GNSS PERFORMANCE IN TIMES OF NATURAL DISASTERS: A CHILEAN 2010 EARTHQUAKE CASE-STUDY

RENATO FILJAR (University College of Applied Sciences, Bjelovar, Croatia),
David Brčić (Faculty of Maritime Studies, University of Rijeka, Croatia),
Krešimir Vidović (The Royal Institute of Navigation, Baška, Croatia)

- Content of presentation:
  - Introduction
  - Earthquake description
  - GNSS environment status
  - Observed GNSS performance in Croatia
  - Discussion
  - Conclusion

- **Introduction**
  - GNSS as a part of national infrastructure
  - Natural catastrophes have potential effects on GNSS performance
  - Assessment of GNSS performance degradation during the Chilean 2010 earthquake as observed in Croatia

- Earthquake description
  - Time: 27 Feb 2010, 06:34:14 UTC
  - Location: coastal area in Chile, 35.93S 72.78W
  - Magnitude: 8.8


Source: USGS

Earthquake Location

OFFSHORE MAULE, CHILE
2010 02 27 06:34:14 UTC 35.93S 72.78W Depth: 35 km, Magnitude: 8.8
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- GNSS environment status during the time of the earthquake
  - Remarkably quiet space weather conditions
  - No global geomagnetic activities observed

- Observed GNSS performance in Croatia
  - **Methodology**
  - Osijek, Croatia IGS reference station
  - Raw single-frequency GPS observables (RINEX files available at: http://igscb.jpl.nasa.gov)
  - Data analysis and visualisation using R statistical package (http://r-project.org)

- Observed GNSS performance in Croatia
- Day 50 in 2010

- Observed GNSS performance in Croatia
- Day 51 in 2010

- Observed GNSS performance in Croatia
- Day 53 in 2010

- Observed GNSS performance in Croatia
- Day 54 in 2010
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- Observed GNSS performance in Croatia
- Day 55 in 2010

- Observed GNSS performance in Croatia
- Day 56 in 2010

- Observed GNSS performance in Croatia
- Day 57 in 2010

- Observed GNSS performance in Croatia
- Day 58 in 2010

- Observed GNSS performance in Croatia
- Day 60 in 2010
Observed GNSS performance in Croatia

Summary of essential statistics - Northing error

- Observed GNSS performance in Croatia
  - Summary of essential statistics - Easting error

- Observed GNSS performance in Croatia
  - Summary of essential statistics - Height error
Discussion

- Common positioning error dynamics prior to the day of the Chilean 2010 earthquake
- Essential statistical analysis of the time series of the GPS positioning error components reveals no significant disruptions
- Graphical presentation of the time series reveals increased dynamics on the days 58 and 60

- Conclusion
  - GNSS performance in the times of natural disasters important for national infrastructure
  - Case-study of Chilean 2010 earthquake's effects on GNSS performance in Croatia presented
  - While statistically not a significant event, increased dynamics observed on the occurrence of the earthquake and the following days
THANK YOU FOR YOUR ATTENTION!

Assist Prof Renato Filjar, PhD FRIN MIET
E-mail: renato.filjar@yahoo.co.uk
rfiljar@vtsbj.hr