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Matera site survey and VLBI invariant point determination

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The role played by CGS (Centro di Geodesia Spaziale) as geodetic fundamental station, hosting the main space geodetic technique systems SLR, VLBI, and GPS, makes the whole survey theme (measurements, related corrections and processing) of great importance for the CGS activities. The last survey at CGS was performed in February/March 2004 and involved measurements connecting seven IERS geodetic reference points and 14 additional reference points in the local network. During July 2005, a measurement campaign was carried out to estimate the VLBI IVP from the geometrical surface described by four optical retro reflectors mounted on the antenna structure. A new software (GSMAT) for the analysis of the survey raw measurements was developed. The main characteristics of this software are: atmospheric effects removed using continuously measured values of local temperature, pressure and humidity provided by the meteorological sensors operating at ASI CGS; rigorous network adjustment (weighted least squares method) with minimal inner constraints (via SVD), using the whole covariance matrix at each step of the computation; outlier detection/rejection; designed to keep the human intervention on the data processing at a minimum; the VLBI invariant point is estimated by modeling the geometrical figure described by the retro-reflectors located on the antenna; production of the SINEX file with coordinates of the IERS reference points and VLBI IVP.