Geophysical Research Abstracts
Vol. 13, EGU2011-8289, 2011
EGU General Assembly 2011

Application of PPP with integer ambiguity fixing for airborne gravimetry

Flavien Mercier (1) and Pascal Gegout (2)
(1) CNES, Orbit Determination, France (flavien.mercier@cnes.fr), (2) CNRS/GRGS, France (pascal.gegout@dtp.obs-mip.fr)

In August 2010, the NGS (National Geodetic Survey) proposed a 'Kinematic GPS challenge', which consists in computing the trajectories of an aircraft using GPS, for gravimetry applications (IGS mail 6232). The data consist in two flights of 4 hours duration, with continuous measurements at 1 s sampling, from start and arrival of the aircraft at the airport. The central part of the flight is a North-South-North trajectory at 10000 m altitude. Data for different reference stations were also provided. There were also some specific requirements for the acceleration performance of the achieved trajectories (better than 1 cm/s2).
A solution was computed at CNES using the PPP with integer ambiguity fixing approach. For this application, a set of phase clocks at 1s sampling was first computed using the reference stations measurements and the GPS IGS ephemeris solution. Then the trajectory is computed in PPP mode using these phase clocks. The obtained ambiguities are validated by comparison with the short baselines solutions which are possible at the beginning and end of the flights, using the airport reference receiver.
For such applications, the first problem to solve is the troposphere propagation delay modelling. Different models were used (GPT/GMF model, and the new AMF model developed at GRGS, using ray tracing and meteorological data). The trajectories for the central part of flights obtained using these different models are compared, in floating and integer mode.
A specific weighting of the data was also applied in order to avoid jumps in the solution due to the errors at the beginning or end of a satellite pass. Also, the airplane receiver has milliseconds clock resets, and it is necessary to correct the PPP trajectory in order to compensate for the difference between receiver clock and GPS time to achieve a smooth trajectory.