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PREFACE

Preface

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GOCE was launched in March 2009. GOCE is the acronym for Gravity and steady-state Ocean Circulation Explorer. It is ESA's first Earth observation satellite after ENVISAT (since 2002 in orbit) and the first mission of its "Living Planet Programme".

George Balmino came up with the acronym in the 1990s in order to associate GOCE's science objectives, being primarily geodetic and oceanographic, with those of the World Ocean Circulation Experiment (WOCE). GOCE is the third of a new generation of dedicated gravity field satellite missions. CHAMP, launched in 2000 was the first one. It combined precise orbit determination using GPS with accelerometry. GRACE followed in 2002 and is still in operation. Its measurement principle is ultra-precise inter-satellite ranging between two low Earth orbiting satellites combined with accelerometry. GOCE is the first satellite carrying a gravitational gradiometer. It consists of a set of six very sensitive accelerometers. A sophisticated sensor system had to be constructed around this instrument in order to make gradiometry at the envisaged precision level in a satellite environment possible.

GOCE is a geodetic satellite mission in that its mission objectives are geoid and gravity determination, part of its scientific goals are geodetic and the mission has been conceived and pursued inside the geodetic community. It is therefore most appropriate to present the results of a first analysis, based on 2 months of data in the Journal of Geodesy.

It took about 15 years after the first ideas to GOCE's approval and another 10 years until its realization and launch. Its sensor system is a novelty as it delivers a new kind of measurement. The present special issue is a summary of the results and experiences, based on the analysis of about 2 months of data. As demonstrated in the articles, GOCE is delivering excellent and important new results. Nevertheless, like with every new experiment of comparable complexity, not every aspect of data processing may be perfectly well understood and there is certainly room for improvement. We therefore hope that this issue of the Journal of Geodesy will trigger discussions and stimulate further analysis and use of GOCE data in and beyond the geodetic community. We can already assume with confidence that GOCE will meet its objectives and will have an important effect on geodesy and Earth sciences. Credit is given to all who made this mission possible, including the engineers, scientists and managers inside and outside the European Space Agency.

The special issue consists of eight articles covering the entire range from mission design, via mission operations, level-1 data processing, orbit determination, gravity gradient analysis to the recovery of global gravity models, validation of orbits and gravity models and their oceanographic application. My sincere thanks go to the authors of this issue, all the reviewers of the articles, and editor-in-chief of the Journal of Geodesy, all of whom made this special issue possible.

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