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# Earth Observation Research for GMES Initial Operations

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GMES Initial Operations - Network for Earth Observation Research Training (GIONET) is a Marie Curie funded project that aims to establish the first of a kind European Centre of Excellence for Earth Observation Research Training.
GIONET is a partnership of leading Universities, research institutes and private companies from across Europe aiming to cultivate a community of early stage researchers in the areas of optical and radar remote sensing skilled for the emerging GMES land monitoring services during the GMES Initial Operations period (2011-2013) and beyond.
GIONET is expected to satisfy the demand for highly skilled researchers and provide personnel for operational phase of the GMES and monitoring and emergency services. It will achieve this by:
* Providing postgraduate training in Earth Observation Science that exposes students to different research disciplines and complementary skills, providing work experiences in the private and academic sectors, and leading to a recognized qualification (Doctorate).
* Enabling access to first class training in both fundamental and applied research skills to early-stage researchers at world-class academic centres and market leaders in the private sector.
* Building on the experience from previous GMES research and development projects in the land monitoring and emergency information services.
* Developing a collaborative training network, through the placement of researchers for short periods in other GIONET organizations. Reliable, thorough and up-to-date environmental information is essential for understanding climate change the impacts it has on people's lives and ways to adapt to them.
The GIONET researchers are being trained to understand the complex physical processes that determine how electromagnetic radiation interacts with the atmosphere and the land surface ultimately form the signal received by a satellite. In order to achieve this, the researchers have been placed in industry and universities across Europe, as well as receiving the best technical training and scientific education. This training is currently being delivered through individually supervised research, international summer schools and local training.
GIONET will develop better methods for monitoring climate change, environmental disasters and land cover change. It will also lead to the development of new methods using satellite monitoring for disaster relief after landslides and floods, controlling deforestation and overseeing the protection of tropical rainforests, as well as for climate change monitoring, lake water quality measurement and coastal erosion assessment.
The training program through supervised research focuses on 14 research topics (each carried out by an Early Stage Researchers based in one of the partner organization) divided in 5 main areas:
* Forest monitoring:
o Global biomass information systems
o Forest monitoring of the Congo Basin using Synthetic Aperture Radar (SAR)
o Multi-concept Earth Observation capabilities for biomass mapping and change detection: synergy of multi-temporal and multi-frequency interferometric radar and optical satellite data
* Land cover and change:
o Multi-scale remote sensing synergy for land process studies: from field spectrometry to airborne hyperspectral

and LiDAR campaigns to radar-optical satellite data
o Multi-temporal, multi-frequency SAR for landscape dynamics
* Coastal zone and freshwater monitoring:
o SAR-based Earth Observation in support of management of intertidal salt marsh habitats
o Dynamics and conservation ecology of emergent and submerged macrophytes in Lake Balaton using airborne remote sensing
o Satellite remote sensing of water quality (chlorophyll and suspended sediment) using MODIS and ship-mounted LIDAR
* Geohazards and emergency response:
o Methods for detection and monitoring of small scale land surface feature changes in complex crisis situations
o Monitoring landslide displacements with Radar Interferometry
o DINSAR/PSI hybrid methodologies for ground-motion monitoring
* Climate adaptation and emergency response:
o Earth Observation based analysis of regional impact of climate change induced water stress patterns fuelling human crisis and conflict situations in semi dry climate regimes
o Satellite derived information for drought detection and estimation of the water balance
GIONET will also cover methodologies including (i) modelling fundamental radiative processes determining the satellite signal, (ii) atmospheric correction and calibration, (iii) processing higher-order data products, (iii) developing information products from satellite
data to meet user requirements, and (iv) statistical methods for assessing the quality and accuracy of data products. These methodologies will enable the researchers to develop careers in the evolving GMES (renamed to Copernicus) Services, network with the GMES community and contribute to rolling out the GMES Program. Communication skills and effective engagement with stakeholders and the public will form an integral part of the training. The Earth Observation methods developed in GIONET will benefit the economy in Europe.