Septentrio

Professional GNSS solutions in challenging environments
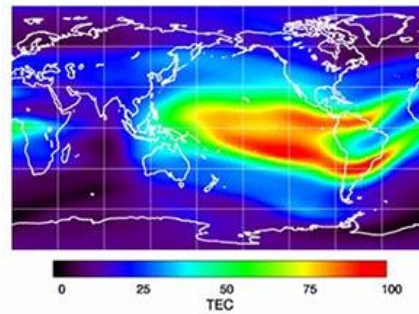
Company history

	2000	Septentrio is founded as a spin-off from IMEC, world's premier semiconductor research center and still a strong partner & shareholder.
	2002	ESA selects Septentrio as development partner for Galileo programs. Many firsts on Septentrio receivers, both IOV and FOC, including PRS.
	2006	Altus is founded in Torrance, CA focusing on high end survey applications
	2008	Veripos selects Septentrio receivers for its worldwide augmentation services.
	2014	Antoon De Proft hired as new CEO, full acquisition of Altus.
	2015	Selected by Unavco for its reference stations and scientific applications.

Who is Septentrio?

- **Focus on Customer success**
  - Most accurate and reliable **GNSS position and timing solutions** in the most demanding industrial environments

- **Our team**
  - International team of **GNSS HW**, **SW** and navigation experts developing all core elements of high-quality GNSS receivers

- **Global Presence**
  - Located in Leuven, Belgium with regional branches in Los Angeles, CA and Hong Kong.
  - Worldwide partner network

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Septentrio markets: Machine control

Marine

Construction

Mining

Logistics

Agriculture

Autonomous driving

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Septentrio Markets:
Reference Stations and Scientific Applications
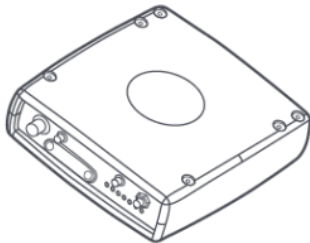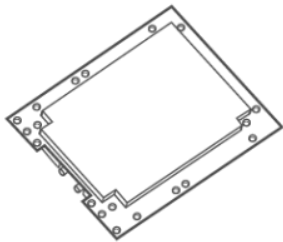
Reference Receivers

Timing Receivers

Space Weather

Our Products

AsteRx

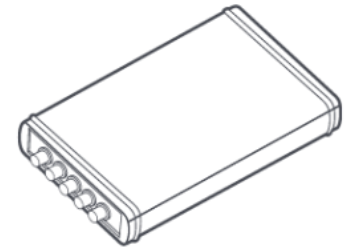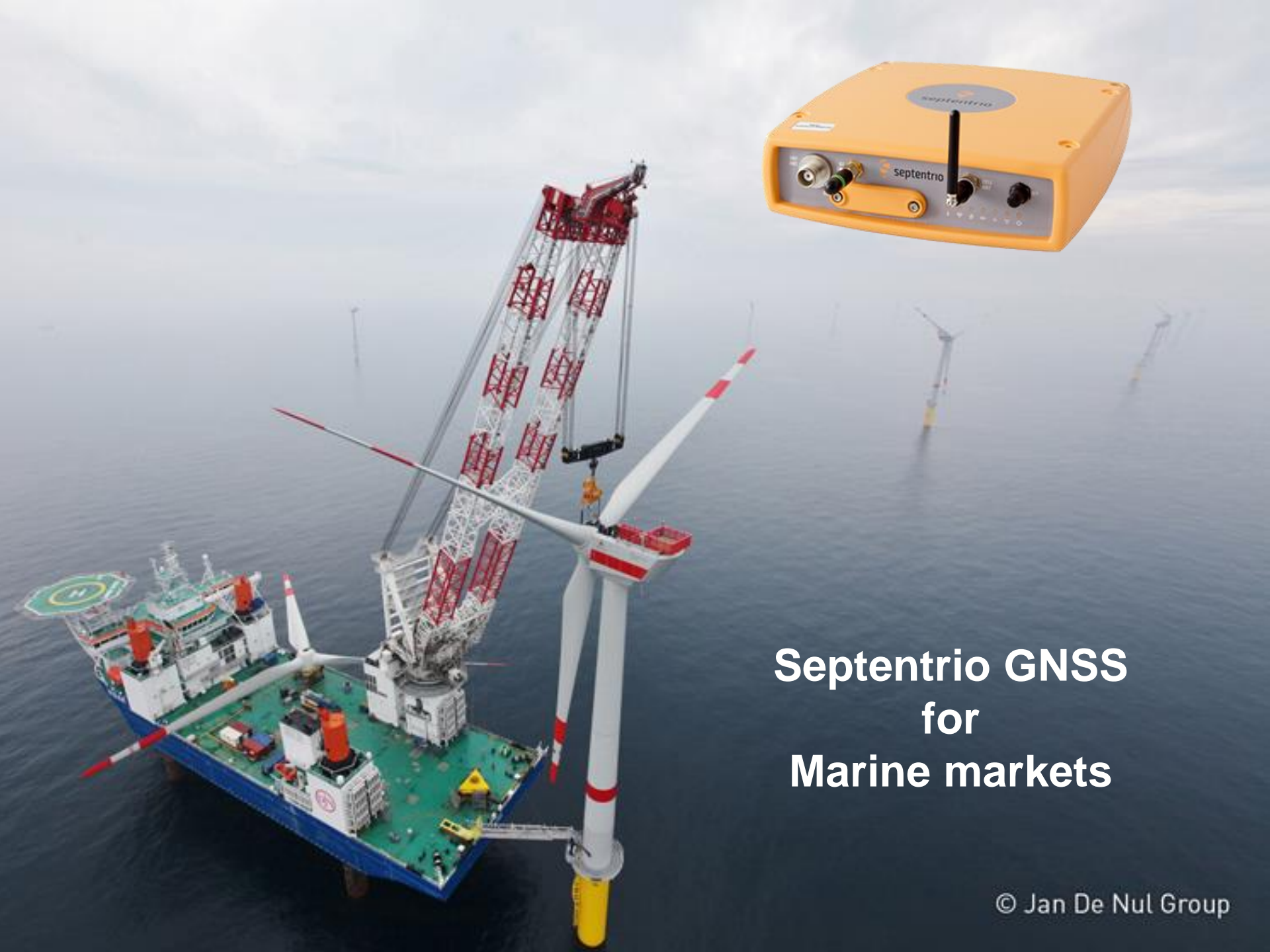Rover Receivers and OEM boards for automation and machine control

Altus

Smart antennas for GIS and survey

PolaRx

Reference receivers for science and networks

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**Septentrio GNSS
for
Marine markets**

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Marine markets – a few references

AsteRx-U Key Features

- Rugged GNSS receiver housing with all options in one box

- All signals support
  - GPS L1, L2, L5
  - GLO L1, L2
  - GAL E1/E5a/E5b/E5ab(incl. AltBOC)/E6
  - Beidou B1/B2/B3
  - QZSS

- TERRASTAR D or VERIPOS for 10 cm with Precise Point Positioning (PPP)

- Robust L-band reception (no interference from inmarsat and iridium transmissions)

- Two antenna inputs for GNSS heading

- Integrated Cellular Modem and optional UHF radio for RTK

- Ethernet, USB (host and client), and Serial interfaces

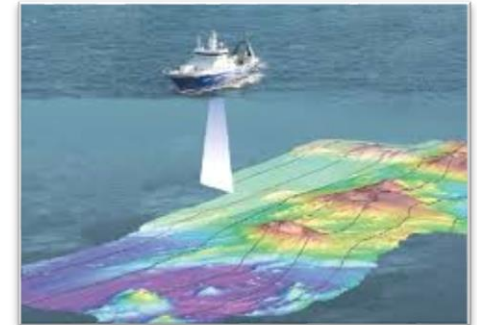- Web Interface on-board for intuitive and simple setup

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AsteRx-U MARINE applications

Oil & Gas

Dredging

Marine Survey
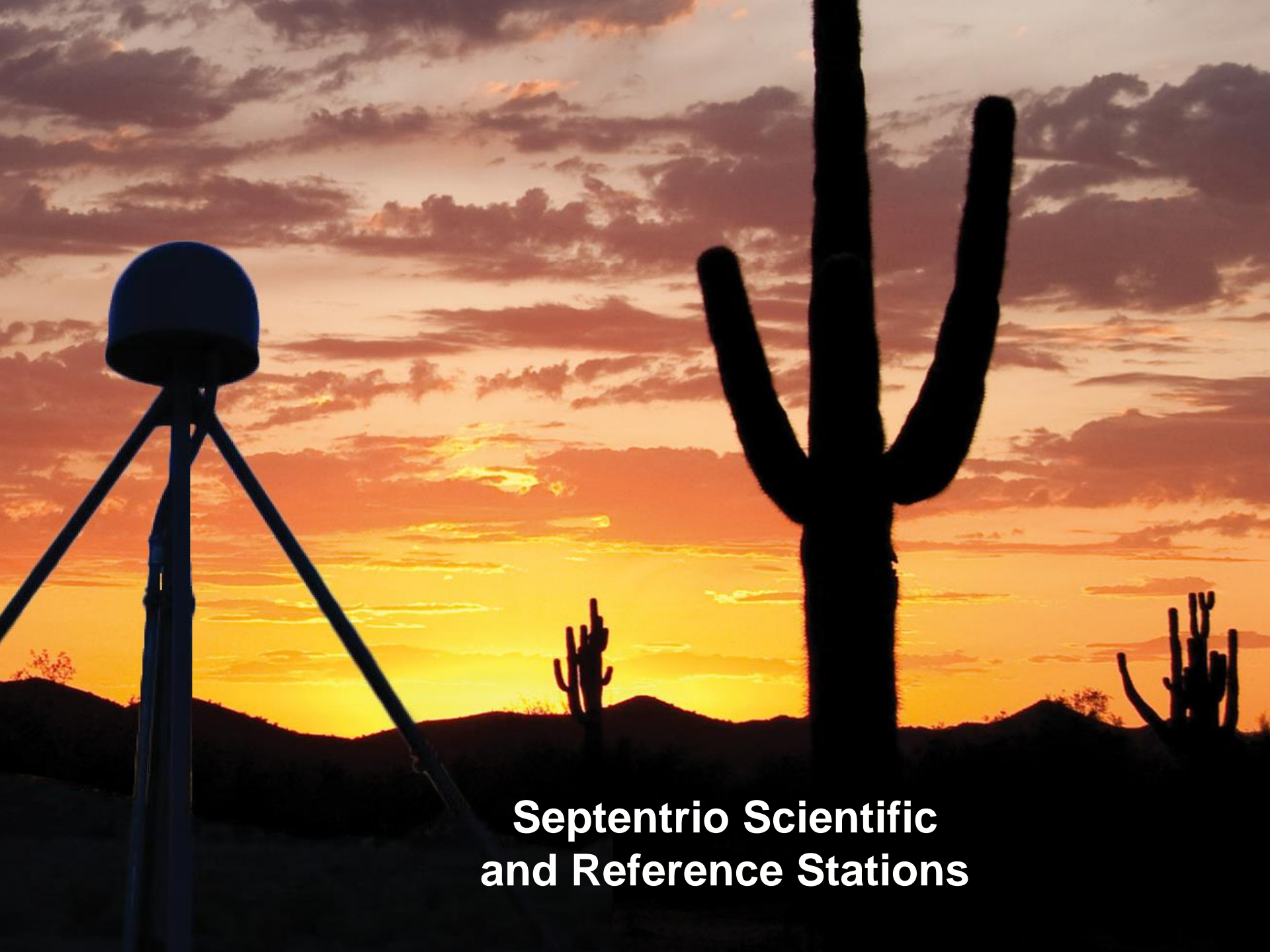
Precise positioning

Piloting

Offshore construction

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**Septentrio Scientific
and Reference Stations**

A few references

PolaRx Multi-GNSS Reference Receiver

- All Signals support
  - GPS L1, L2, L5
  - GLO L1, L2
  - GAL E1/E5a/E5b/E5ab(incl. AltBOC)/E6
  - Beidou B1/B2/B3
  - QZSS
- Advanced Interference Mitigation (digital, in-band)
- 100Hz Measurement output
- Integrated webserver/ftp
- Clock Steering + Disciplined Ref out (VCTCXO)
- Compatible with variety of reference network softwares (s.a. Geo++ GNSmart)
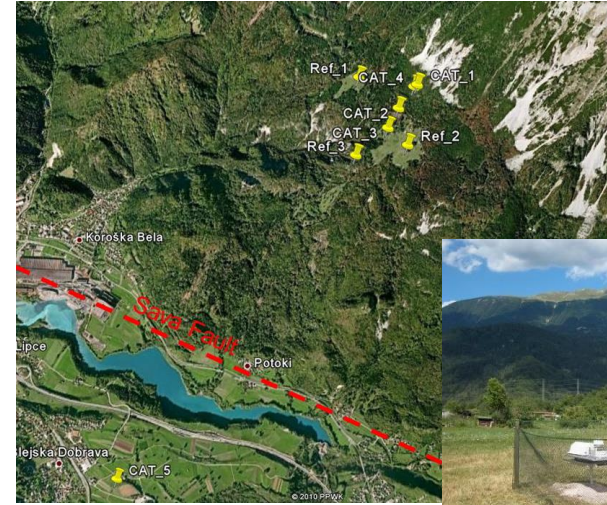- Serial, USB, Ethernet
- Reference in-out

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RTK and PPP reference networks

Geodetic Applications
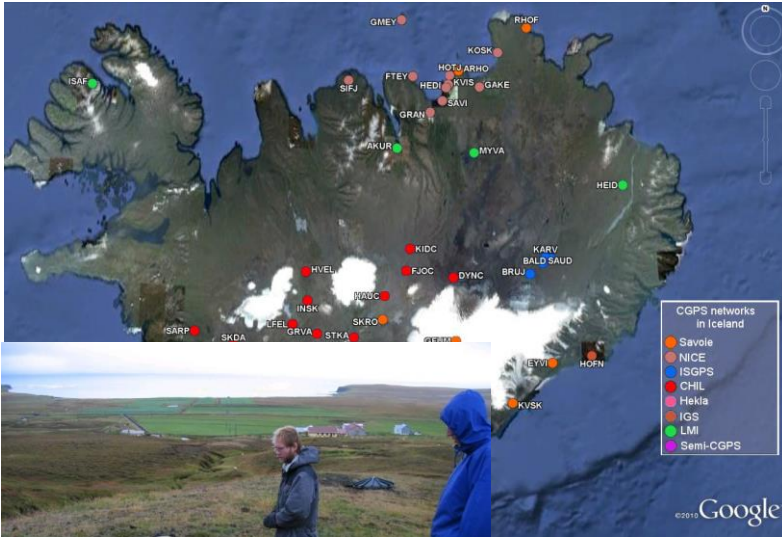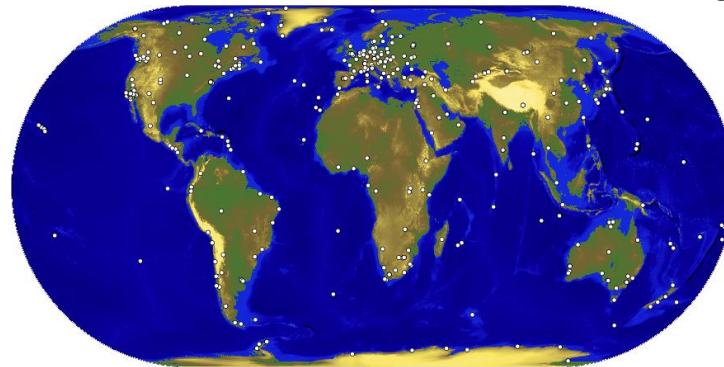

Volcano Monitoring

Landslide Monitoring

Plate tectonics

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Challenging environments

Obstructed environments

- Many marine applications are not open sky !
  - Cranes, masts and other obstacles will cause obstructions & multipath reflections

- Septentrio receivers feature advanced multipath mitigation and positioning algorithms to provide reliable positions in obstructed environments

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Interference

- Satellite based correction delivery sensitive to Iridium interference with competitive receivers

  - (independent report from Chevron)

- No interference problems with Septentrio receivers due to special RF design of both GNSS and L-band receiver

Iridium and Inmarsat C interference to DGPS

Chevron

OE Moment
CVX Marine HES Contractor Meeting

Interference problems with DGPS signals

© 2011 Chevron

Scintillation

- Short-term variations of the GNSS signal amplitude and phase

- Caused by scattering and diffraction in small-scale irregular structures ("bubbles") in the ionosphere

- Can cause serious disruptions of GNSS reception in non-protected receivers

Frequent

Infrequent

PPP error

Without mitigation
With mitigation
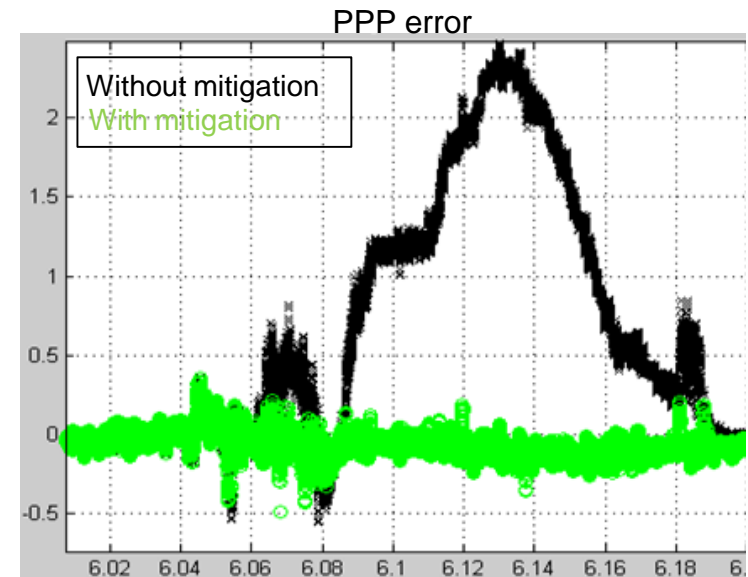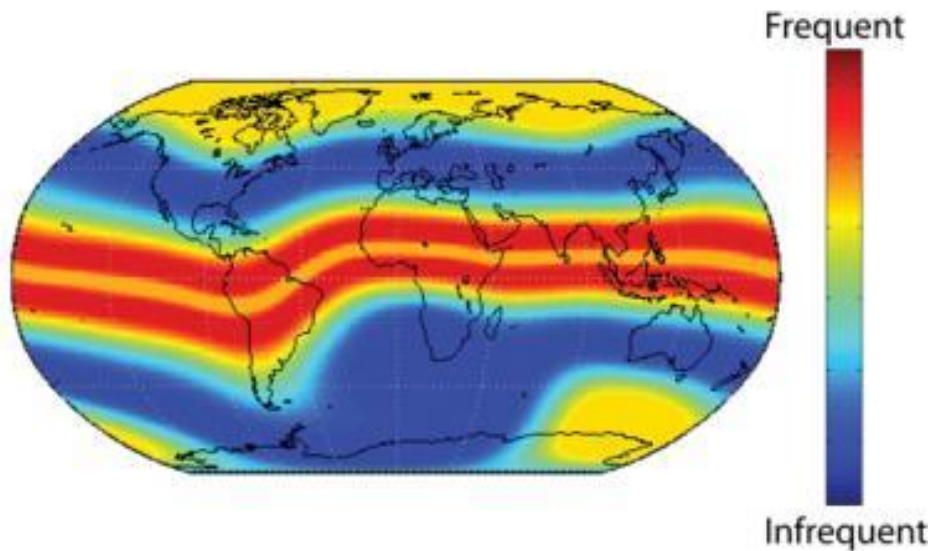
Multi-constellation matters
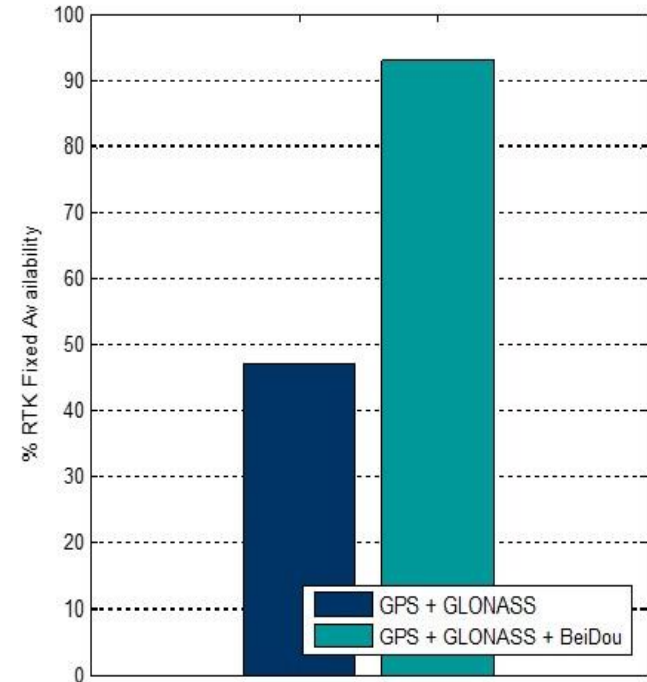
Availability boosted by BDS in challenging environment

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