SEASONAL EFFECT ON VERTICAL POSITIONING BY LASER AND GPS AND ON ABSOLUTE GRAVITY AT THE OCA GEODETIC STATION, GRASSE, FRANCE

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The multi-technique geodetic observatory of Grasse, France, is located on a ~1200 m high karstic plateau. We present a comparison of the vertical displacement monitored by independent techniques. Both SLR (Satellite Laser Ranging) and GPS (Global Positioning System) vertical position time series over the period 1998-2004 show a prominent annual signal with a magnitude of 5-6 mm and reaching a maximum every year in July. It is also in fair agreement with 14 Absolute Gravity (AG) measurements performed during the same period exhibiting a 204 day periodic signal of several microGals amplitude. We investigate the possible origin of the observed signal by comparing it with predictions from various local and regional contributions. GPS results from a local network indicate that the elastic deformation of the karstic plateau due to local water storage loading does not exceed 1-2 mm. A combination of global model prediction for atmospheric and hydrological loading explains more than 70% of the annual and semi-annual observed signals.