atmospheric tide, and after this it is necessary to discuss from various angles.