



## Static PPP with GPS+GLONASS. A case study

Angel Martin-Furones (1), Ana B. Anquela (1), Miriam Sanmartin (1), Raquel Capilla (2), and Jose L. Berne (1)

(1) Department of Cartographic Engineering, Geodesy and Photogrammetry. Technical University of Valencia, Spain, (2) Cartographic Institute of Valencia, Spain.

PPP based on the processing of GPS static observations is limited by the number of visible satellites, which is often insufficient for urban or mountain applications, for instance. Even if a number of GPS satellites are available, accuracy and reliability can still be affected by poor satellite geometry. One possible way of increasing satellite signal availability and positioning reliability is to integrate GPS and GLONASS observations, so an improvement in PPP can be expected in terms of shorter convergence time and increased accuracy. MagicGNSS software has been used to analyse daily observation files at 8 selected IGS stations according to their location in order to provide a balanced geographical world sample and different satellite geometry of GPS and GLONASS observables. Our study is based on the convergence time for the first four hours of the day 1, 33 and 211 of 2010. A 28 % mean reduction in PDOP have been found when GPS+GLONASS is used instead GPS only constellation. The results show that centimetric convergence is obtained using less time in the 60% of the determinations with GPS+GLONASS solution compared with GPS only solution (the determinations include N, E and Up components), no significant convergence improvement has been found in the 20% of the determinations and the other 20% need more time to converge that the GPS only solution. When only one hour of static station data is used the 70% of the determinations converge at centimetric level, from these group of observations, the 36% converge only with GPS+GLONASS solution (not with GPS solution), the 4% converge only with GPS solutions (not with GPS+GLONASS solution) and the 60% converge both with GPS+GLONASS and GPS solution. If only 30 minutes of static data is used the 70% of the determinations converge at decimetric level, from these observations, the 25% converge only with GPS+GLONASS solution, the 4% converge only with GPS solutions and the 71% converge both with GPS+GLONASS and GPS solution. The main conclusion of the study is that when only one hour of static station data is used, GPS+GLONASS solution is noticeably more accurate and considerably more robust than the GPS only solution. The convergence percentages with GPS+GLONASS solution will be higher with the constant improvement of orbit and clock GLONASS MagicGNSS products, or with the improvement of satellite geometry using the forthcoming multi-constellation GPS+GLONASS+COMPASS+GALILEO scenario.