

**United Nations/United Arab Emirates/United States of America
Workshop on the Applications of
Global Navigation Satellite Systems**

Dubai, United Arab Emirates, 16 - 20 January 2011

**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)**

Filjar, Brčić, Vidović: GNSS performance in times of natural disasters: A Chilean 2010 earthquake case-study

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

Filjar, Brčić, Vidović: GNSS performance in times of natural disasters: A Chilean 2010 earthquake case-study

• 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



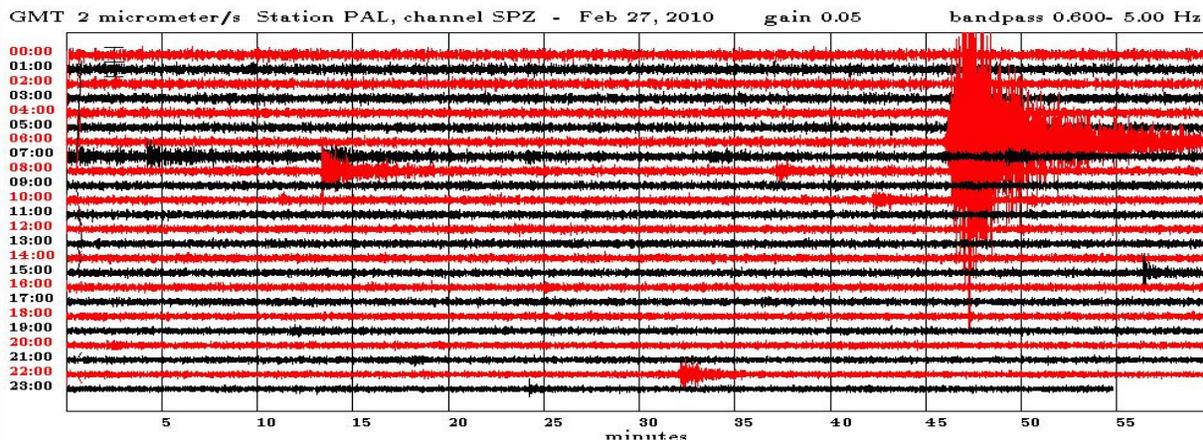
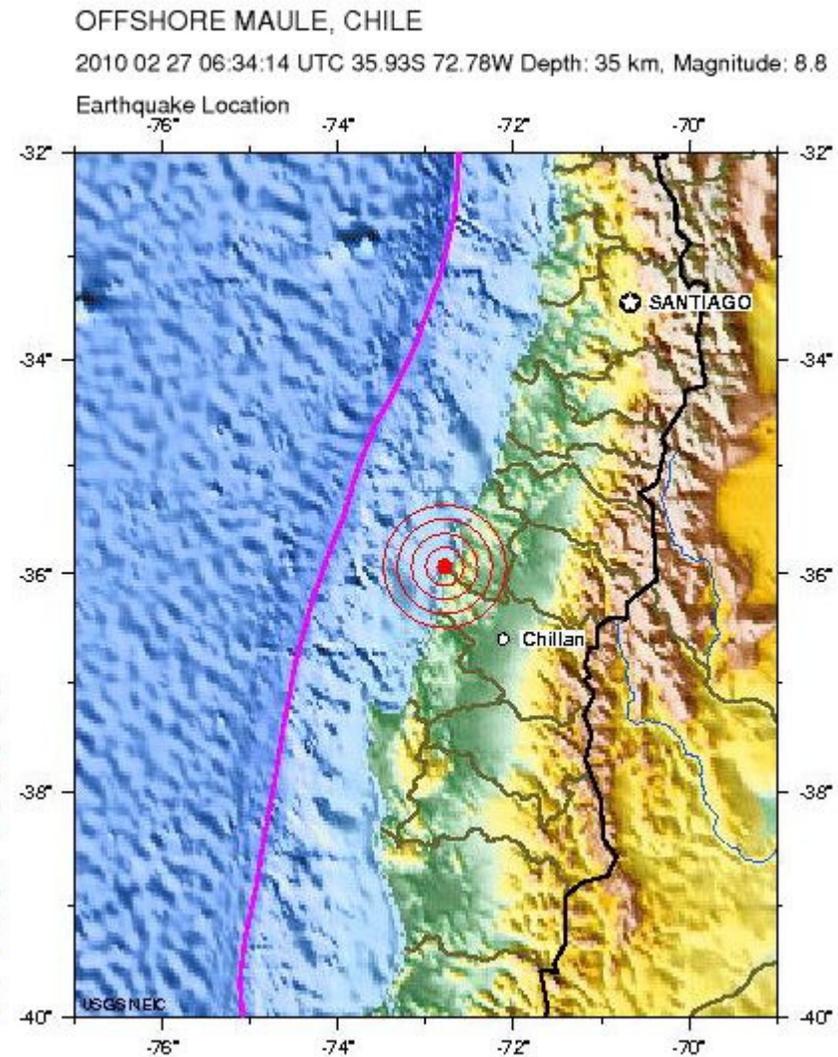
Filjar, Brčić, Vidović: GNSS performance in times of natural disasters: A Chilean 2010 earthquake case-study

- Earthquake description

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

Source: Hudson Valley Geologist, <http://bit.ly/gQNKVv>

Source: USGS



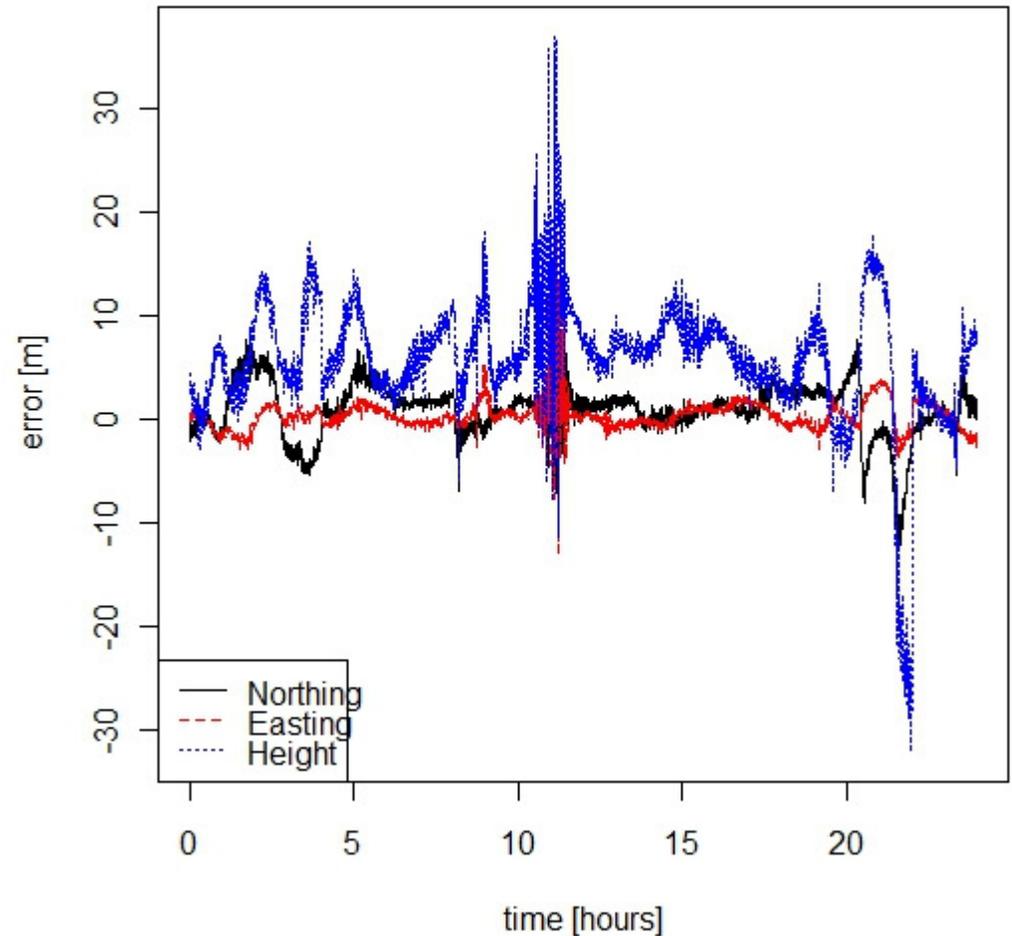
Filjar, Brčić, Vidović: GNSS performance in times of natural disasters: A Chilean 2010 earthquake case-study

- GNSS environment status during the time of the earthquake
 - Remarkably quiet space weather conditions
 - No global geomagnetic activities observed



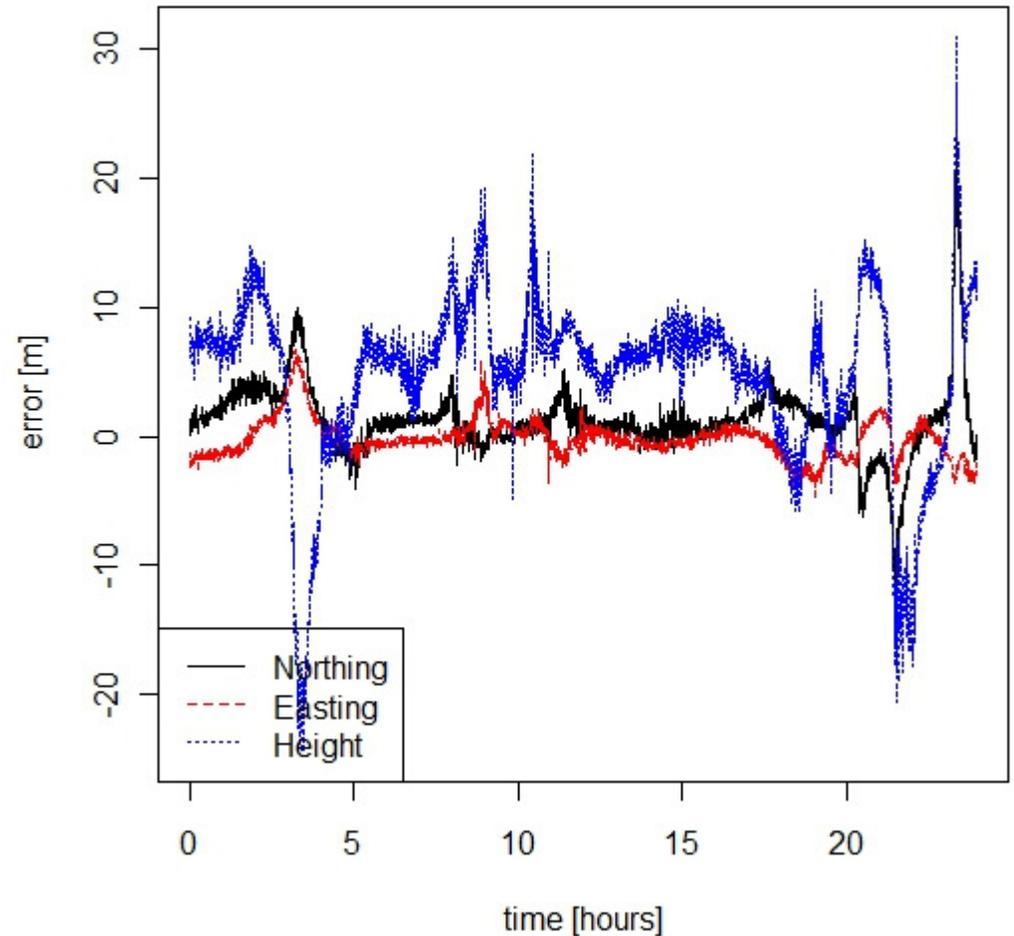
Filjar, Brčić, Vidović: GNSS performance in times of natural disasters: A Chilean 2010 earthquake case-study

- Observed GNSS performance in Croatia
 - Day 50 in 2010



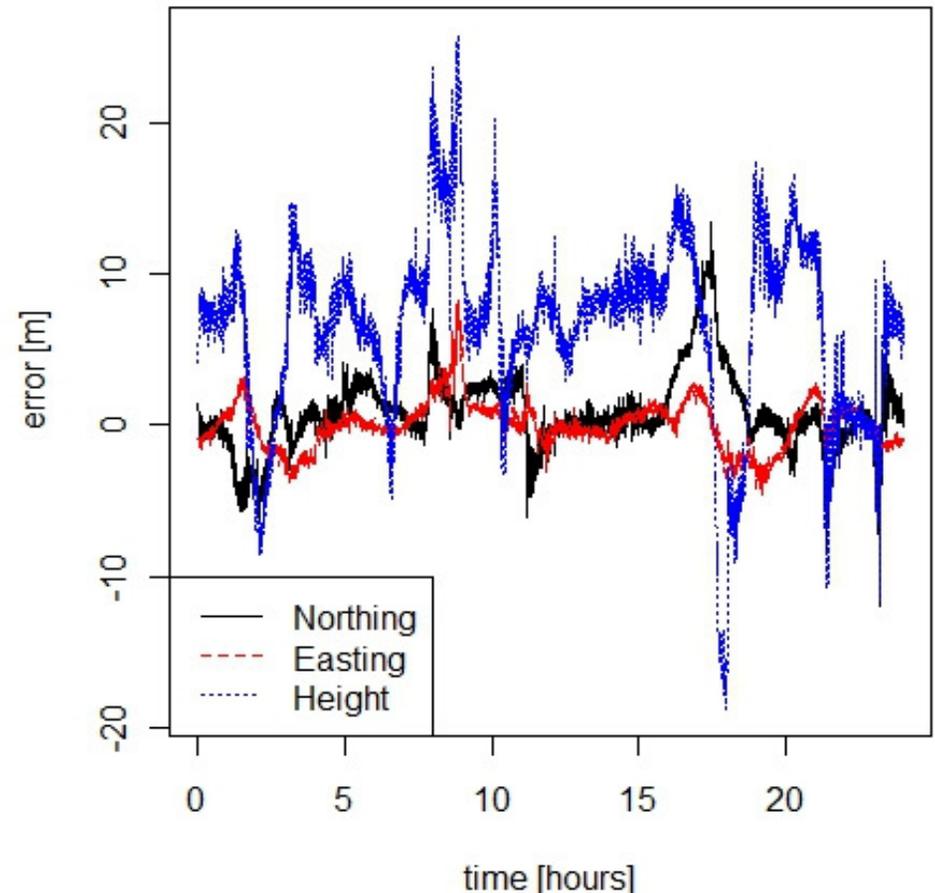
Filjar, Brčić, Vidović: GNSS performance in times of natural disasters: A Chilean 2010 earthquake case-study

- Observed GNSS performance in Croatia
 - Day 51 in 2010



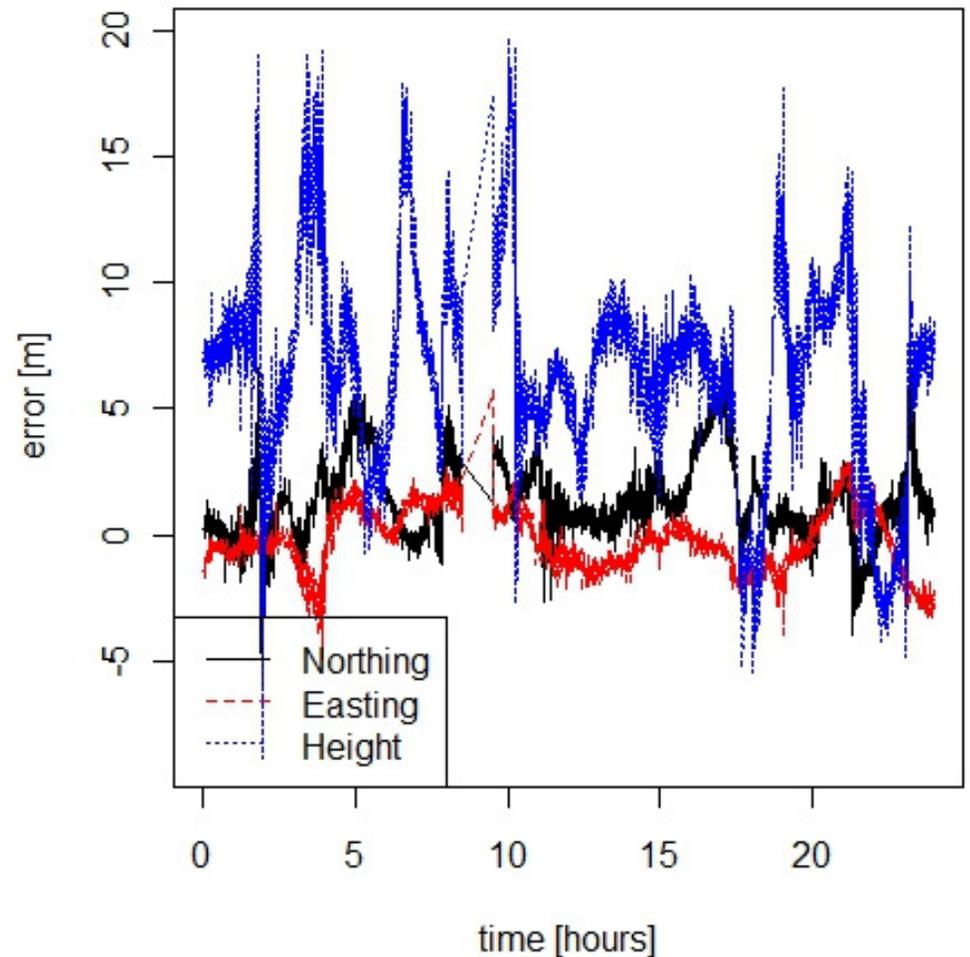
Filjar, Brčić, Vidović: GNSS performance in times of natural disasters: A Chilean 2010 earthquake case-study

- Observed GNSS performance in Croatia
 - Day 53 in 2010



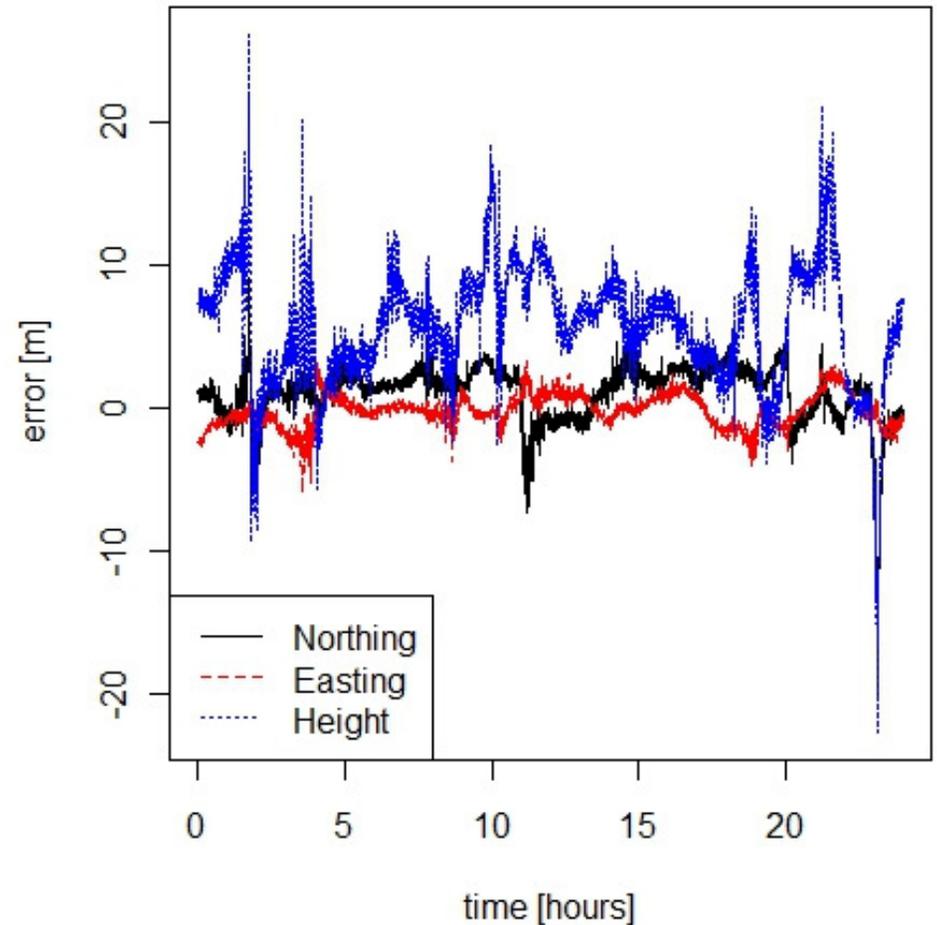
Filjar, Brčić, Vidović: GNSS performance in times of natural disasters: A Chilean 2010 earthquake case-study

- Observed GNSS performance in Croatia
 - Day 54 in 2010



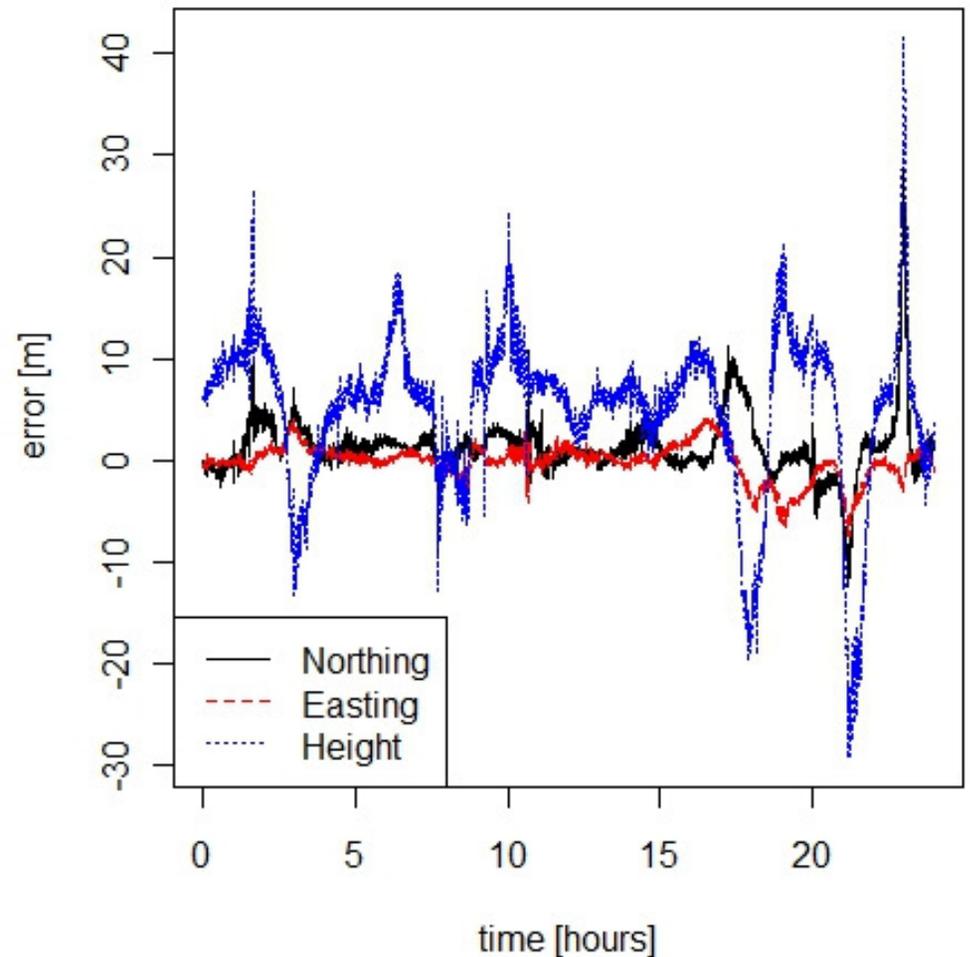
Filjar, Brčić, Vidović: GNSS performance in times of natural disasters: A Chilean 2010 earthquake case-study

- Observed GNSS performance in Croatia
 - Day 55 in 2010



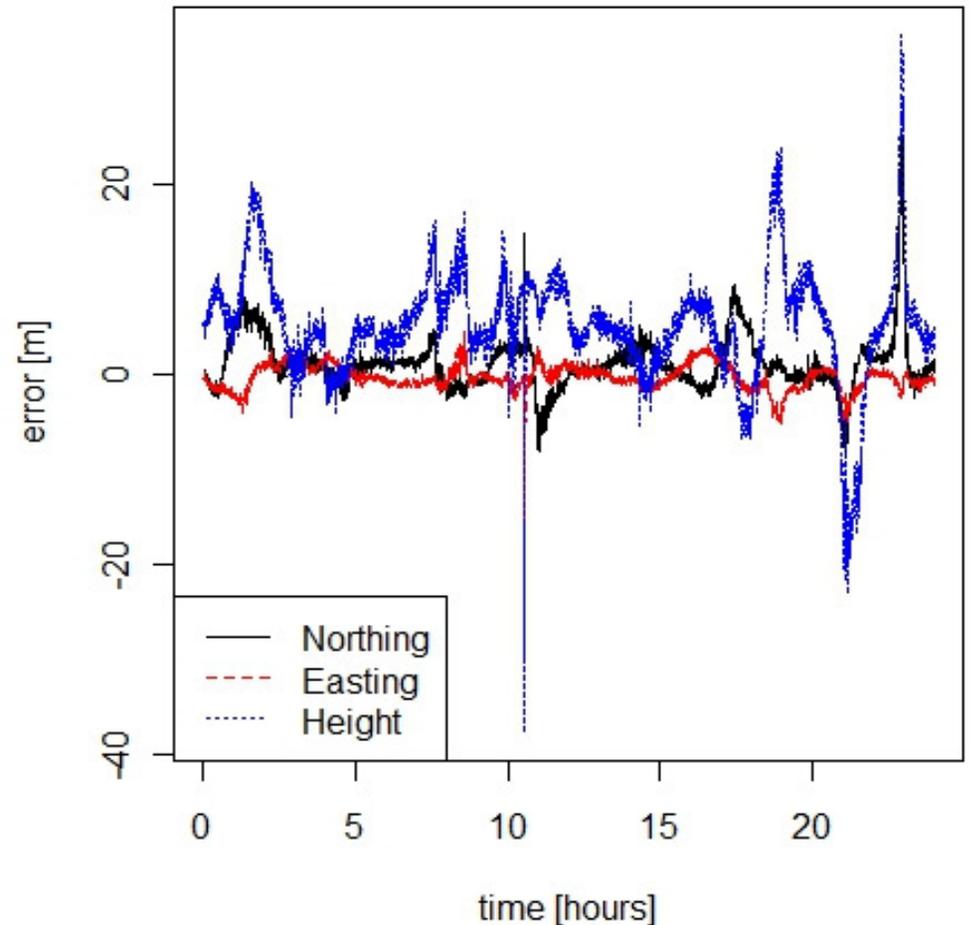
Filjar, Brčić, Vidović: GNSS performance in times of natural disasters: A Chilean 2010 earthquake case-study

- Observed GNSS performance in Croatia
 - Day 56 in 2010



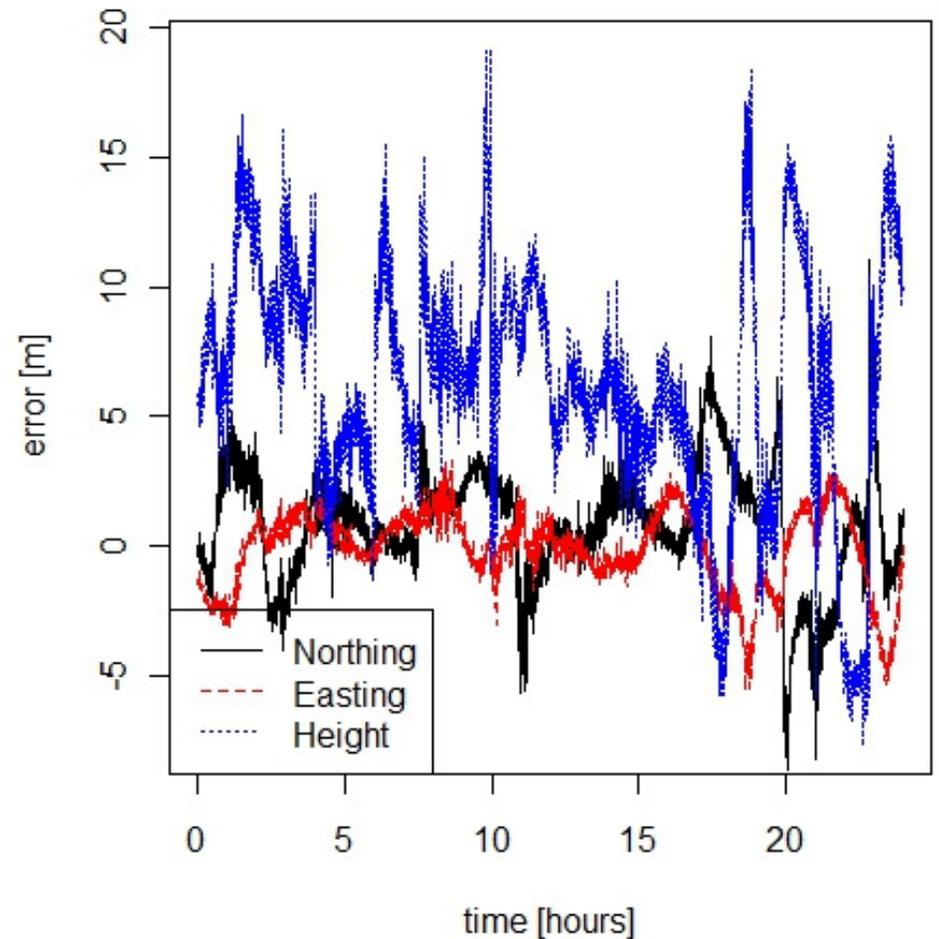
Filjar, Brčić, Vidović: GNSS performance in times of natural disasters: A Chilean 2010 earthquake case-study

- Observed GNSS performance in Croatia
 - Day 57 in 2010



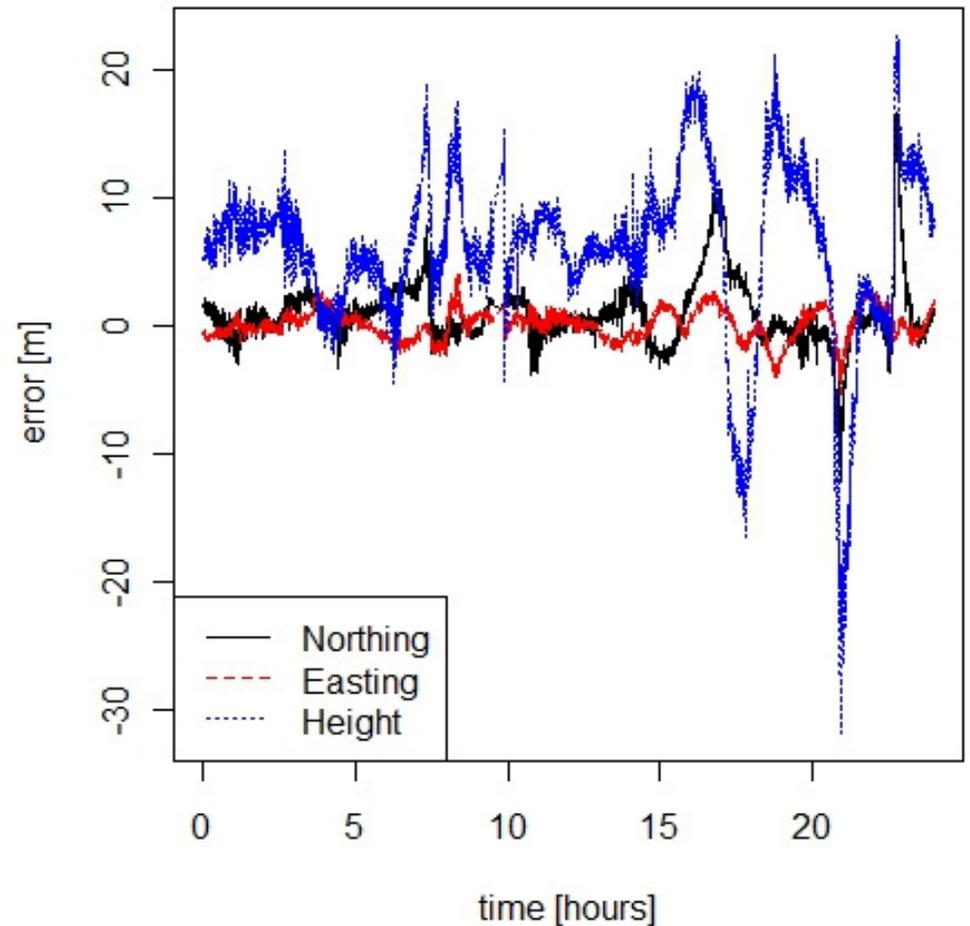
Filjar, Brčić, Vidović: GNSS performance in times of natural disasters: A Chilean 2010 earthquake case-study

- Observed GNSS performance in Croatia
 - Day 58 in 2010



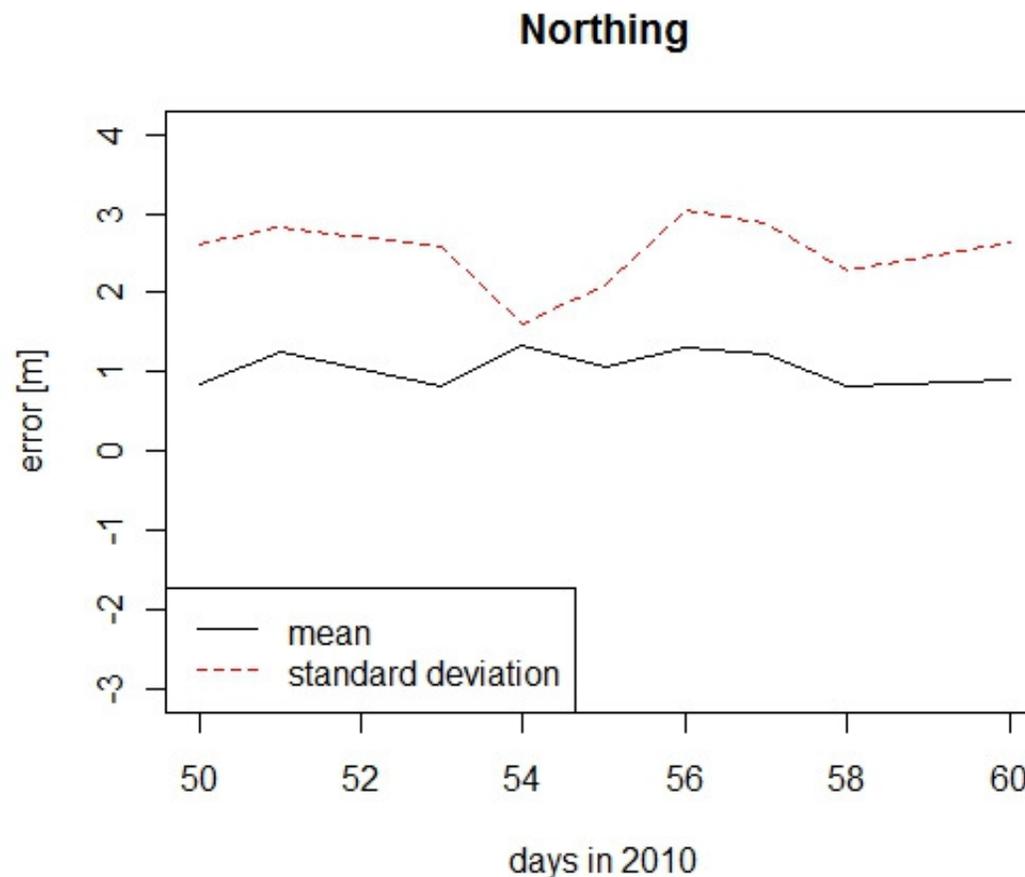
Filjar, Brčić, Vidović: GNSS performance in times of natural disasters: A Chilean 2010 earthquake case-study

- Observed GNSS performance in Croatia
 - Day 60 in 2010



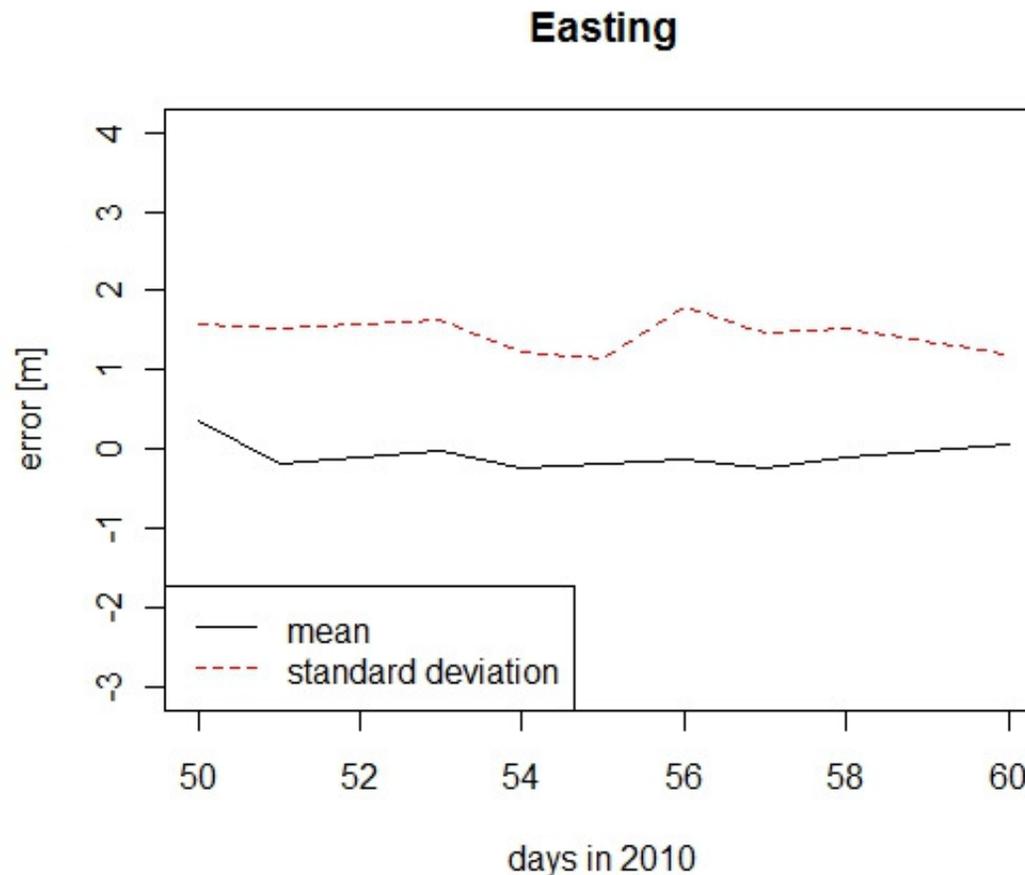
Filjar, Brčić, Vidović: GNSS performance in times of natural disasters: A Chilean 2010 earthquake case-study

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



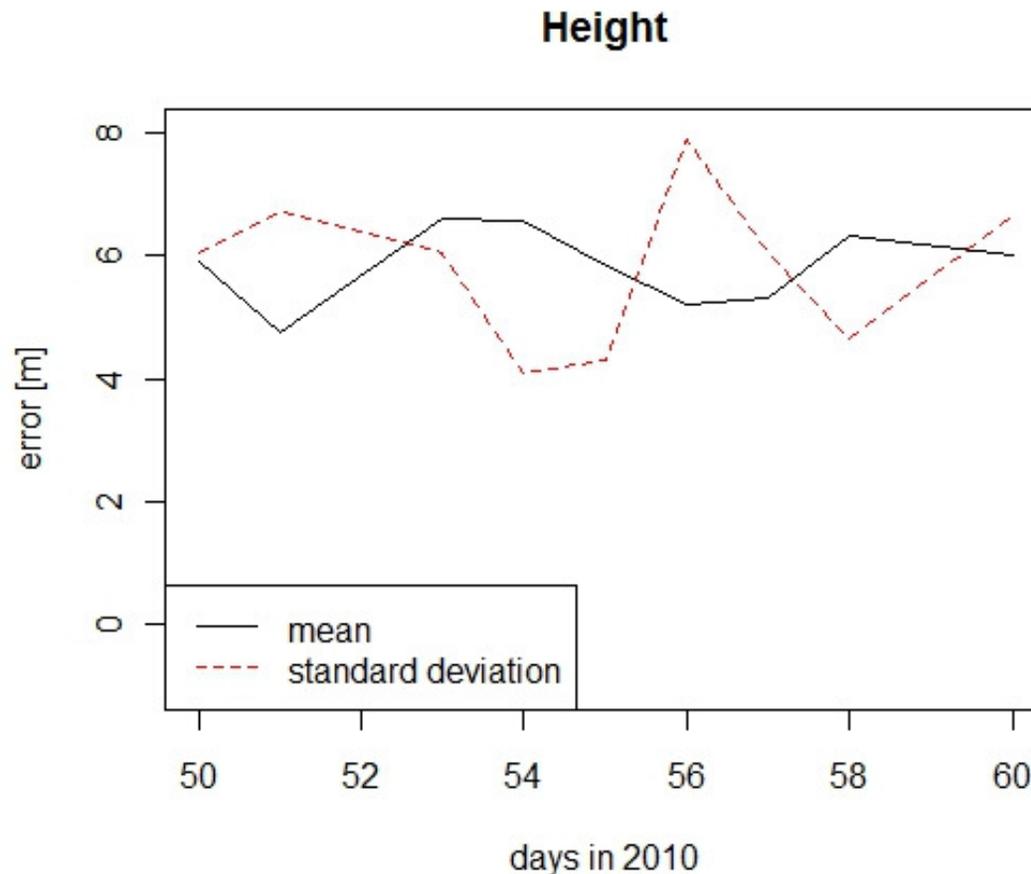
Filjar, Brčić, Vidović: GNSS performance in times of natural disasters: A Chilean 2010 earthquake case-study

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



Filjar, Brčić, Vidović: GNSS performance in times of natural disasters: A Chilean 2010 earthquake case-study

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



Filjar, Brčić, Vidović: GNSS performance in times of natural disasters: A Chilean 2010 earthquake case-study

- 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

Filjar, Brčić, Vidović: GNSS performance in times of natural disasters: A Chilean 2010 earthquake case-study

• 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



A scenic view of a coastal town with a harbor, a large mountain in the background, and buildings in the foreground. The water is bright blue and shimmering. A large white ferry is docked at the harbor. The town is built on a hillside, and the mountains in the background are covered in green vegetation.

THANK YOU FOR YOUR ATTENTION!

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