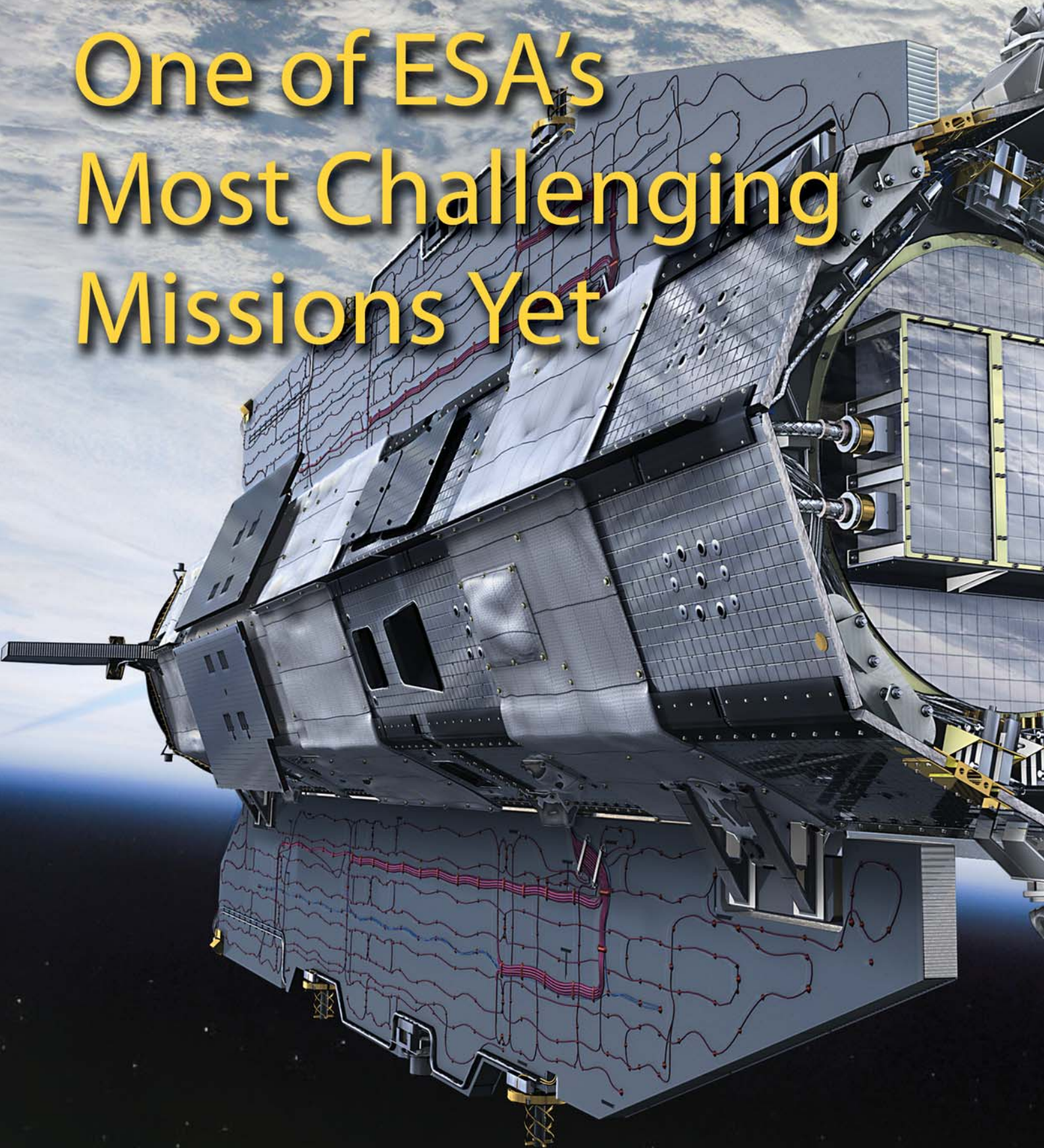


GOCE: One of ESA's Most Challenging Missions Yet



*A foreword by Volker Liebig
Director of Earth Observation Programmes
ESRIN, Frascati, Italy*

The launch of the Gravity field and steady-state Ocean Circulation Explorer (GOCE) constitutes a cornerstone for ESA's Earth Observation Envelope Programme. It will be the first satellite of the Earth Explorer family to be placed in orbit and its mission is to explore one of the most intriguing features of our planet: its gravity field.

ESA's fleet of Earth Explorers are the research missions of the Living Planet Programme. They focus on the key components of our planet, such as the geosphere, including Earth's interior, hydrosphere, cryosphere, atmosphere and biosphere. The aim is to make space-based global measurements to advance our understanding of the interactions between these components and the impact that human activity is having on natural Earth processes.

For instance, gravity is a fundamental force of nature that drives many dynamic processes within Earth's interior, and on and above its surface. This is because gravity is directly linked to the distribution of materials with different densities within Earth and to the distribution of waters and ice on its surface.

The GOCE mission will therefore advance our knowledge of Earth interior processes such as earthquakes and volcanism but also of ocean circulation, which plays a crucial role in energy exchanges around the globe, and sea-level change.

Consequently, GOCE data will be used by a wide range of scientific disciplines, such as geophysics, oceanography, glaciology and geodesy. This data will also have numerous practical applications; one of the most important will be the setting of a high-

accuracy planet-wide height reference system, useful for cross-border levelling and construction as well as for the comparison of sea levels all over the world.

In order to achieve its very challenging mission objectives, the GOCE satellite is based on cutting-edge technology, making it a jewel of innovations. GOCE will add a new entry in ESA's book of records. It is carrying a gradiometer in space for the first time, which is a unique instrument based on six ultra-sensitive accelerometers able to achieve amazing measurement accuracies.

Moreover, it has been designed to fly at an extremely low orbital altitude, just 250 km above Earth. For this reason it has an eye-catching aerodynamic shape and will actively compensate for the air drag by using the finely controlled thrust of an ion engine.

The development of the GOCE satellite by an industrial consortium of 45 companies, distributed over 13 European countries, is an outstanding example of what European cooperation can achieve. The same goes for the GOCE ground segment where, in particular, the European GOCE Gravity Consortium (comprising ten leading institutes and universities) will have the task of processing the data and generating an Earth gravity field model and associated geoid with unprecedented accuracy and spatial resolution.

The launch of GOCE this spring, followed by its measurement campaign, will be the deserved reward for the many efforts spent in ESA, industry and the scientific community in the preparation of this very challenging European mission.