Geophysical Research Abstracts
Vol. 12, EGU2010-3173, 2010
EGU General Assembly 2010

Results from some calibration experiments conducted at Strasbourg Superconducting gravity station

Umberto RICCARDI (1,2), Severine Rosat (1), and Jacques Hinderer (1)

(1) Institut de Physique du Globe de Strasbourg- (UMR 7516 CNRS-Université de Strasbourg), Strasbourg-Cedex, France (umbricca@unina.it / Fax: +33 368850291), (2) Dipartimento di Scienze della Terra, Università "Federico II", Napoli (Italia)

The availability of superconducting gravimeters (SGs) enables us to collect high-precision gravity observations for the investigation of a large number of geodynamical processes inducing weak gravity signals. As the SGs are relative meters, even though the most sensitive and stable ones currently available, they need to be accurately calibrated. Indeed each branch of the Earth sciences (e.g. volcanology, seismology, etc.) that benefits from the high precision gravity monitoring, demands a calibration of gravity sensors to an accuracy of better than 0.1%. In general the SGs are designed to operate in a geophysical observatory as a permanent gravity station. They are not portable then not suitable for measuring on calibration lines. This has led users to develop in situ calibration methods. The direct method of calibration by gravitational attraction requires some special devices, sometimes turning out to be problematic as is the management of heavy reference masses. Another method is based on the oscillating platform where a specific acceleration is caused by the periodic motion. These two methods are not feasible at every SG station. Currently the indirect method based on the comparison with an absolute gravimeter (AG) is the most widely used without any disturbance to the SG. The use of a well-calibrated relative spring gravimeter as a reference for the SG is still under discussion in the gravimetric community, because the spring meter needs itself to be calibrated against some other references.
This research deals with the calibration experiment performed at the Strasbourg (France) SG site by means of two FG5 AGs (#206 and #211) and some new generation spring meters (Scintrex Ltd. Autograv-CG3M and -CG5M and Microg-LaCoste gPhone). We discuss the results in terms of precision and accuracy of the SG calibration by means of different metrological approaches. Our main results turn out that spring gravimeters are not suitable to replace AGs for SG calibration. Owing to the time variability of their sensitivity, the spring meters cannot be used as a stable reference for the SGs. On the contrary, the spring gravimeters could take advantage from measuring in well calibrated superconducting stations. In fact a monthly record session in a superconducting gravity observatory could provide a complete definition of the sensor's transfer function in the tidal band, in terms of phase and amplitude.