

## Report of Activities of the IAG/ETC Working Group 7

### «Analysis of Environmental Data for the Interpretation of Gravity Measurements»

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This working group was established during the 13<sup>th</sup> Earth Tide Symposium in Brussels, 1997. Following the tradition of the former WG meetings at Bonn University ('Bonn – Meeting') we organised a workshop in Jena, September 1 – 4, 1998, at which Michel van Ruymbeke spent one afternoon for a meeting of his WG on CALIBRATION OF GRAVIMETERS. In all, 25 scientists from 9 countries participated.

The objectives of the WG are:

- Systematic investigation of effects of environmental parameters on the gravity vector, such as air pressure, air humidity, wind, seasonal effects of vegetation, ground water level variations, soil moisture;
- Understanding of the relation between the individual sources and their effects on the gravity vector, both in different periods, and different amplitudes;
- Development of models for the correction of environmental effects and recommendations for the recording of environmental parameters, and recommendations for the application of the corrections.

In a first step, the basic task at the workshop was to collect experiences gained by the different groups and to work out recommendations to be presented at the 14<sup>th</sup> Earth Tide Symposium.

We refer to the papers presented by the participants at the working group meeting, printed by the International Center, Bulletin d'Information Mareés Terrestres, volume 131, May 1999.

The recommendations and proposals submitted to the 14<sup>th</sup> Earth Tide Symposium cover the topics discussed:

(1) Parameters to be recorded:

- Standard parameters to be monitored should be barometric pressure, temperature, precipitation, and ground water level. The sampling rate for the recording of environmental parameters should correspond to the sampling rate of the geodynamic data observed. A sufficient resolution and accuracy of the measurements of the environmental parameters should be granted.
- Although the difficulties of monitoring soil moisture are recognized, the working group recommends to undertake efforts to realize a continuous monitoring of this parameter.
- The monitoring of wind is also recommended because wind might produce short-period noise as well as long-period modulations.

(2) Area that enters into the correction:

- For studies of long-period effects it is recommended to correct gravity data for local (diameter: 100 km), regional (diameter 2000 km), and global pressure signals as all three produce significant effects in this spectral range.
- All other environmental parameters should be monitored directly at the station.

(3) Models to be developed:

- Effects due to ground water table variations should be investigated more closely and models for the correction of gravity and tilt measurements should be developed.
- The influence of snow and rain on gravity should be studied.
- The application of precipitation functions and statistical models for correcting gravity, tilt, and strain should be tested.
- With respect to soil moisture a reliable method for a continuous monitoring needs to be found and models for correction should be developed.
- The effect of stress resulting from temperature variations on tilt and strain needs to be studied.
- The correlation between precipitation, barometric pressure, and ground water table should be investigated in order to develop transfer functions. For this special events should be studied, disturbing signals should be compared and correlated to different inputs. In addition, experiments should be done.

(4) Data handling / data bank:

- There should be free access to global meteorological barometric pressure charts for the 'earth tide' community.
- If the International Center (ICET) agrees, global barometric pressure data should be collected by the center.