

Common research programme for the next 10 years to increase Romania's capacity to contribute to GMES

Climate change, erosion and desertification phenomena, soil, water and air pollution, ecosystem surfaces reduction have negative, measurable effects over the social and economic development and human quality of life in vast global areas. In order to understand the interactions and changes of atmosphere, water and soil, and to quantify their impact on the Earth climate system and implicitly on the social and economic systems, long-term, multi-instrument and multi-disciplinary observations are needed, intelligently distributed in all geographical areas. At large scale, Global Earth Observation System of Systems (GEOSS) is the system that integrates information gathered from different platforms, to offer a secure instrument for the decision system. GEOSS is based, in this process, on satellite observations from the Earth observation programmes, and on the ground-based research infrastructure for environment. GMES, or Copernicus as it was recently named, represents the European Union contribution to GEOSS, being the most ambitious Earth observation programme, which includes two components: space and ground data.

Romania's contribution to large Earth monitoring platforms is still in development phase regarding the human and institutional capacities. INOE is already in a position where the first steps regarding the collaboration with the Space Agency have been made, not only through international networks, where it is member (contributor to GMES), but also through projects that proved its capacity to be a credible partner in providing services, data and results of research, for existing and future space missions.

In order to identify the needs and challenges that influence Romania's position as partner in the Earth observation programmes, the achieved SWOT analysis highlights the elements that can threaten, maintain or develop this new research direction.

Diagnostic analysis (SWOT)

Strengths

- The existence of high-class institutional and technological capacities relevant to ESA;
- Up to now, strong connections with the European Space Agency have been created, contracts are ongoing already;
- The centre for atmospheric remote sensing and space Earth observation established through STAR projects and implemented at INOE;
- We are members of the European InGOS and IAGOS infrastructure;
- INOE and INCAS are members of the new ACTRIS proposal – research infrastructure proposed for the new ESFRI roadmap. (Romania being one of the 6 participating countries which declared its financial and political support – signed by ANCS);
- A national network has already been developed in Romania – Romanian Atmospheric 3D Observatory (RADO) coordinated by INOE;
- Projects with ESA are already ongoing. The largest contract with ESA (at national level) that aims to develop a HSRL lidar with multiple wavelengths and multidepolarisation, is coordinated by INOE, INCAS being a partner;
- Within INOE, the lidar calibration centre has been created (globally unique) having great importance not only for producers but also for lidar users;

- INCAS holds an airborne research infrastructure that is unique in South-East Europe, containing 2 piloted aircrafts and 2 aircrafts with autopilot;

- Personnel involved in the research activities, from the two institutes, is highly qualified;

- There is a modern and effective research infrastructure, for specific directions, unique at national level and in South-East Europe, which offers the technical capacities needed to ensure Romania's contribution to major research infrastructure and implicitly to GMES;

- The existence of favourable premises regarding the formation and development of research networks with current partners; experience in managing activities undertaken in large consortia;

- Both INOE and INCAS are institutes evaluated and classified A+.

Weaknesses

- Limited accession to ESA programmes at national level;

- Lack of adequate space to extend the research activities or to employ new scientists;

- Part of the research equipment is old, depreciated or with reduced performance, not very adequate for certain applications (for example, climate change, aerosol-cloud interaction);

- Lack of state of the art equipment to push the research beyond the boundary of knowledge in specific domains;

- The lack of an integrated research, the approach of the relationships between changes in atmosphere, water and soil not being possible because of the lack of common research directions;

- The existence of limited programmes to cover the costs of development of a modern infrastructure for Earth observation.

Opportunities

- Collaboration with ESA will facilitate the development and maintenance of the institutional capacities at high standards;

- Development of an Earth observation centre to permanently provide the input for GMES, through the ground data component;

- Romania has not touched yet a good "geo-return", therefore, there are great chances for Romania to develop and implement many more contracts with ESA;

- INOE is involved in 6 contracts with ESA, out of which 4 refer to satellite calibration / validation activities. These could lead to the development or creation of new contracts with ESA for technological and research developments to support GMES;

- The investments through the programmes of European Union FP 6, 7, Horizon 2020 ensure the use of developed infrastructure to support the achievement of global objectives of Earth observation, as support in the decision process;

- Access to structural funds destined to increase the economic competition, innovation and development of human resources;

- Potential to access the HORIZON 2020 European research funds on new research directions;

- Potential to attract funds from the private sector.

Threats

- The fast technological advancement creates constant pressure over the Romanian institutions, which have to keep up to with similar centres in Europe, and the research directions must be constantly adapted depending on the new capacities and requirements;
- There is a continuous competition to host future large campaigns for Calibration / Validation to support Sentinel-5P, and Romania must prove the existence of the institutional capacities to maintain this kind of activities;
- The tendency of the young to look for jobs in European Union states leads to the loss and formation of valuable researchers;
- Limited motivational potential for young researchers;
- Limited funds from national research programmes and contracted budget cuts;
- Insufficiently clear national legislation regarding the property rights over the research results, in the context of multidisciplinary projects.

The current common development plan establishes concrete objectives to implement, in a realistic and reasonable time interval of approx. 10 years, the research model generator of added value oriented towards the interest for knowledge and innovation, in the context of improving the European programmes for Earth observation GMES (Copernicus).

In the assumed perspective of participating to ESA EOEP, InGOS and ACTRIS-RI, INOE has decided to build the necessary capacities in the next 10 years and to use the accessible funds (structural, national ROSA_STAR, PNCDI-III) to create a sustainable infrastructure and a human resource capable of bringing a major contribution for this geographic area (South-East Europe) to GMES.