FIG WORKING WEEK 2019

22–26 April, Hanoi, Vietnam

"Geospatial Information for a Smarter Life and Environmental Resilience"

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"Geospatial Information for a Smarter Life and Environmental Resilience"

BELS+
Building European Links toward South East Asia in the Field of EGNSS

Tackling Ionosphere to enhance High GNSS Accuracy in Vietnam

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Istituto Nazionale di Geofisica e Vulcanologia

European Global Navigation Satellite Systems Agency

HORIZON 2020

SPACEARTH TECHNOLOGY

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SpacEarth Technology

About Us

We are a Spin-off company of Istituto Nazionale di Geofisica e Vulcanologia one of the biggest research body in Italy. We are a team of engineers, physicists and geologist with a long involvement in research and business management with the goal to create value by the results of more than 60 years experience of INGV.

Mission

Our purpose is to:

- design and develop applications, tools, software, hardware components and products for Aerospace, GNSS and Environment sectors in cooperation with major European and Italian Industries, Organizations, Universities and Research Centres.
- bring innovative R&D products to market.

Vision

Our vision is to become an international leader in designing and developing cutting edge technology solutions in selected civil market niches.

Produtcs and services

Aerospace

- GNSS high precision
- Space weather
- Earth observation

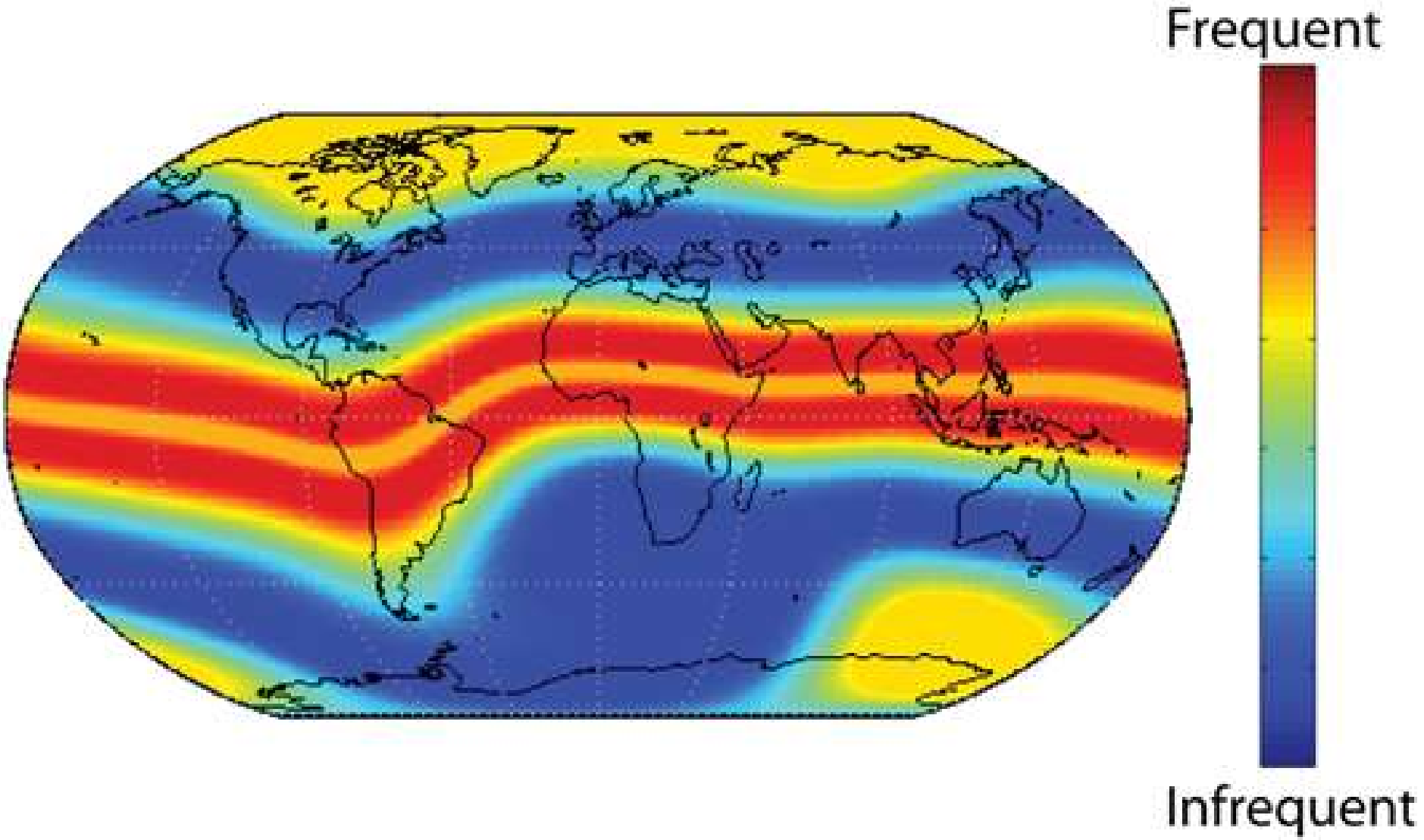
Marine Monitoring

- Deep sea data acquisition
- System control

Environment

- Remote sensing
- Shallow deep monitoring
- Subsoil imaging

The problem



Our solutions

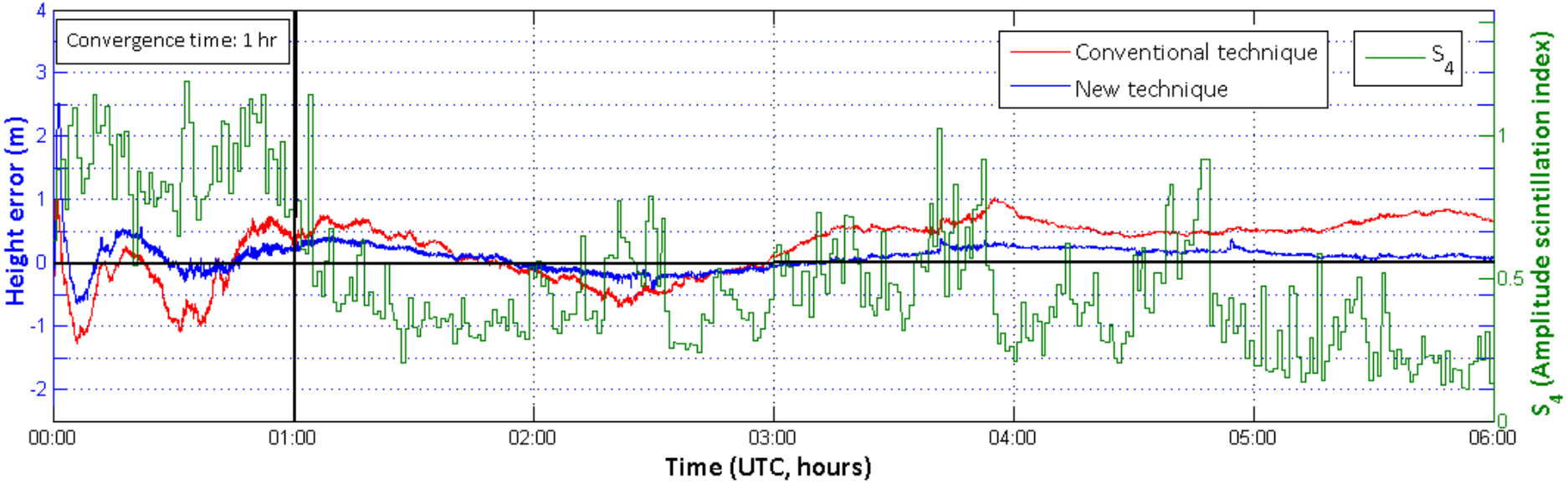
SpacEarth Technology is proud to introduce a series of solutions able to nowcast, forecast and mitigate the ionospheric impact on GNSS services.

- ✓ **Mitigation on high accuracy positioning and navigation**
- ✓ **PPoT: Precise Positioning of Things**
- ✓ **Ionospheric Scintillation and TEC nowcasting and forecasting**

Mitigation on high accuracy positioning

In collaboration with University of Nottingham and Space Research Centre Polish Academy of Science

Precise Point Positioning results



	RMS of height error (m)		
	Mitigated	Conventional	**Improvements**
During convergence	**0.21**	0.51	**60%**
After convergence	**0.16**	0.54	**69%**

Mitigation on high accuracy positioning

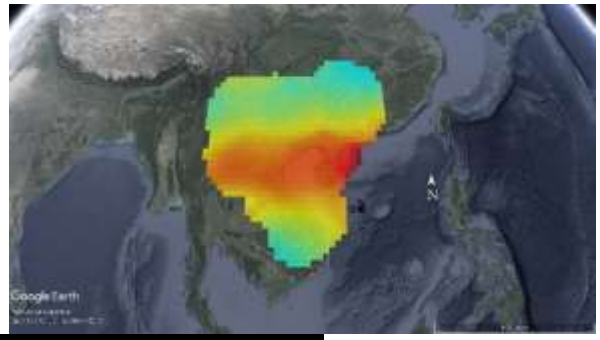
In collaboration with University of Nottingham and Space Research Centre Polish Academy of Science

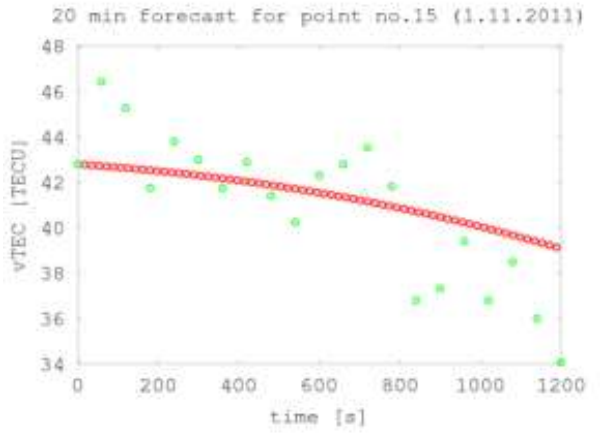

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)
(19) World Intellectual Property Organization
International Bureau
(43) International Publication Date
24 November 2016 (24.11.2016)
WIPO | PCT
(10) International Publication Number
WO 2016/185500 A1

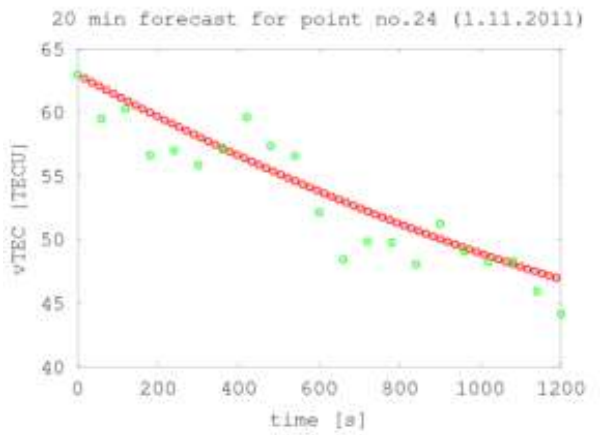
The short term forecasting model

International patent n. PCT/IT/2016/000126
"Forecasting model for Scintillation and TEC"

Field test in Hanoi performed last October thanks to BELS!







0 to 20 min forecasting horizon

P	σ_{S4}	$\sigma_{\sigma\phi}$(rads)	σ_{TEC} (TECu)
99%	0.12	0.13	1.06

TEC map

Model forecasting resolution

www.spacearth.net

Measurement campaign in Hanoi

In collaboration with Hanoi University of Science and Technology

Measurement campaign to test the model

- Network of 4 ISMRs (Ionospheric Scintillation Monitoring Receivers)
- Deployment of 3 Septentrio PolaRx5S receivers (about 10 km apart)
- 4th receiver is the PolaRxS at Navis
- Model runs to mitigate scintillation on two rover experiments
  - Fixed station near Navis (kinematic mode)
  - Rover
- Start: 12 October – Stop: 20 October 2017

PolaRx5S
Real time output of TEC & scintillation indices from 50 (100) Hz samples

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Measurement campaign in Hanoi

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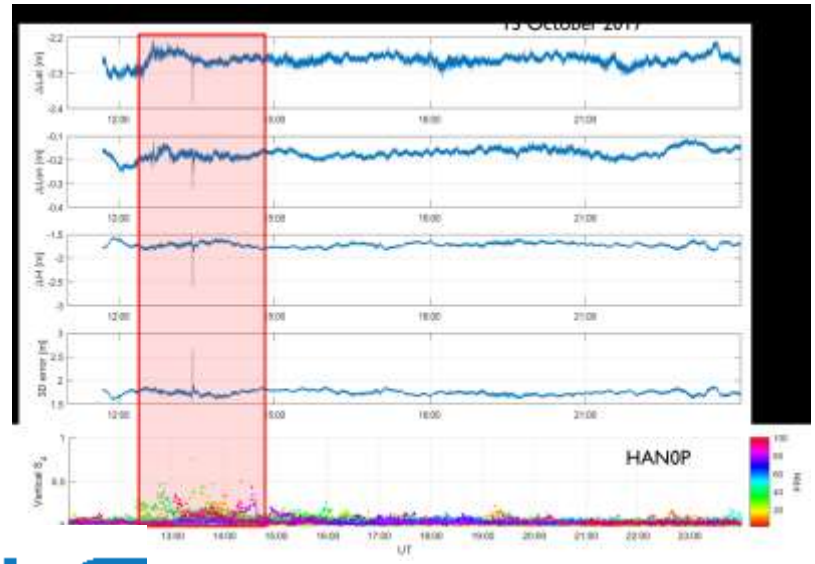
Rover test site 1

Positioning on a fixed point to be processed in kinematic mode



Rover test site 2

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Measurement campaign in Hanoi

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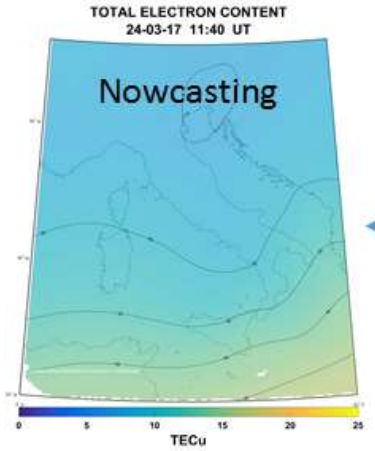
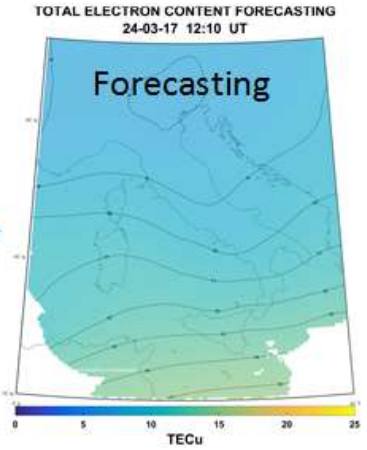
PPoT: Precice Positioning of Things





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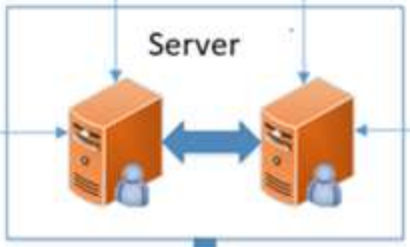
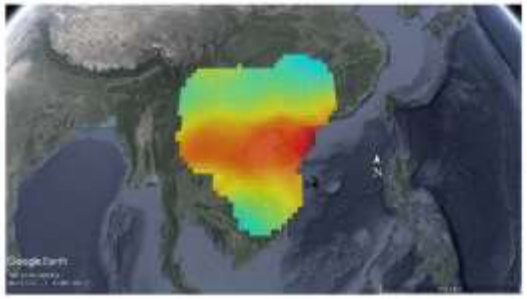
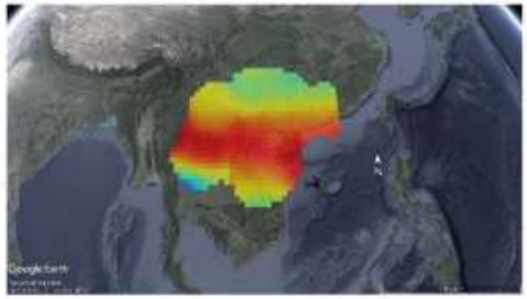
SpacEarth Technology is proud to introduce the GNSS real-time solution to support high-precision GNSS applications in Vietnam



onospheric Range Error/Total Electron Content
Nowcasting



Ionospheric Range Error/Total Electron Content
30 Minutes' Forecasting



Connected Devices

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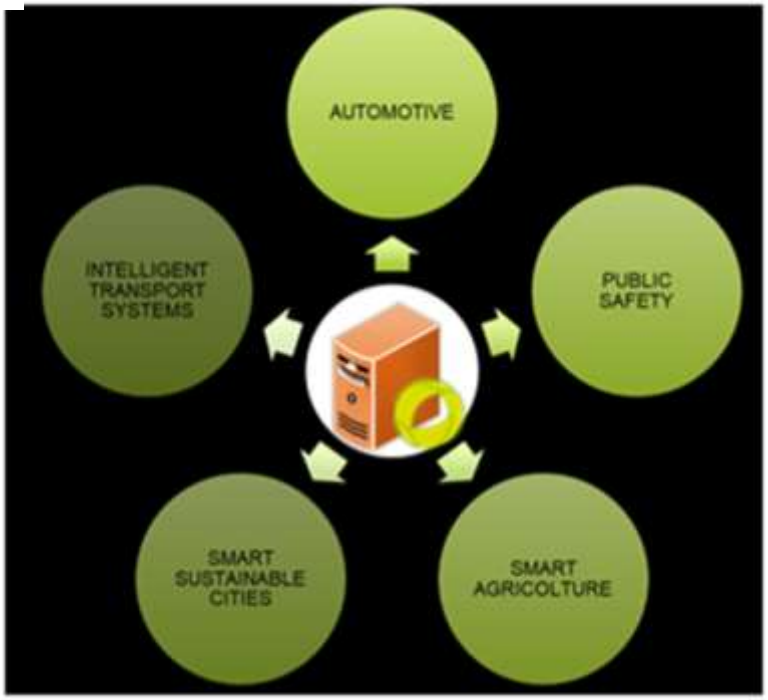
The market



High-Spatial resolution nowcasting and forecasting is available to assist GNSS operations. Ionospheric product is customizable to match user needs exploiting existing infrastructures.

Product	Application
TEC/IRE Nowcasting	Improvement of the accuracy of single frequency positioning
TEC/IRE Forecasting	Operation planning for GNSS reliant services

Enjoy the experience of SpacEarth solutions at the GNSS Demo Centre, at the NAVIS in Hanoi.

www.belsproject.eu

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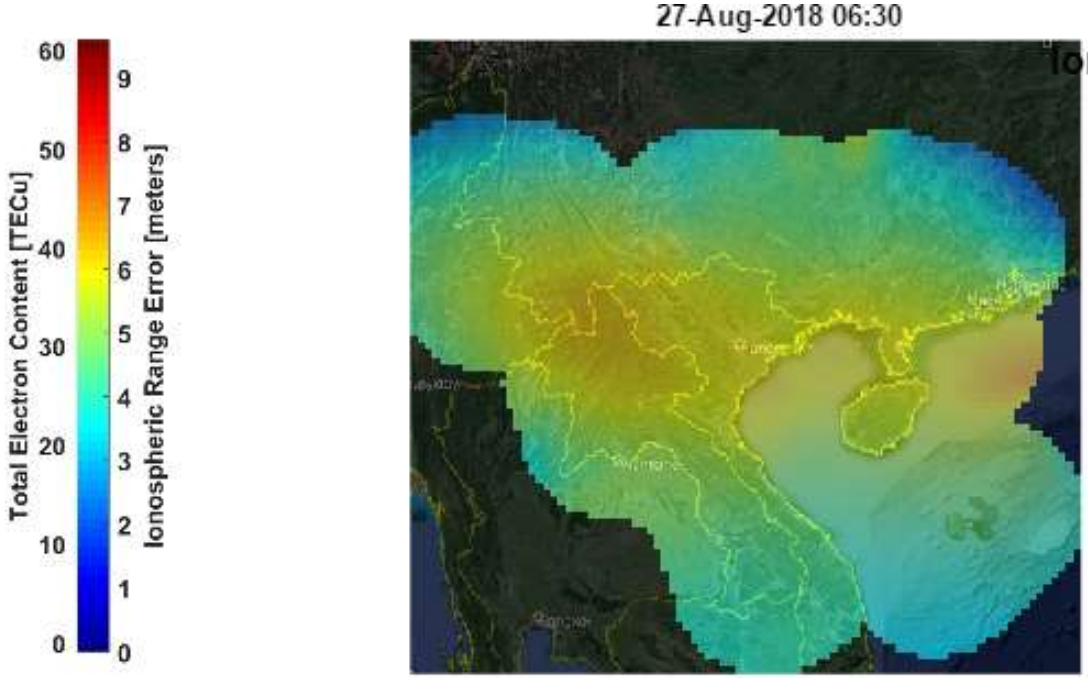
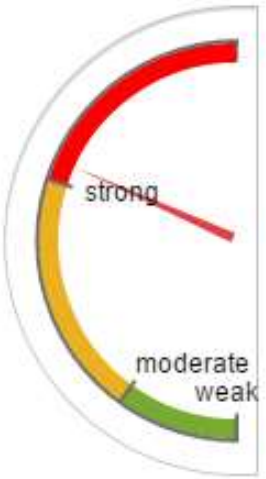
navis

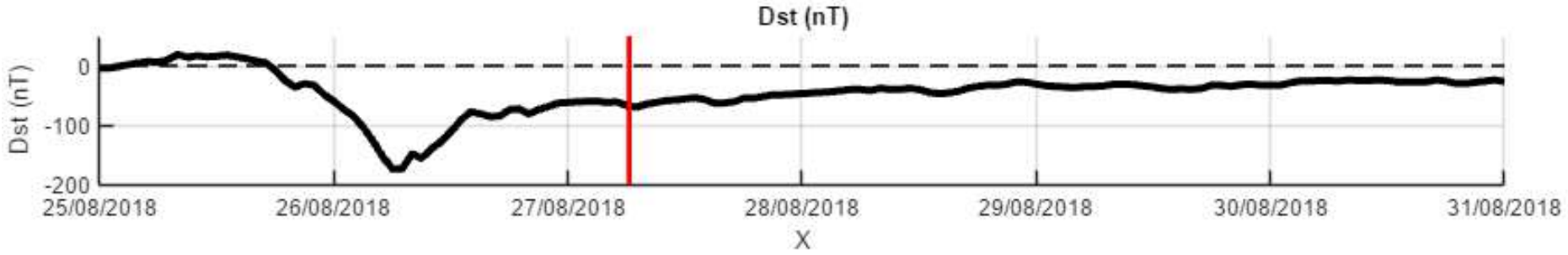
ĐẠI HỌC BÁCH KHOA

BELS+

SpacEarth Technology at the Galileo Demo Centre







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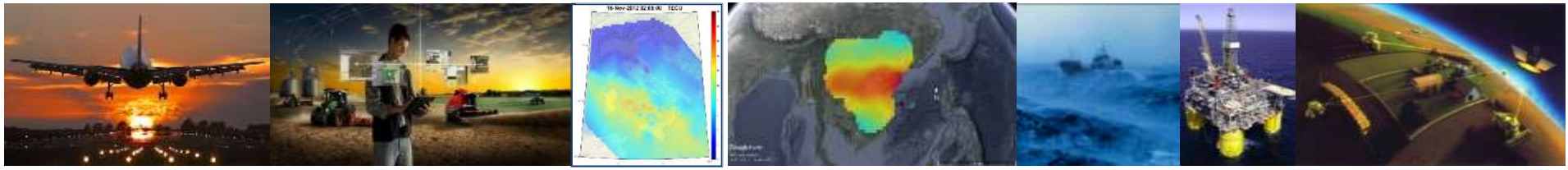
Potential customers



GNSS service providers

- Agriculture
- Aviation
- Maritime
- Mining
- Dredging
- Constructions
- Offshore operations
- Land management
- Geodesy/land surveying

Industrial partnership is welcome

SPACE WEATHER Centres

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Cám ơn vì sự quan tâm của bạn

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IRGV spin-off SPACEARTH TECHNOLOGY

SET team for the measurement campaign

Vincenzo Romano
General Manager

Luca Spogli
GNSS expert

Ingrid Hunstad
GNSS expert

Claudio Cesaroni
GNSS expert

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