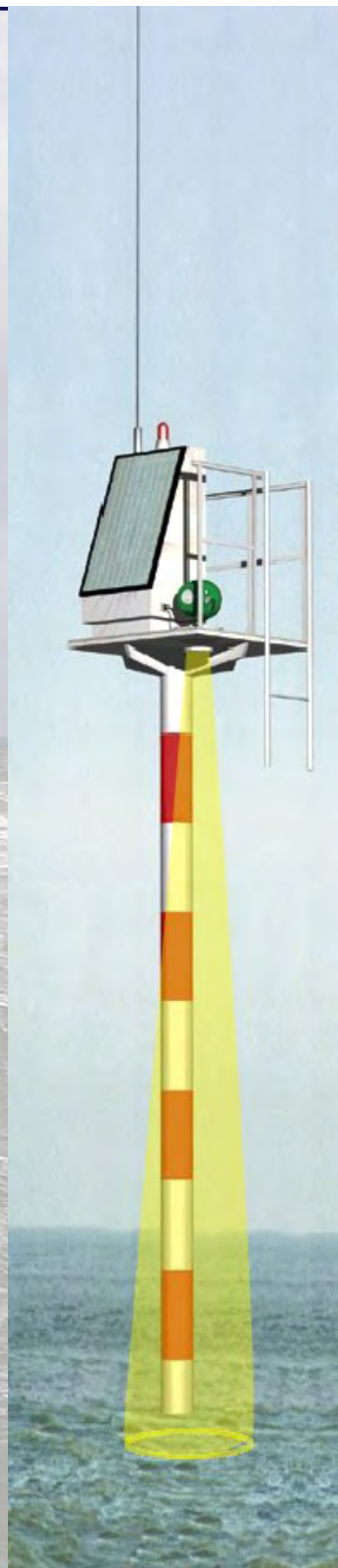


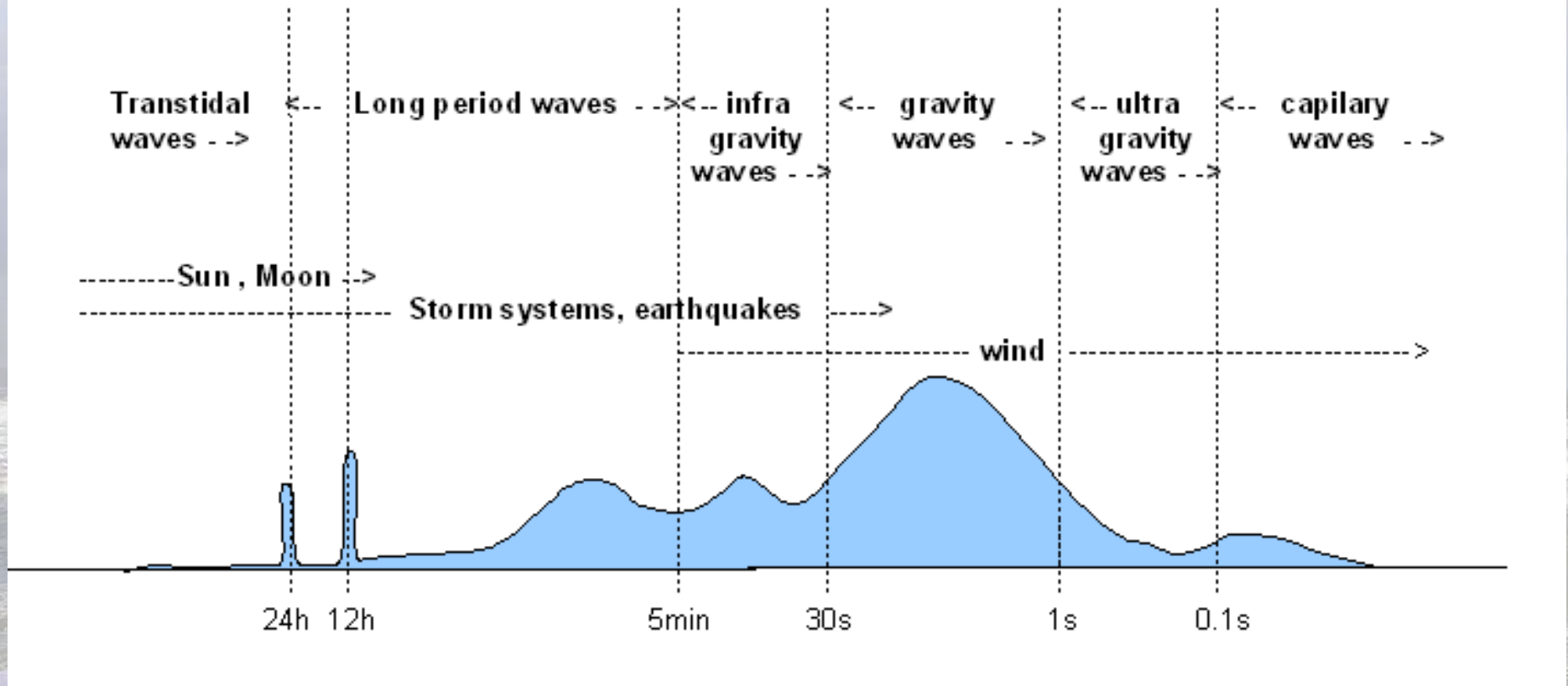


Sensors based on radar to observe remotely the vertical motions of the water surface in the range 0-1Hz.

- **Inland waters (rivers and lakes)**
- **Coastal waters**
- **Oceans**




Schematic representation of the energy contained in the surface waves of the ocean



- Sea level rise and fall
- Tides
- Storm surge
- Tsunamies
- Infra-gravity waves
- Seiches/ harbour oscillations
- Swell
- Wind waves

The Netherlands protected against flooding

 Floodable land if there would be no flood defences



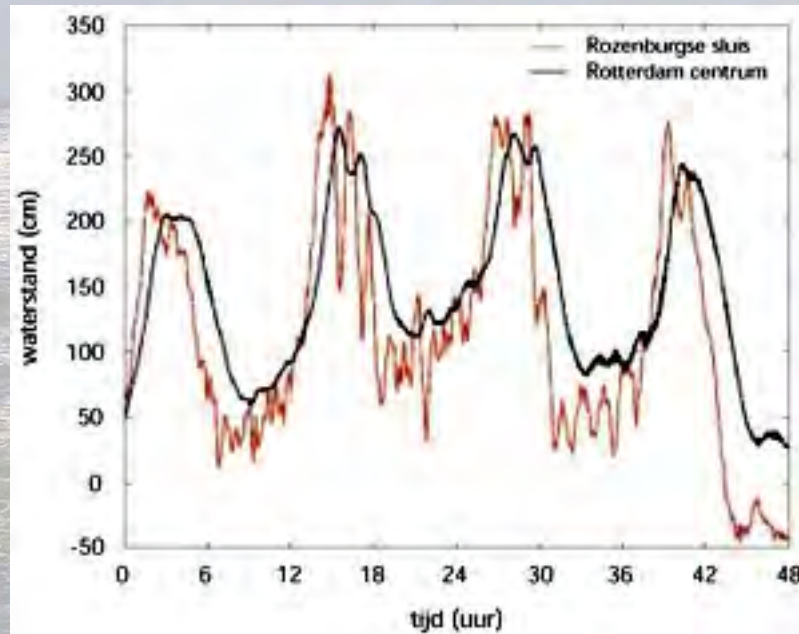
radac





Seiches / Tsunamies

periods several minutes (no buoy or stilling well)



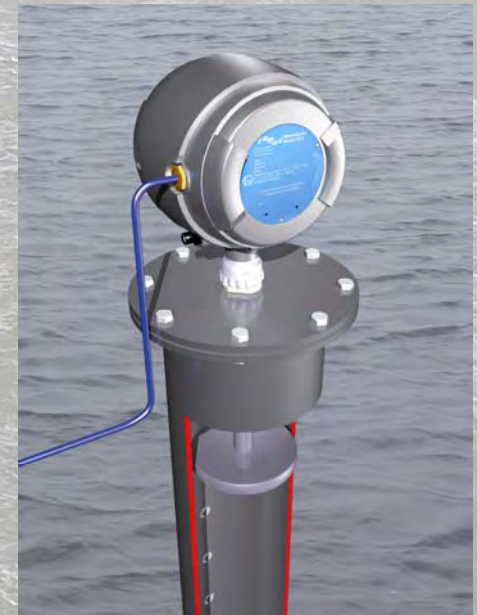
"...It's late because of a dock strike..."





WaveGuide Products

- free space from fixed platform
- “stilling” well
- free space from moving platform
- wave direction (3x free space)





System Concept

WaveGuide Radar

- maintenance free
- stable zero point / sensitivity
- based on Enraf tank gauge
- large quantities (5000/year)
- Explosion proof (Ex certified)
- 2.56 Hz



WaveGuide Server

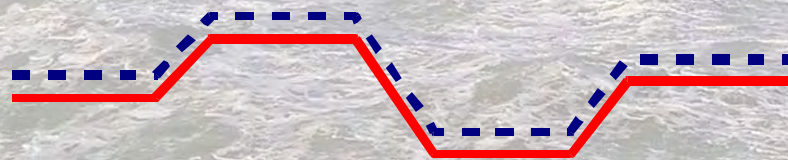
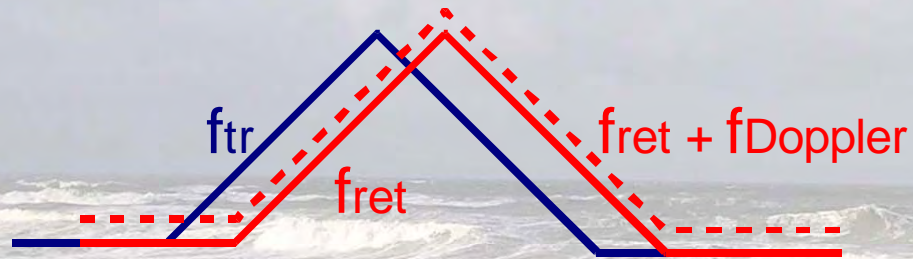
- control radar
- processing, presentation, storage
- data distribution
- web interface



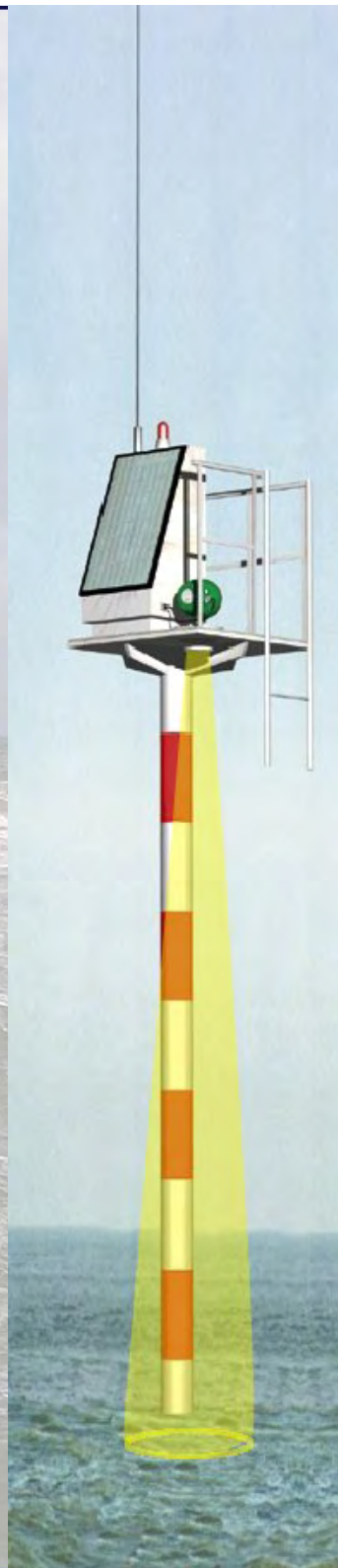


Healthy measuring principle

FMCW radar

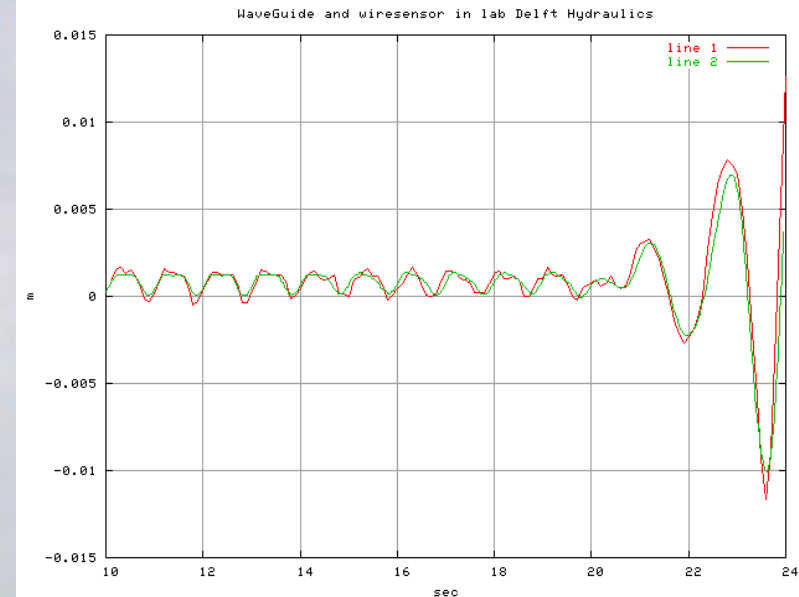
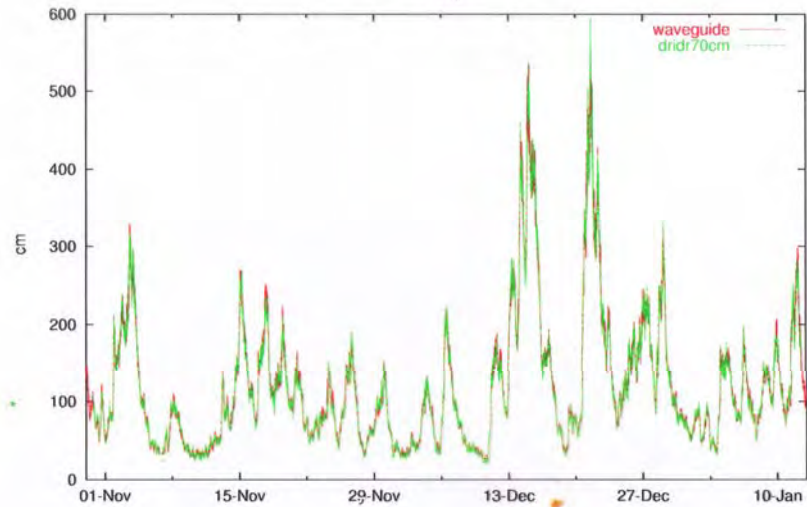


Distance +/- velocity





comparison WaveGuide and Directional Waverider 70 cm
30-Oct-2003 until 13-Jan-2004
Hm0



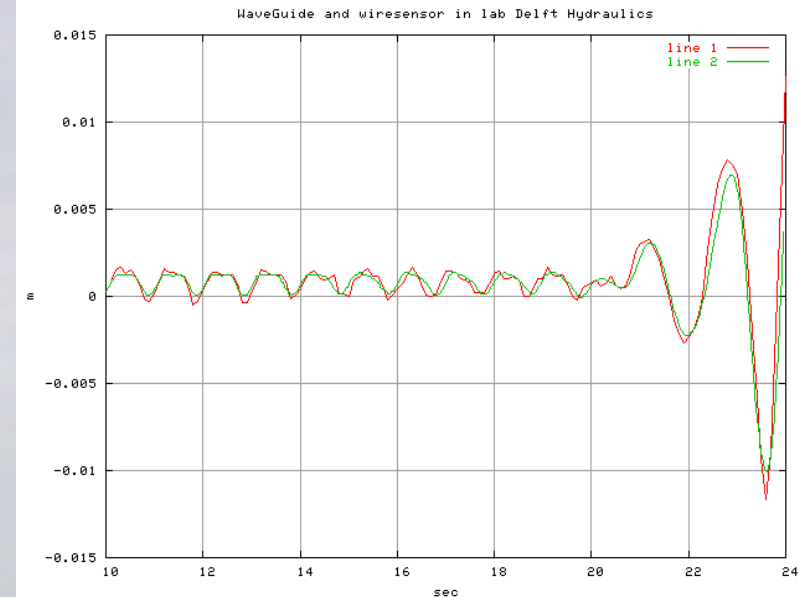
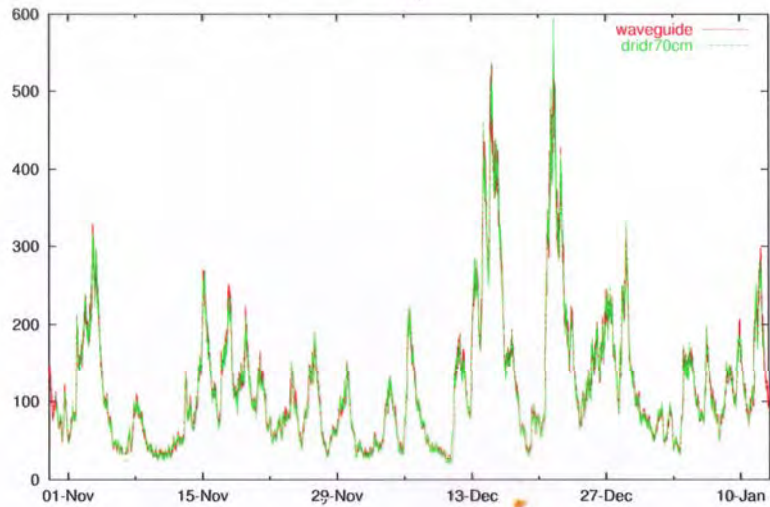
Evaluation studies

- In laboratory (**wave shape**) Delft Hydraulics, Germany, Spain
- At research platform Noordwijk (3 sensors 10Hz ,
2 Directional Waveriders) **waves**
- Along side stilling well for **tide** measurements.





comparison WaveGuide and Directional Waverider 70 cm
30-Oct-2003 until 13-Jan-2004
Hm0



Evaluation studies

- In laboratory (**wave shape**) Delft Hydraulics, Germany, Spain
- At research platform Noordwijk (3 sensors 10Hz ,
2 Directional Waveriders) **waves**
- Along side stilling well for **tide** measurements.





WaveGuide Server

Low power (<2 Watt) industrial PC with Linux

- data collection
- data processing
 - quality control
 - operational use (averaging, wave heights, wave direction)
 - early warning (!!!!!!!!!!!!!)
- data distribution
- data presentation





Communication

- subscribe to raw data, parameters, spectra as ascii strings, sms messages, email via serial port or network
 - 2 way communication. Web interface, ftp, ssh etc.
 - direct line, modem (telephone, radio), GSM, GPRS, satellite (Iridium, GBAN etc), network (wired, wireless)





Application aspects

Timestamps

- time (computer clock, synchronization GPS or network)
- synchronization with e.g motion sensor (1ms)

Zero point

- configure
- control by CGPS (Rinex format GPS data)



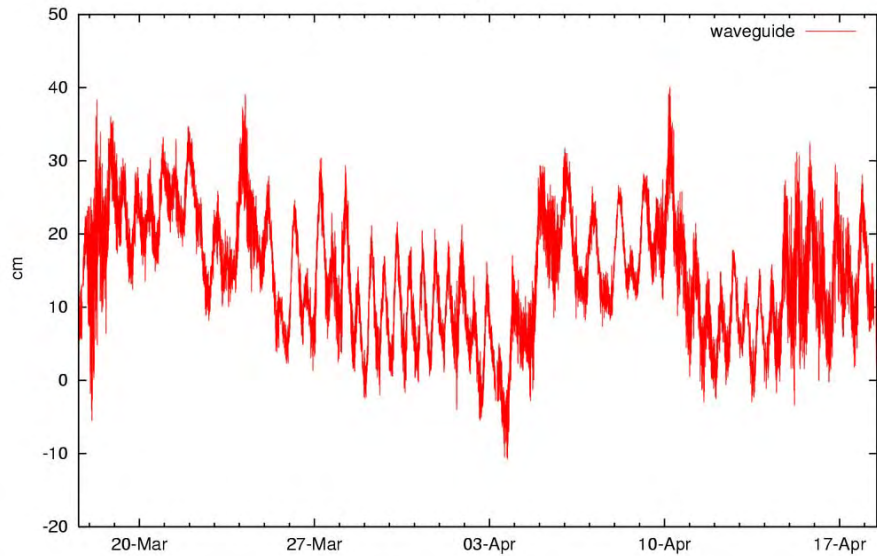


**System demo
at
test site
Scheveningen
via
www.radac.nl**

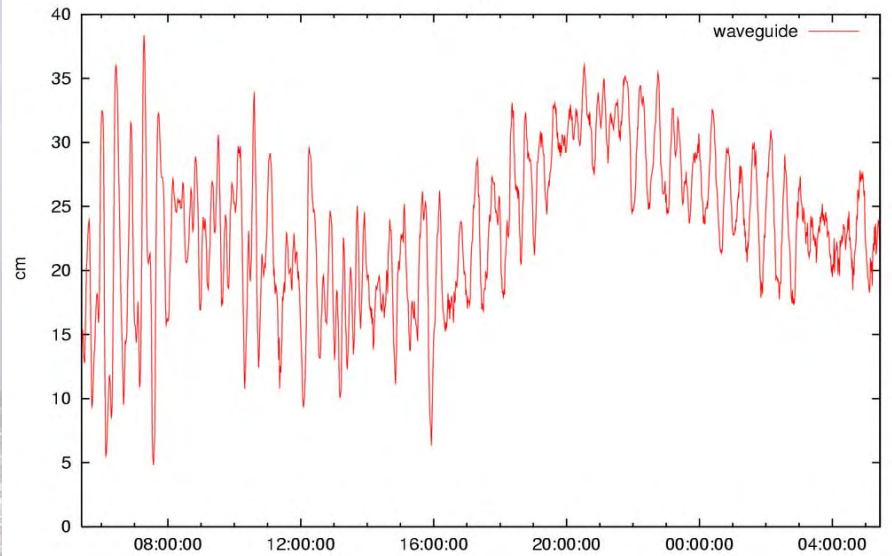




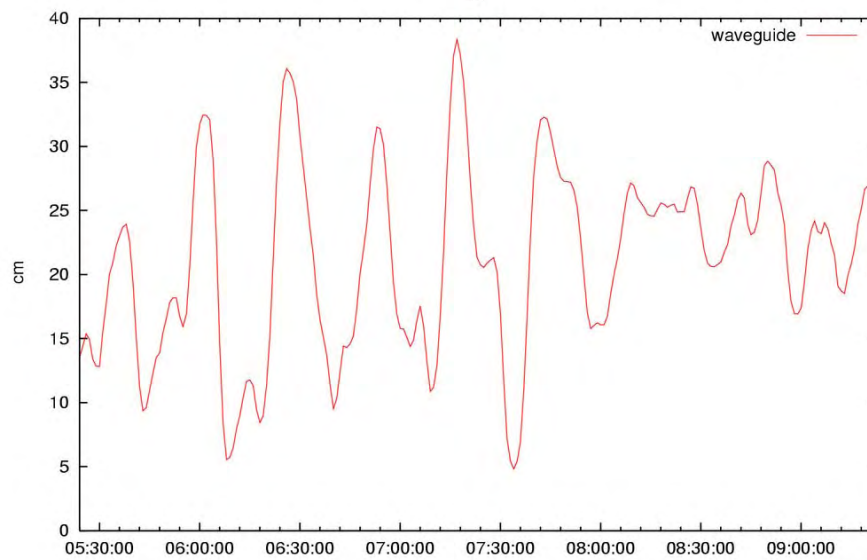
WaveGuide Taragona harbour
17-Mar-2006 until 18-Apr-2006
h1

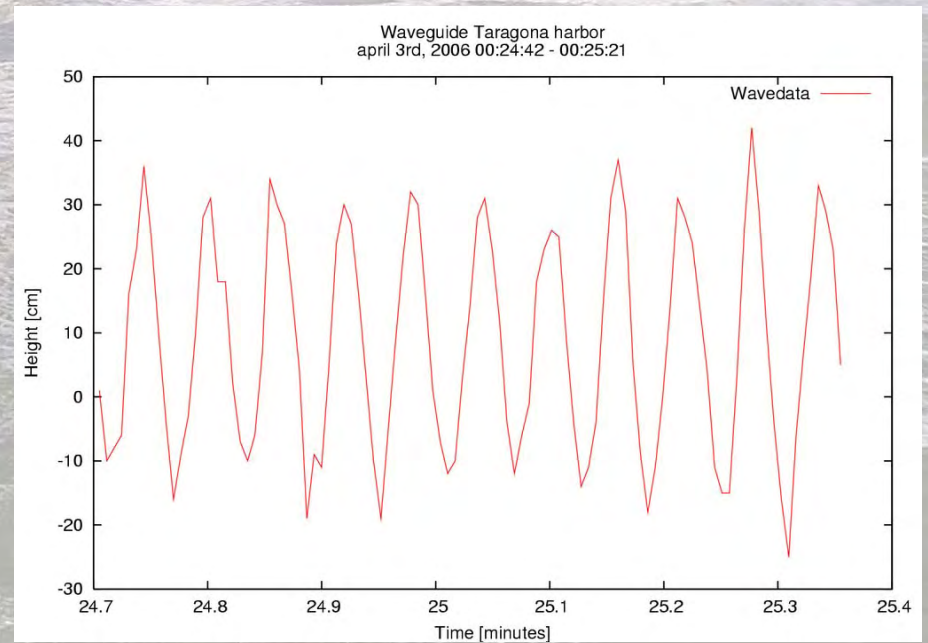
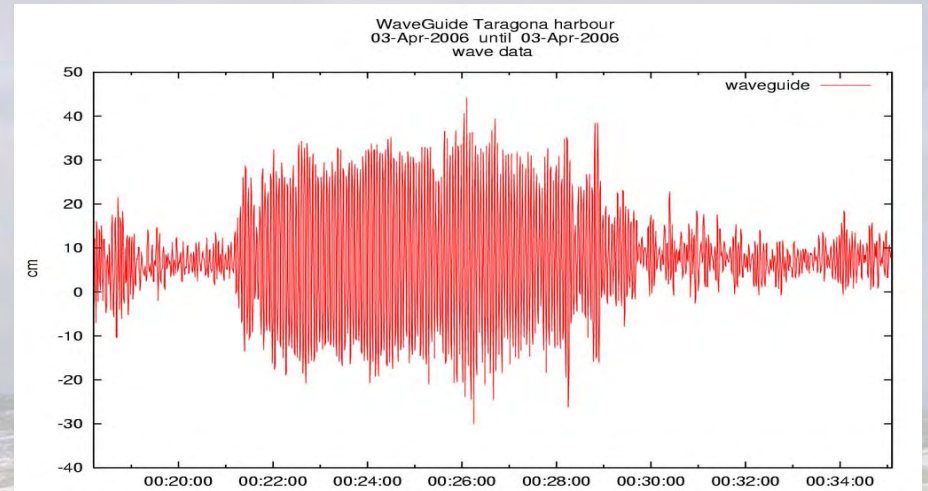
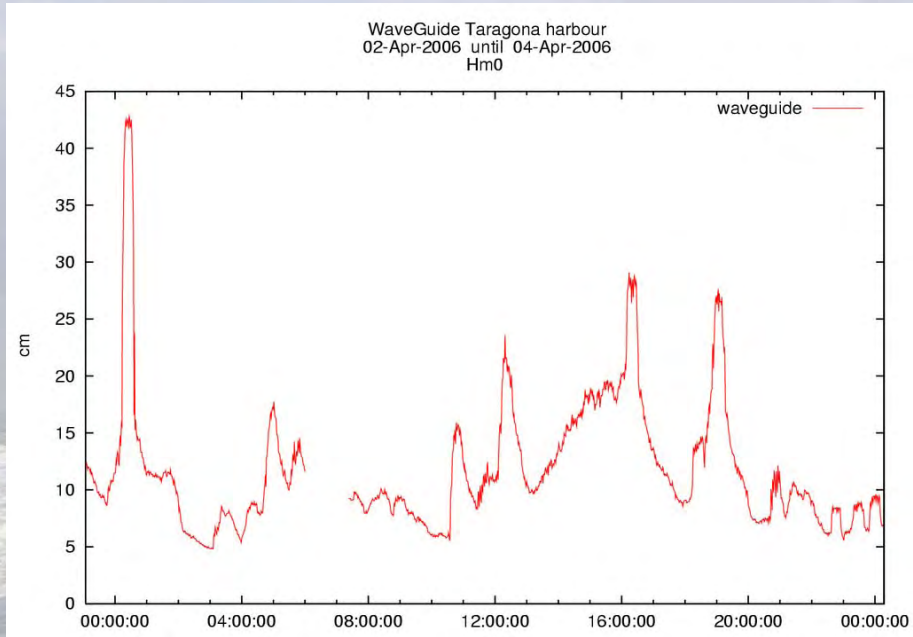


WaveGuide Taragona harbour
18-Mar-2006 until 19-Mar-2006
h1



WaveGuide Taragona harbour
18-Mar-2006 until 18-Mar-2006
h1





radac



Datawell MOSE G1000



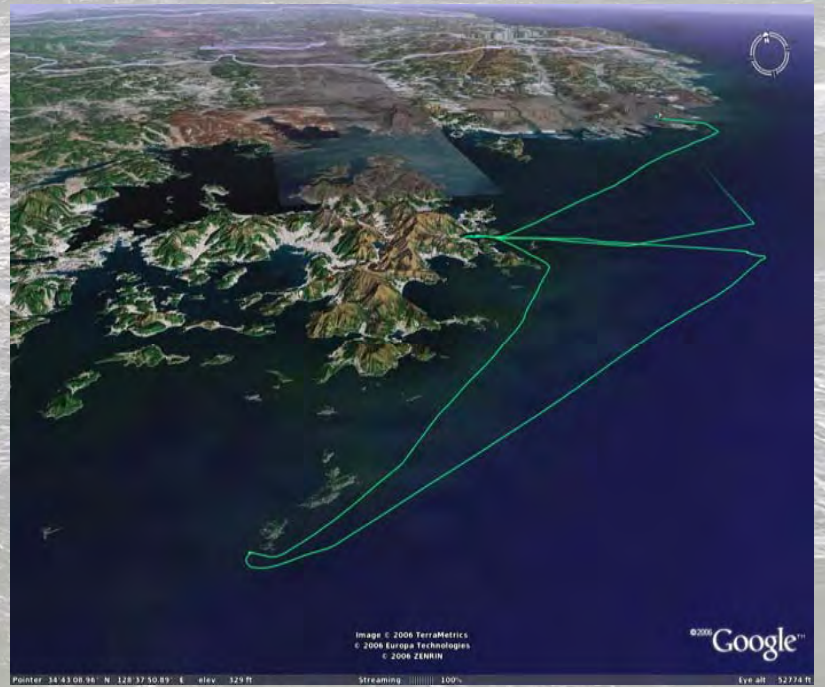
WaveGuide On Board



WaveGuide



radac





**Free space /Stilling well
explosion proof certified**



**Free space + GPS
+ GSM/GPRS +.....**



radac

