biomass

→ ESA'S FOREST MISSION

Driven by science

ESA's Earth Explorer missions are developed in direct response to priorities identified by the scientific community. Carrying novel technologies, these satellite missions are realised to improve our understanding of how the planet works as a system and the impact human activity is having on natural Earth processes.

Selected as ESA's seventh Earth Explorer in May 2013, the Biomass mission will provide crucial information about the state of our forests and how they are changing. The data will be used to further our knowledge of the role forests play in the carbon cycle.

This latest mission follows on from GOCE, SMOS and CryoSat, which are in orbit delivering key data, as well as Swarm, ADM-Aeolus and EarthCARE, which are in various stages of development.

New technology in space

The Biomass satellite will be designed to provide, for the first time from space, P-band synthetic aperture radar (SAR) measurements to determine the amount of biomass and carbon stored in forests.

Exploiting the unique sensitivity of P-band SAR together with advanced retrieval methods, maps of forest biomass and forest height at a resolution of 200 m will be generated. In addition, the mission will have an experimental 'tomographic' phase to provide 3D views of forests.

Understanding the carbon cycle

Quantifying the global carbon cycle is essential to understanding many of the dramatic changes taking place in the Earth system, particularly those resulting from the burning of fossil fuel and land-use change.

Forests absorb, store and release large amounts of carbon, therefore, they are a key component of the carbon cycle. Despite this crucial role, forest biomass is poorly quantified in most parts of the world. Responding to this challenge, ESA's Biomass mission sets out to provide measurements of forest biomass and forest height.

These urgently-needed data will shed new light on the state of our forests and how they are changing, and, in turn, advance our knowledge of the global carbon cycle. Reliable knowledge of forest biomass also underpins the implementation of the UN Reducing Emissions from Deforestation and forest Degradation, REDD+, initiative – an international effort to reduce carbon emissions from deforestation and land degradation in developing countries.

Beyond forest biomass

Observations from this new mission will also lead to better insight into rates of habitat loss and, hence, the impact this may be having on biodiversity in the forest environment. In addition, the Biomass mission will offer the opportunity to map subsurface geology in deserts and map the topography of forest floors.

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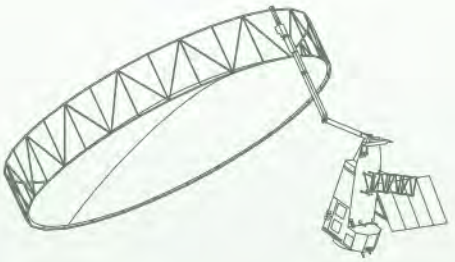

Facts and figures

- Launch: envisaged around 2020
- Launch: compatible with Vega, Antares and PSLV
- Orbit: altitude of approx 660 km; Sun-synchronous
- Mission life: five years (including a tomographic phase of at least three months)
- Satellite: three-axes stabilised platform 10 m high, 12 m wide and 20 m long (including large reflector)
- Mass: 1170 kg (including 67 kg fuel)
- Instrument: synthetic aperture radar operating at P-band (435 MHz); fully polarimetric
- Power: 1.5 kW deployable solar array with 6.8 m^2 triple junction GaAs cells; 144 Ah Li-ion battery
- Mission control: ESA's European Space Operations Centre (ESOC) in Darmstadt, DE
- Communication links: ESA's ground station in Kiruna, SE, via X-band downlink (310/520* Mbit/s) for science data; via S-band uplink (64 kbit/s) and downlink (128 kbit/s) for tracking, telemetry and command
- Data: processing at ESA's Centre for Earth Observation (ESRIN) in Frascati, IT
- Project and commissioning: managed at ESA's European Space Research and Technology Centre (ESTEC) in Noordwijk, NL

*Depending on satellite concept

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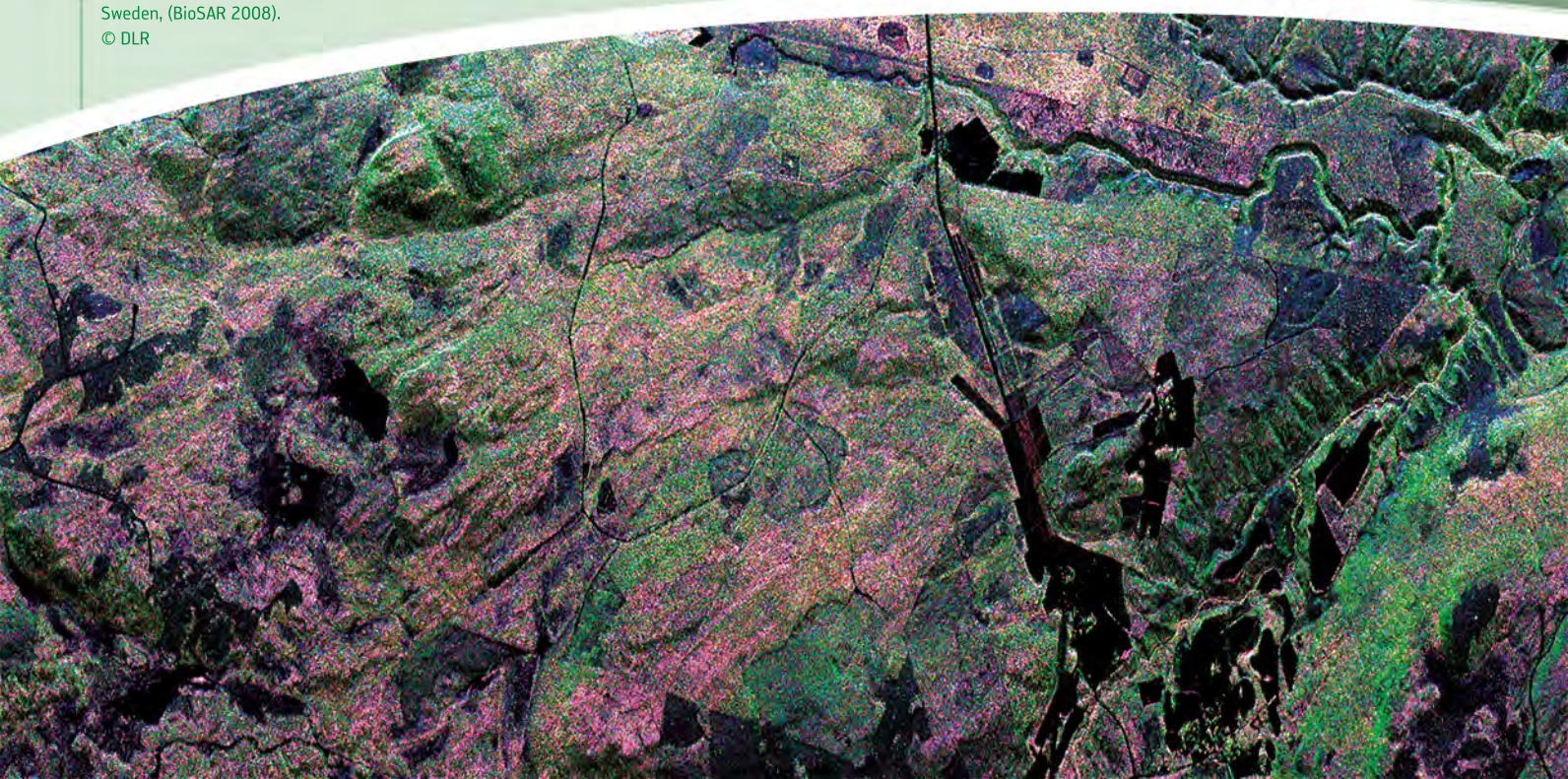

Airborne P-band SAR data over Krycklan, Sweden, (BioSAR 2008).
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