

3.6.2.6 GeoForschungsZentrum Potsdam (GFZ)

The objectives of the GFZ CRC are:

- Study the possible systematic error sources of various space techniques (effects on translation, scale, rotation).
- Develop new combination methods to benefit from the advantages of each technique.
- Investigate the effect of the time variable gravity field on the reference frame and further develop the EPOS software at GFZ to enable it to solve the time-variable gravity field together with the reference frame.

During 2001 our efforts were focused on:

(1) Study the effects of the uncertainty of the geopotential constant GM on various satellite techniques.

The major results are:

- The effect of GM on the scale of satellite orbits is different from that on the scale of a reference frame. The latter depends on the height of the satellite(s) and on the tracking technique(s), while the former does not.
- The effect of GM on the scale of a GPS terrestrial frame is very small because the clock solution (or double difference procedure) absorbs most of the GM error.
- As far as the scales of terrestrial frames are concerned, the uncertainty in the GPS satellite antenna phase centre offset (z-direction) is almost equivalent to an error in GM. But the uncertainty in the currently available GM is much smaller than that of the z-offset. Therefore the z-offset could be one of the major scale error sources of the GPS terrestrial frame, whereas GM could not.

These findings were presented at the IAG Scientific Assembly ("Visitas for Geodesy in the New Millennium"), 2-7 Sept. 2001, Budapest, Hungary. A number of papers are published or submitted.

(2) Software development and test runs

Currently, the most widely used method for LEO orbit determination is a so-called two-step method in which the GPS orbits are fixed. We have undertaken to combine CHAMP SST GPS data with the ground GPS data to solve the LEO precise orbits together with the GPS orbits and the station coordinates (one-step method). At the first stage the aims are to study the advantages (and disadvantages) of these two methods, and to investigate possible contributions of LEO data to the GPS solutions.

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