INGV spin-off

SPACEARTH TECHNOLOGY

COMPANY PRESENTATION

www.spacearth.net

SpacEarth Tecnology (SET)

About us

A spin-off company of the Istituto Nazionale di Geofisica e Vulcanologia: a team of researchers, engineers, physicists, and geologists delivering executive solutions in Seismology, Environmental Geophysics, Remote Sensing, Satellite Navigation and Positioning and Training fields

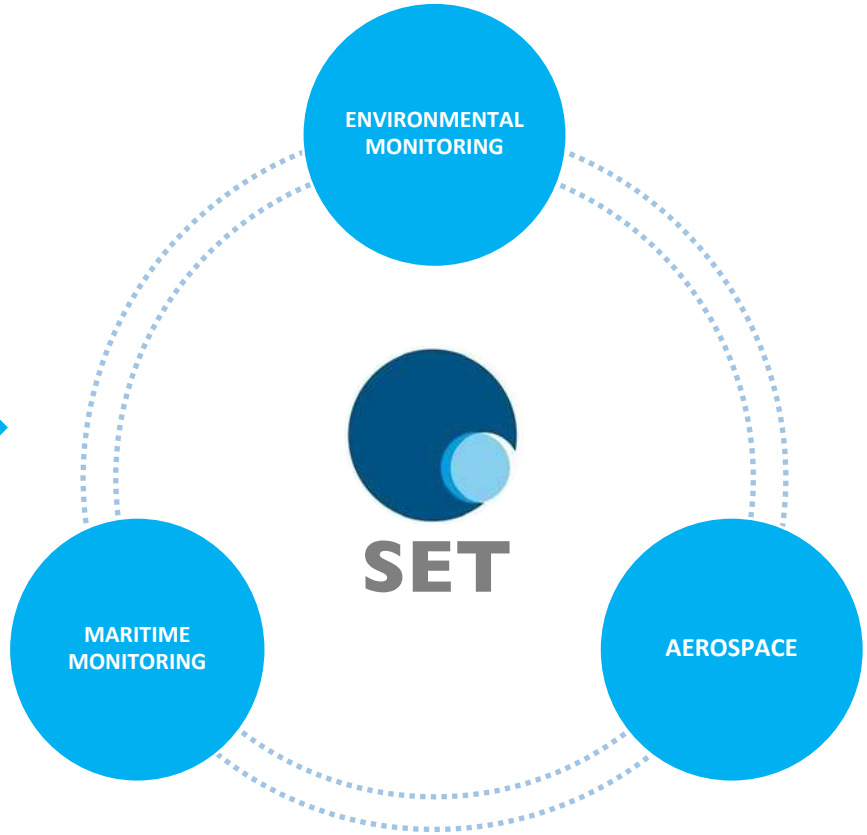
Mission

To design and develop applications, tools, software, hardware components and products for Aerospace, Maritime and Environment sectors in cooperation with major European and Italian Industries, Organizations, Universities and Research Centres

Vision

Provide innovative services and high-tech tools in high-growth markets

SET | *History based on science & innovation.*



SET | *Products and services*

AEROSPACE

- GNSS HIGH PRECISION
- SPACE WEATHER
- EARTH OBSERVATION

ENVIRONMENTAL MONITORING

- REMOTE SENSING
- SHALLOW DEEP
- GEOTHERMAL
- MINE SEISMOLOGY

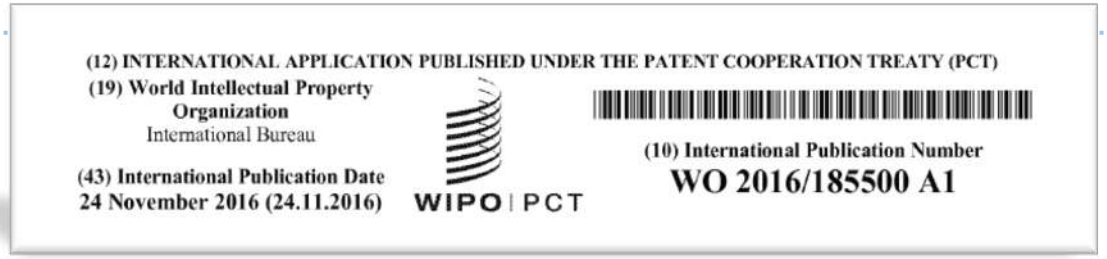
MARITIME MONITORING

- DEEP SEA DATA ACQUISITION
- SYSTEM CONTROL
- SEA LEVEL RISE

Issue Ionospheric threats on GNSS precise positioning limit many high accuracy commercial by limiting service continuity.

Our Solution

A patented value added service able to forecast minutes in advance the ionospheric parameters and provide a mitigation solution.



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Services Service delivery/pilot projects on precision agriculture, mining, dredging, constructions, offshore operations, aeronautics, land management and geodesy/land surveying systems

Benefits Provide high accuracy GNSS services and overcome economic losses due to large positioning errors under disturbed ionosphere

Issue

Ionospheric threats on GNSS precise positioning limit precision agriculture al equatorial latitudes

Our Solution

A highly accurate and robust GNSS precise positioning service for equatorial areas based on innovative forecasting and alerting models designed for agriculture

Benefits

Main benefit is the GNSS high accuracy position to ensure business continuity and seamless operations

It works with all GNSS satellite systems

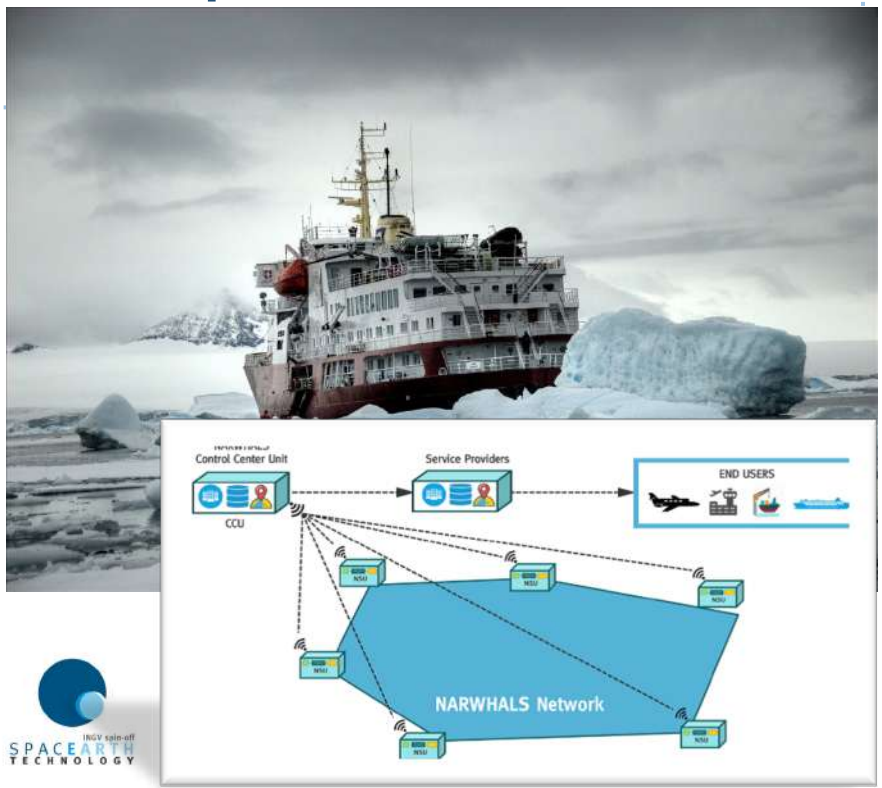
WINNER of ESA kick-start activity

Issue

Ionospheric threats on GNSS precise positioning limit maritime shipping in Arctic and sub-Arctic areas

Our Solution

A highly accurate and robust GNSS precise positioning service for Arctic and sub-Arctic areas based on innovative forecasting and alerting models together with low power architectures designed for Arctic conditions



Benefits

Main benefit is the GNSS high accuracy position to avoid ships collisions and allow automatic maneuvering

NARWHALS works with all GNSS satellite systems

NARWHALS
NAVIGATION IN ARCTIC WITH GNSS HIGH ACCURACY LOW POWER SOLUTION

SPACEARTH TECHNOLOGY

AIS is…

an ionospheric radar that uses high-frequency radio waves for the remote sensing of the ionosphere and is a system that measures all parameters of the ionospherically reflected HF radio signals, and automatically calculates the local ionospheric electron density profile in real time.

Benefits

- AIS is essential for space-weather monitoring and ionospheric modelling

Customers

- Space weather centres
- Meteorology Centres
- Research Institute

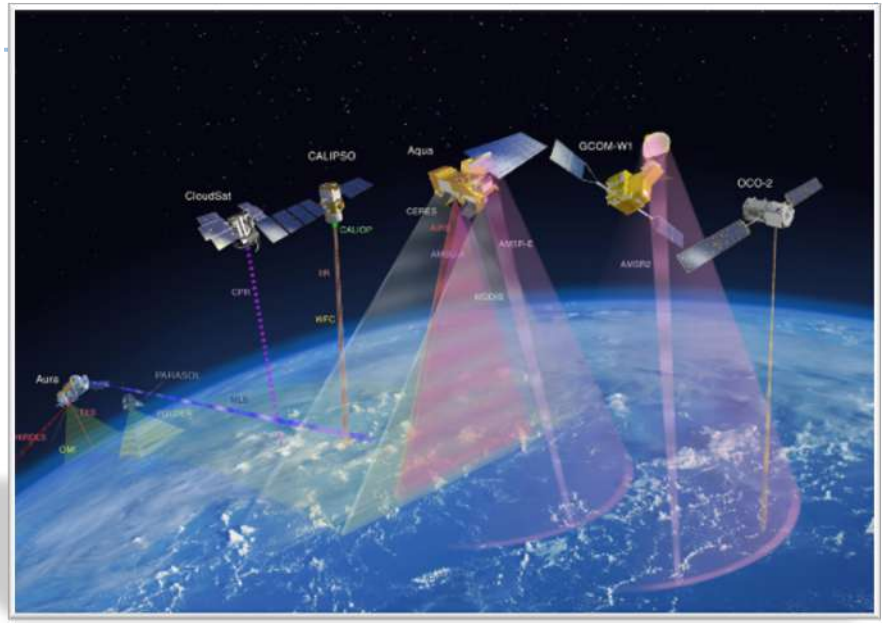
AIS ionosonde

Issue

Infrastructures damages caused by ground displacement

Our Solution

Ground displacement measurements by InSAR and real time GPS analysis



Services

Pilot & executive project on selected infrastructures, public and private properties, historical buildings and archeological areas

Benefits

Infrastructures safety

Investigate and monitor geohazards over wide areas, assess the temporal evolution of a single, at risk, location

Issue

Impact of wildfire disturbances due to global climate change

Our Solution

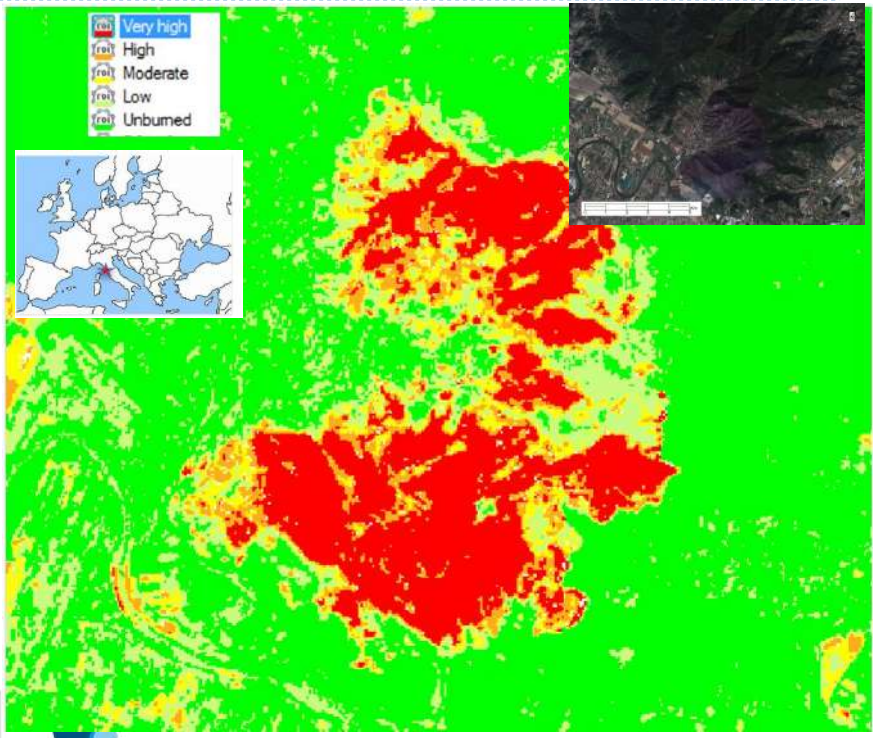
Localization and delineation of burn scars with associated level of severity

Services

- Tracking wildfire impact by multiple space sensors
- Burn scar delineation, Vegetation Mortality, Ecosystem Recovery, Land use change, fire regime

Benefits

- Optimize mitigation and recovery strategies and save money
- Post fire geo-hazards risk mitigation and management
- Health and social impact



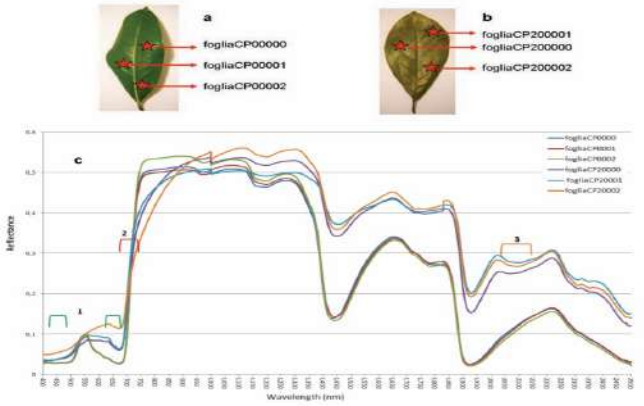
Monte Serra fire in Tuscany, Burn severity map . In red where no vegetation is left. Credits : contains modified Copernicus data [2018], processing INGV

Issue

Monitor forest, vegetation and crop evolution

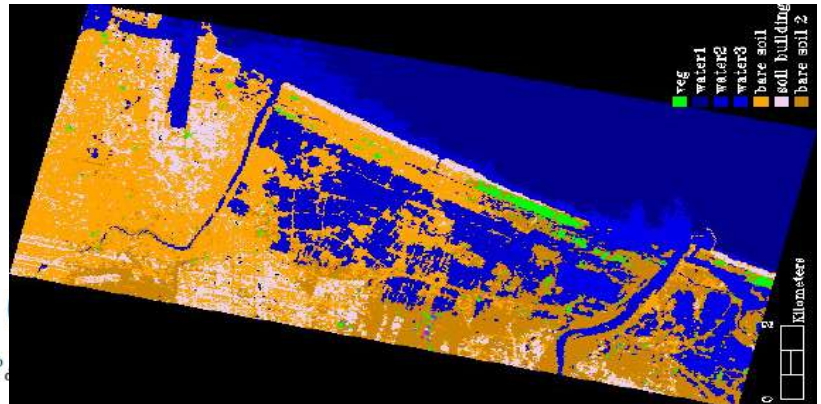
Our Solution

Classification and coverage maps by using Machine Learning approach applied to multispectral and hyperspectral technology from space and airborne systems



Services

- Identify species and phenological state of vegetation
- Biomass estimation,
- Vegetation monitoring
- Crop phenological development and mapping



Benefits

- Enable illegal crops identification
- Better farm management
- Better forest management

Laser Vibrometer

Provide versatile non-contact vibration transduction in applications where it is impossible or undesirable to mount a vibration transducer onto a vibrating object

Project funded by Lazio Region

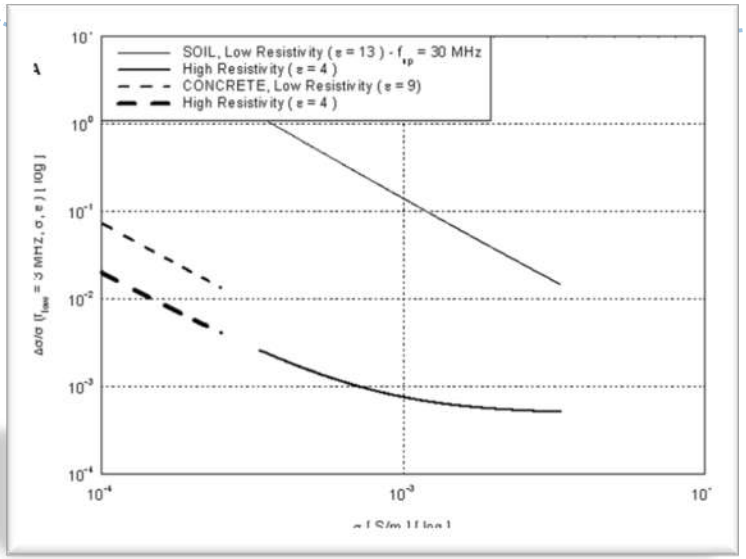
Typical applications include measurements on:

- Oscillations of buildings, bridges, roads, etc.
- Rotating surfaces speed
- Remote targets behind layers of glass

	Doppler Interferometry	Laser Vibrometer
Available in the market	yes	**no**
Distance	medium-short	**long**
Surface	rough	**rough**
Orthogonality	no	**no**
Cost	high	**low**

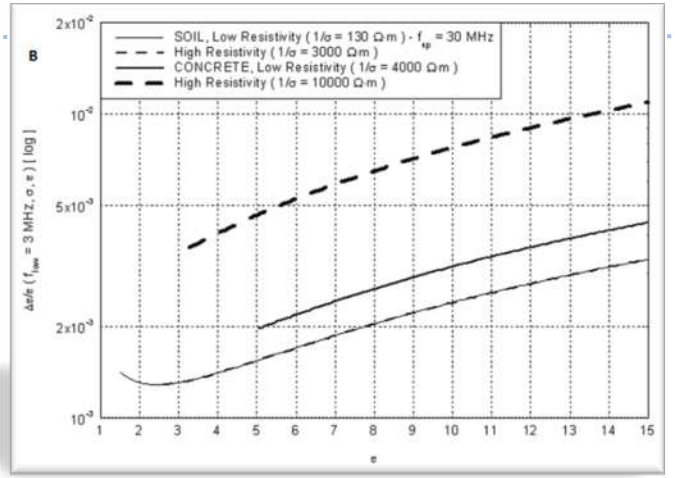
Resper Meter

An electrical RESistivity and dielectric PERmittivity measuring device for non-invasive investigation of environment is a survey device exploiting the electrical induction by means of a capacitive coupling with media as terrestrial soils and concretes



Typical applications include measurements on:

- Estimating the uniformity and homogeneity
- Detection of presence of cracks, voids and other imperfections
- Monitoring changes in the structure of the concrete which may occur with time
- Estimating the in-situ compressive strength
- Estimation of humidity content through relative electric permittivity measures



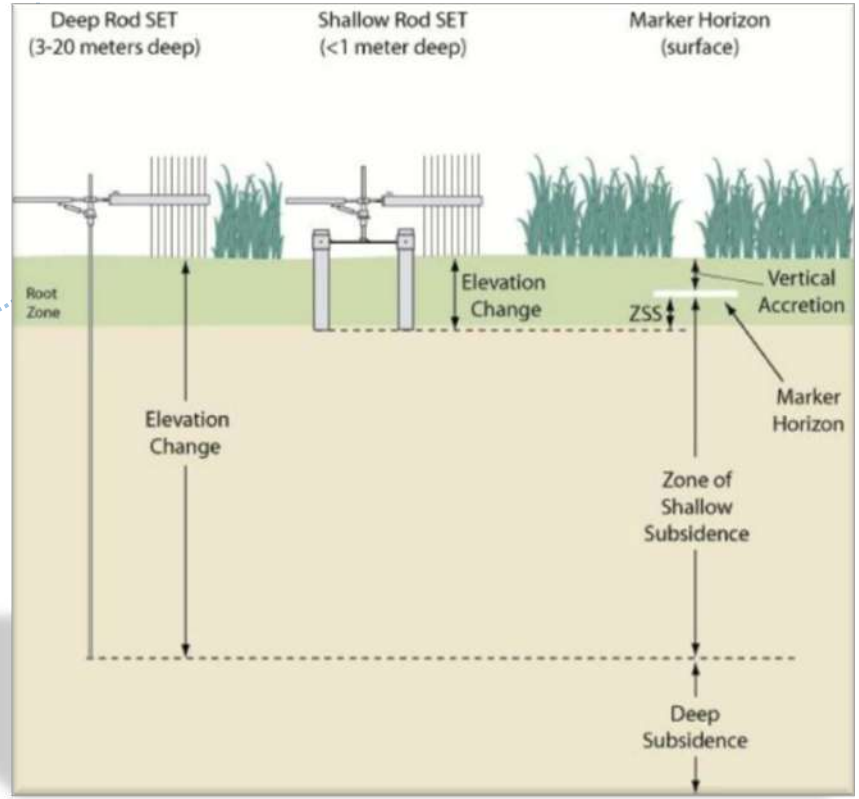
Environmental | *Shallow deep* Monitoring

Issue

- Anthropogenic sinkholes – collapses, water and subsoil pollution, ground and infrastructure instability

Our Solution

- **Novel application of integrated geophysical methods to rapidly and accurately image the very near surface**



Services

- Service delivery/pilot & executive project on selected infrastructures

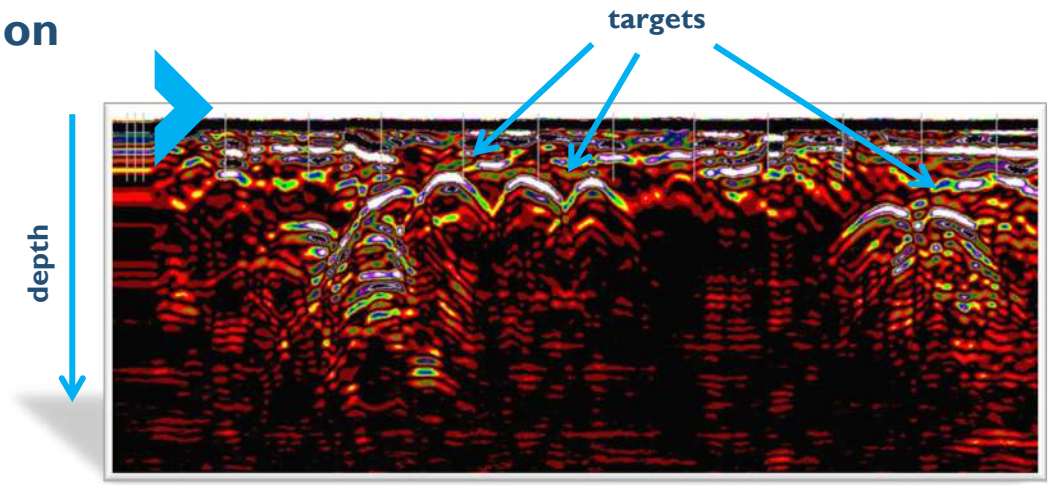
Benefits

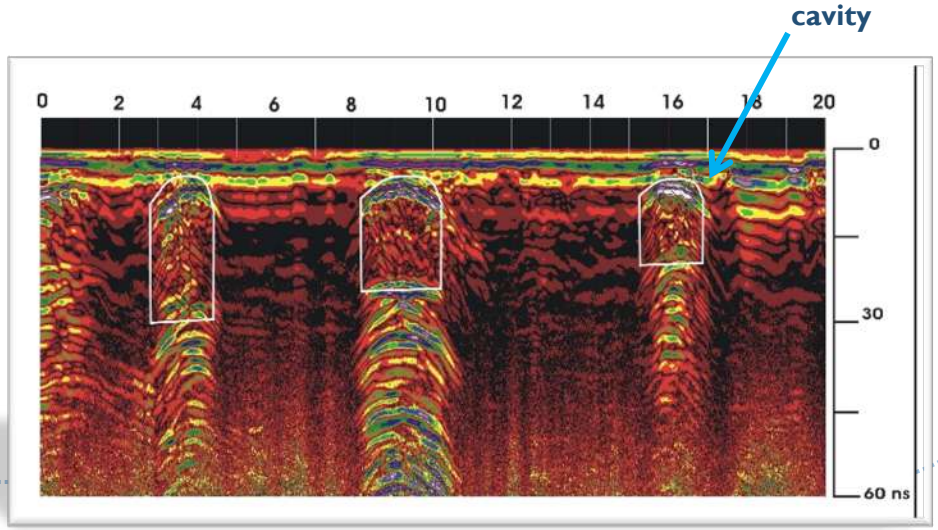
- Infrastructures safety; sinkholes risk mitigation; subsoil characterization and monitoring

Project funded by ENEL SpA

Ground Penetrating Radar and Geoelectric methods for underground utility detection

- Cavity detection
- Utility location
- Concrete inspection
- Bridge deck inspection
- Subsoil mapping





Customer: Sorgenia Geothermal SpA

Micro-seismic monitoring is mandatory by law before geothermal sites exploitation

Our Services

- Micro-seismic design
- Network installation and maintenance
- Micro-seismic monitoring reports
- Monitoring network management

Environmental Monitoring | *Mine Seismology - seismic monitoring service for mining areas*

WINNER of H2020 "SME Instrument" Phase I

- Mining-induced ground collapse represents the main hazards in mining sites

Our Solution

- **Mines-In-Time is an automatic service for monitoring in real time the stress alteration of the rock mass during mining operations**

NEW BOLIDEN
Metals for modern life

Seismic data

MIT

Cloud Processing

Automatic early-warning

Benefits

- Save lives - Reduce economic losses - Ensure mine business continuity

Maritime Monitoring | *Deep sea data acquisition and system control*

- Data acquisition and management for ocean observatories

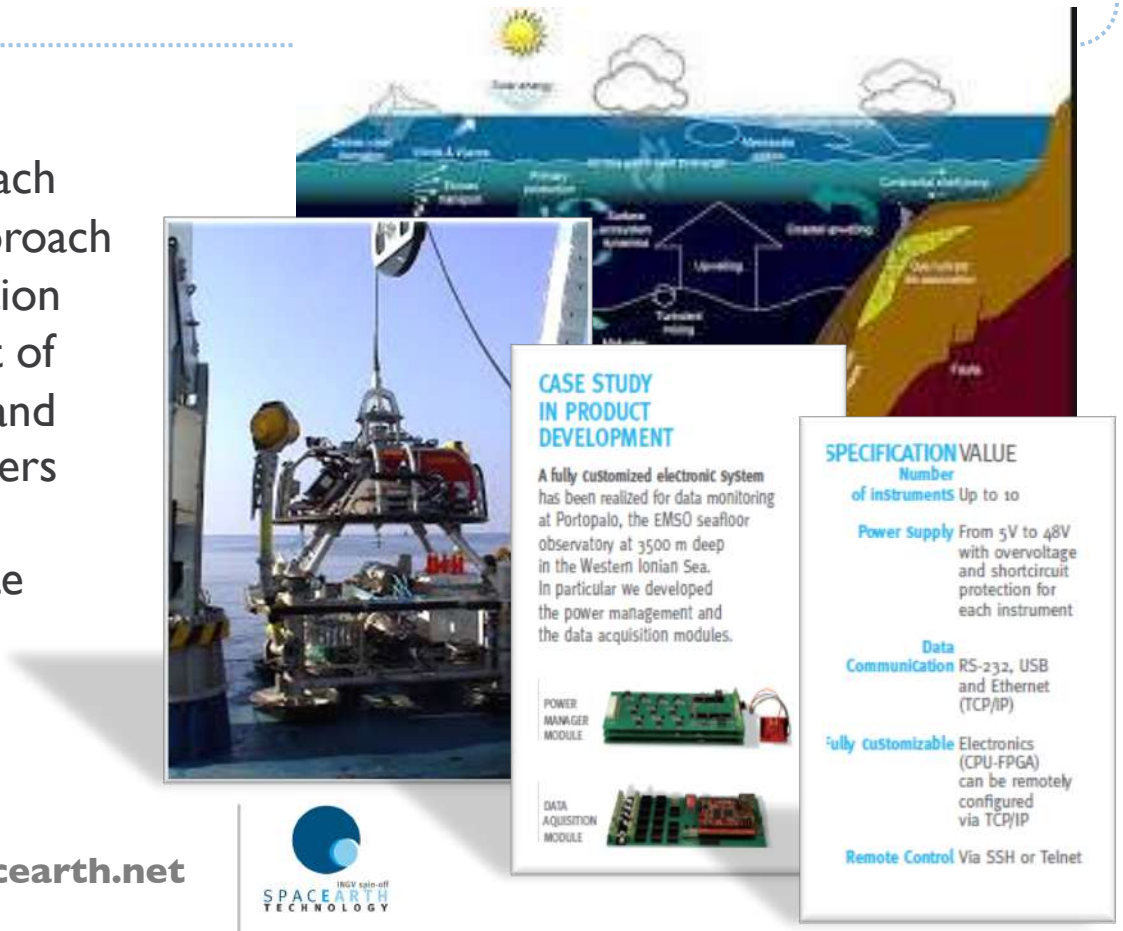
Accurate, consistent and comparable, long-term measurements of ocean parameters to address natural hazards, climate change and marine ecosystems

Benefits

- Advanced approach
- Standardised approach for data elaboration and management of biogeochemical and physical parameters

Customers

- Research Institute
- Universities
- Industries
- Policy makers



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Issue

- Global warming causes sea level rise with serious consequences for the environment, population, infrastructure and cultural heritage

Our Solution

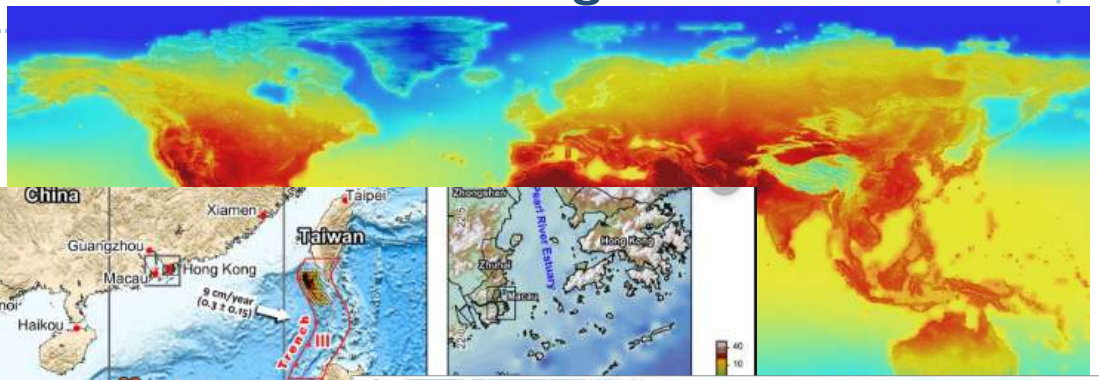
- **Multi-temporal scenarios of marine floods up to 2100 for selected areas. Results will be used for coastal resilience to prepare interested parties to face future changes**

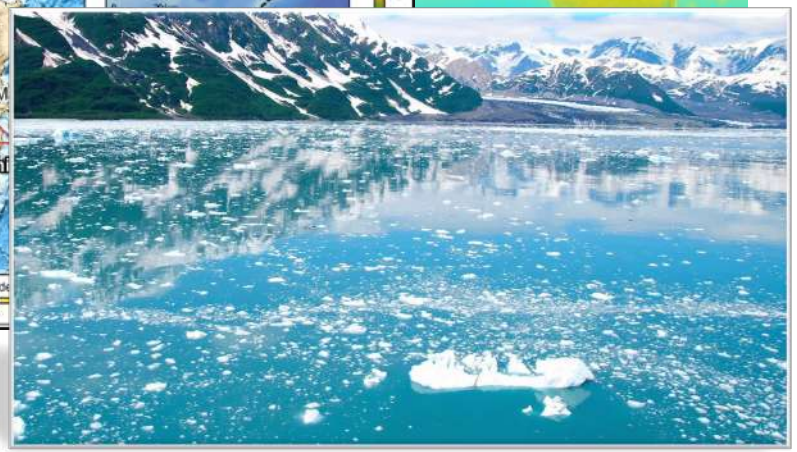
Benefits

- Flood and Climate Risk Assessment
- Affordable and detailed reports

Customers

- Business
- Governmental
- Residential
- Municipalities





SET | *Main collaborations*

BOLIDEN
Metals for modern life

The University of Nottingham
UNITED KINGDOM · CHINA · MALAYSIA

CBK PAN

sansa
SOUTH AFRICAN NATIONAL SPACE AGENCY

Consiglio Nazionale delle Ricerche

POLITECNICO DI TORINO

ISMB
Istituto Superiore Mario Boella

esa

european multidisciplinary seafloor & water-column observatory
emso

septentrio

eit RawMaterials
Connecting matters

Mackenzie

TELESPAZIO
a LEONARDO and THALES company

UNIVERSITY OF BATH

SET | *Main projects participation*

- Italian Antarctic program - DemoGRAPE project (GNSS High Precision)
- EUROCONTROL – SESAR project (GNSS High Precision)
- H2020 INFRADEV - EMSODEV project (Maritime)
- ESA – Disaster Risk Management (Earth Observation)
- H2020 Marie Skłodowska-Curie ITN – TREASURE project (GNSS High Precision)
- H2020 BELS+ Promote European GNSS technologies in South East Asia (Space Weather)
- EIT Raw Material "Seismic monitoring systems for mining areas" (Mine Seismology)
- ESA – NARWHALS PROJECT (GNSS High Precision)

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SPACEARTH TECHNOLOGY

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