reelektronika

RESEARCH & RADIONAVIGATION
GENERAL LIGHTHOUSE AUTHORITIES
United Kingdom and Ireland

eLoran Provider, Monitoring and User equipment Performance

- Timing and Harbour Entrance & Approach -

Gerard Offermans, Arthur Helwig,
Durk van Willigen, Rene Kellenbach
Reelektronika

Paul Williams
General Lighthouse Authorities of the UK and Ireland

NAV08 – ILA37
October 28-30, Church House, London

reelektronika

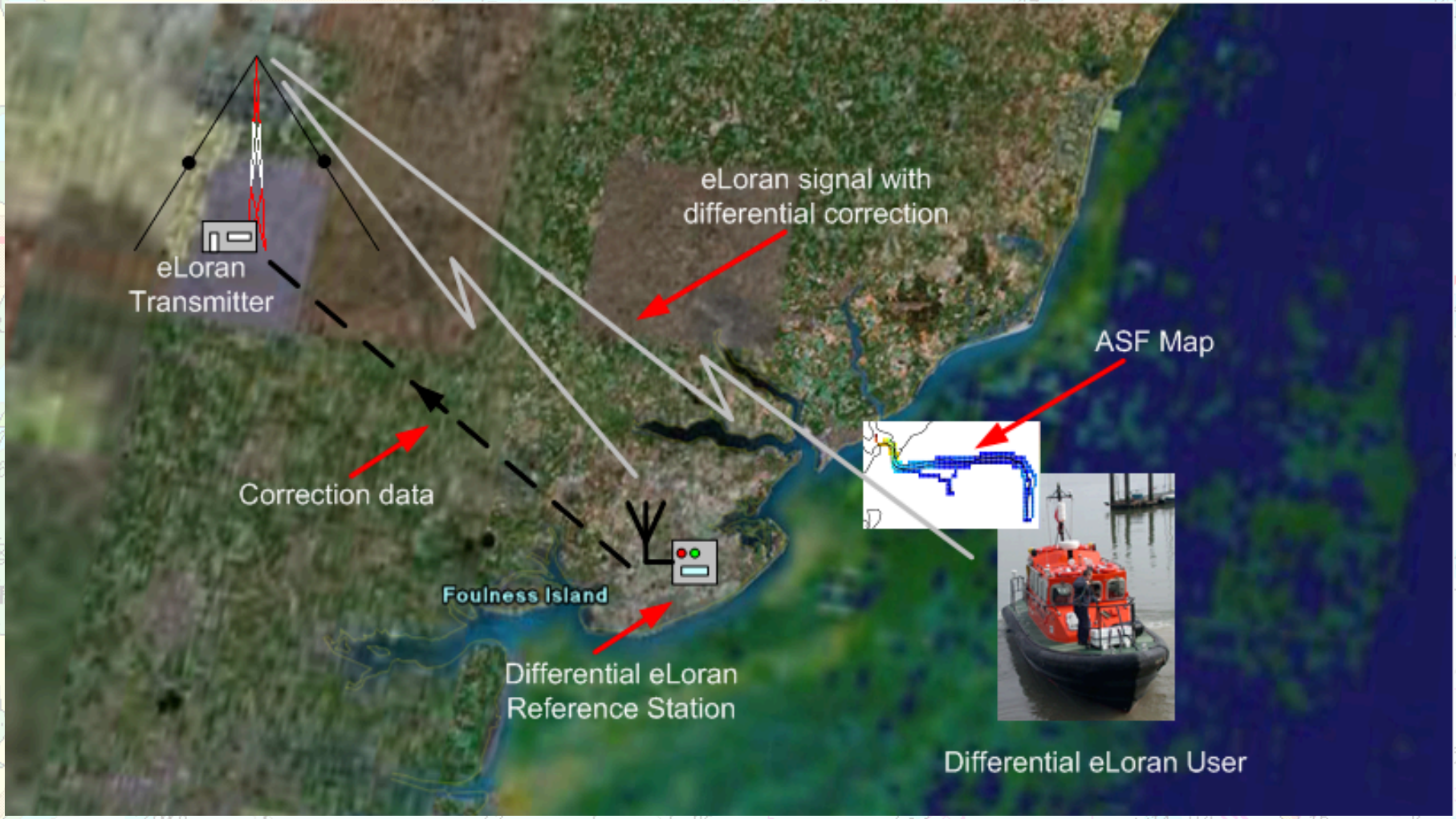
Receiver characteristics

- eLoran requires the receivers to be:
  - All-in-view eLoran
  - Small size
  - Integrated with GPS
  - eLoran data channel capable
  - Firmware upgradeable
- RTCM SC-127 working group on Minimum Performance Standards for eLoran receivers

eLoran equipment for Maritime Harbour Entrance & Approach

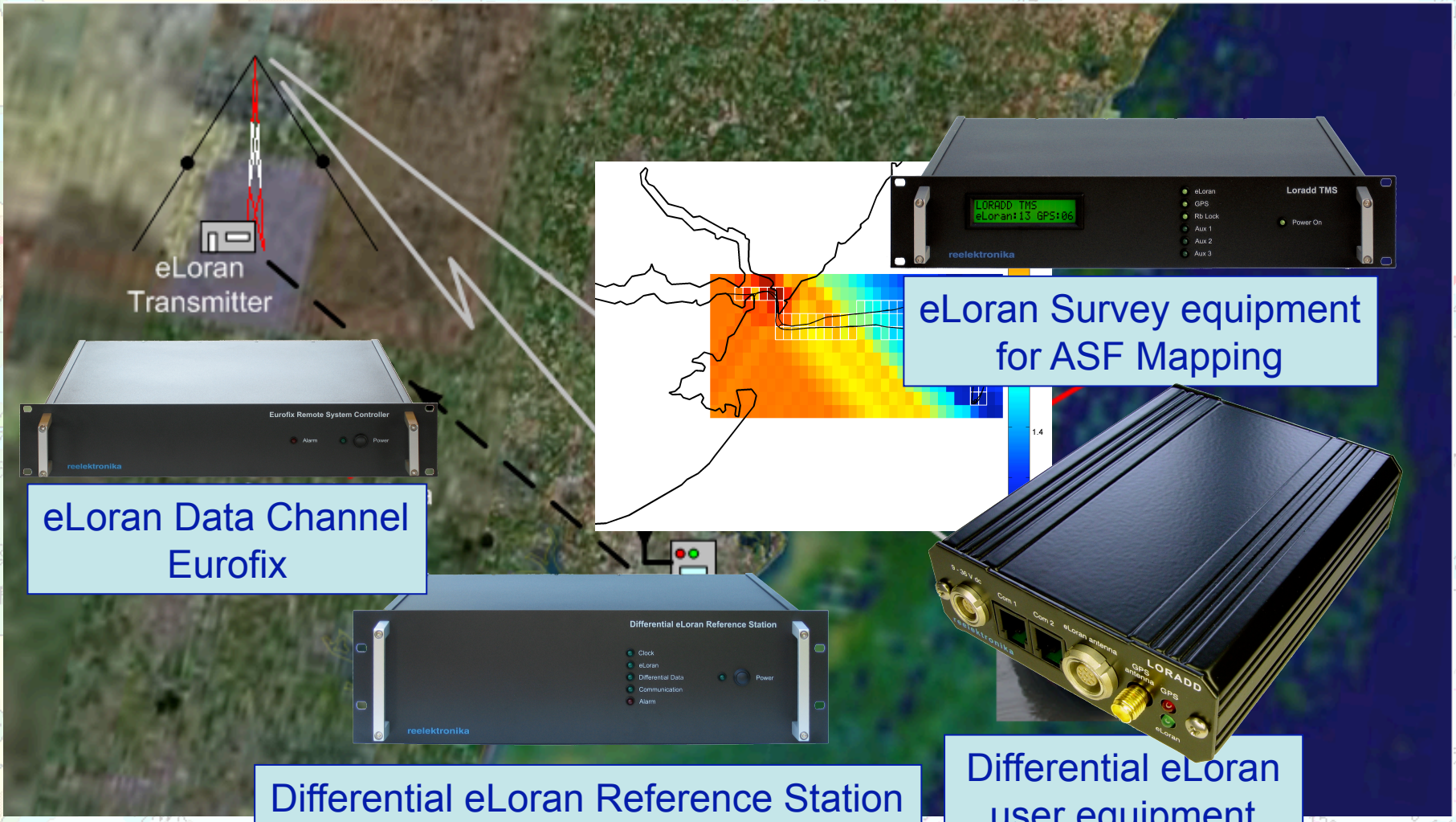
reelektronika

Maritime Harbour Entrance & Approach



reelektronika

Maritime HEA requires…



eLoran Data Channel Eurofix

eLoran Survey equipment for ASF Mapping

Differential eLoran Reference Station

Differential eLoran user equipment

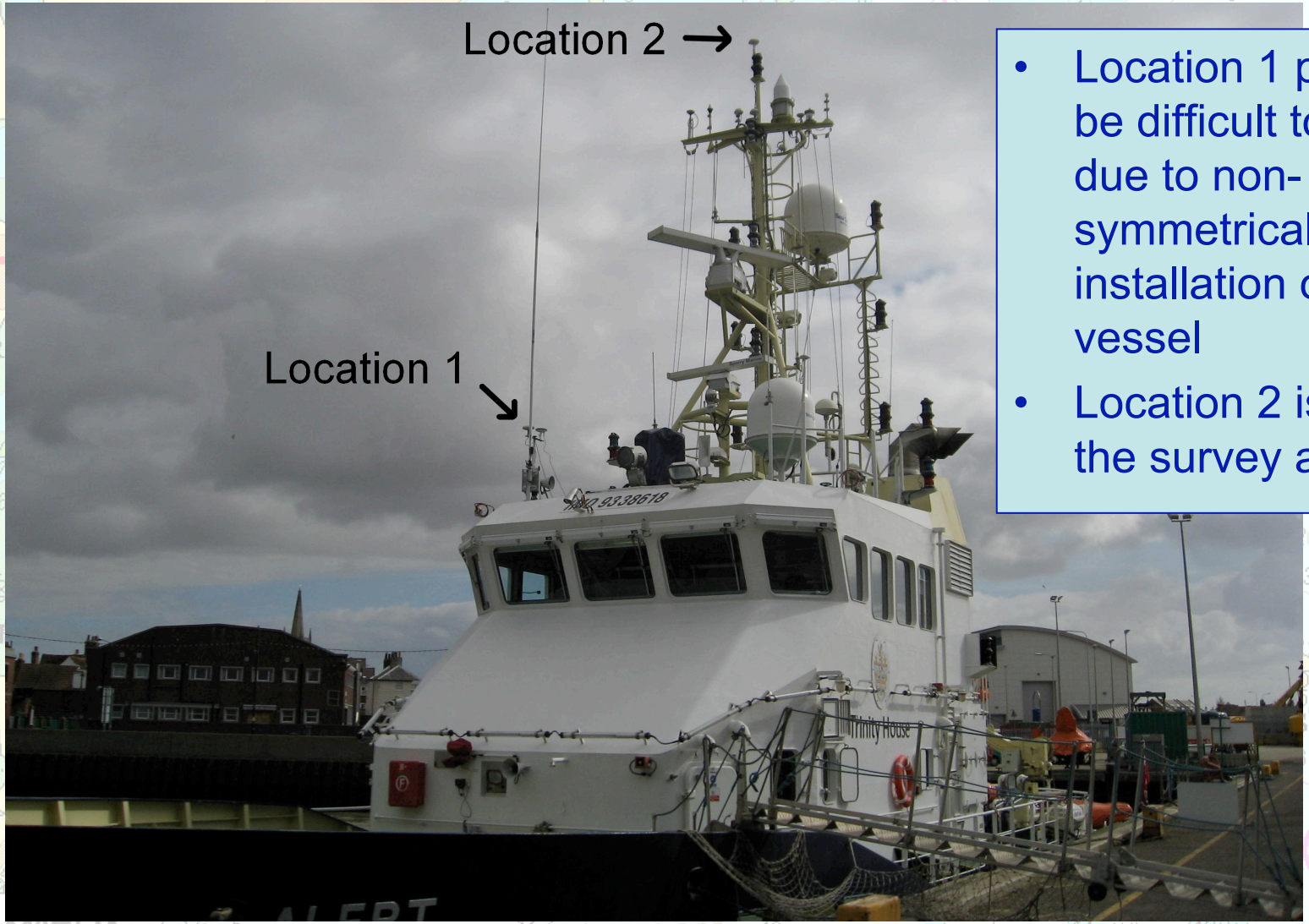
reelektronika

Real-time differential eLoran trials at Harwich

- 1 day installation and calibration
  - Differential eLoran Reference Station at Trinity House's engineering building
  - Installation of survey equipment on Trinity House's vessel "Alert"
- 1 day ASF Map survey
  - Overnight ASF map generation
- 1 day differential eLoran demonstration

reelektronika

Antenna installation on the “Alert”

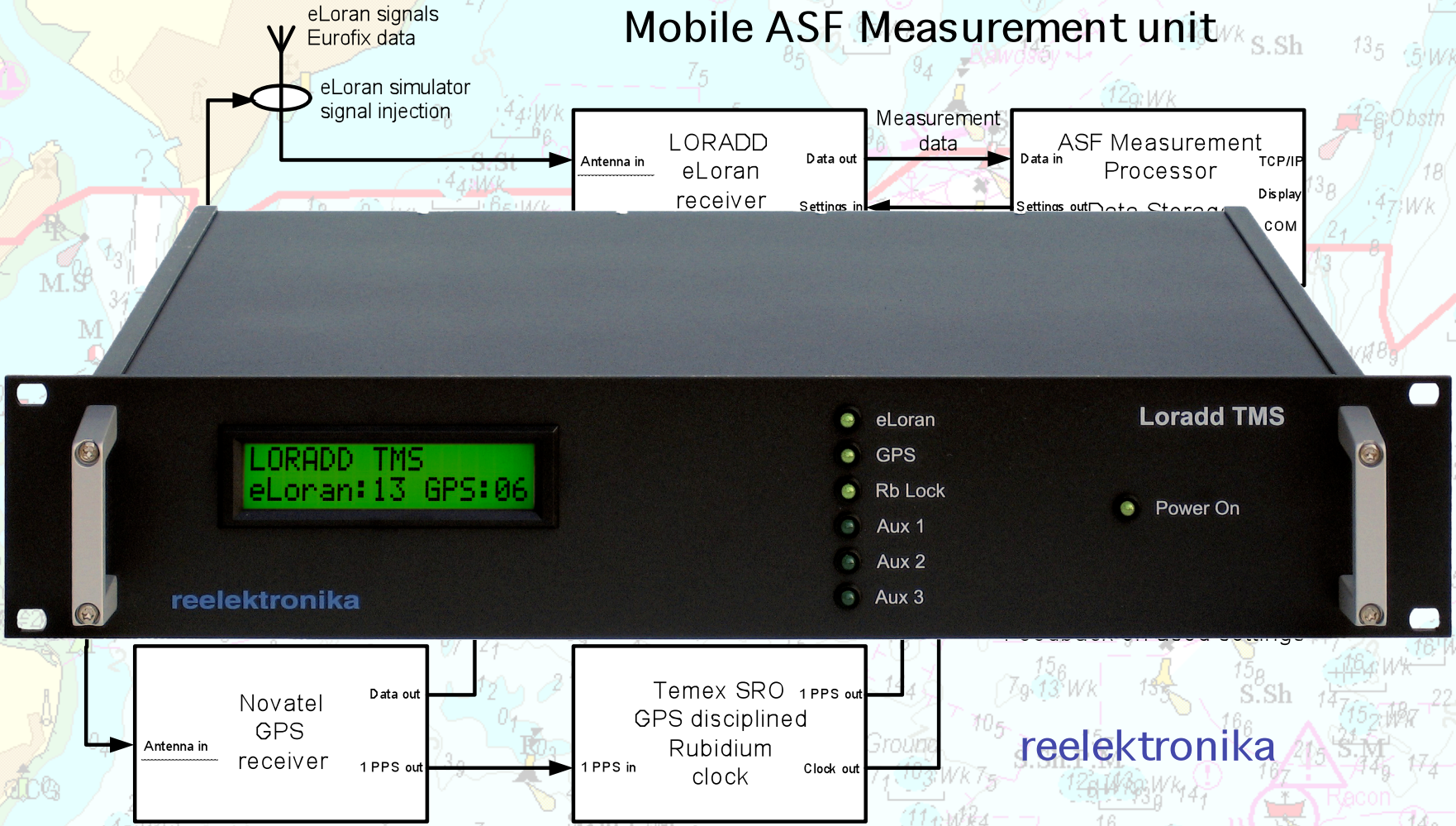


- Location 1 proved to be difficult to calibrate due to non-symmetrical installation on the vessel
- Location 2 is used for the survey and trials

reelektronika

ASF Survey equipment

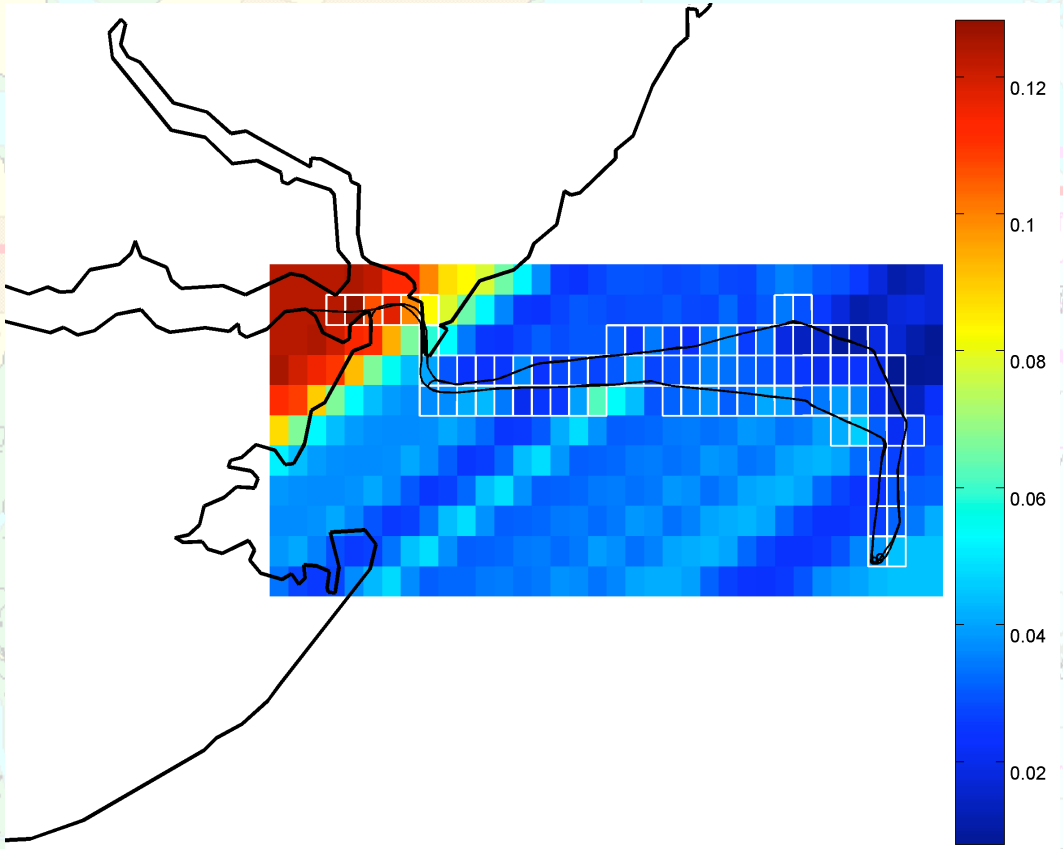
Mobile ASF Measurement unit



reelektronika

reelektronika

ASF Map generation



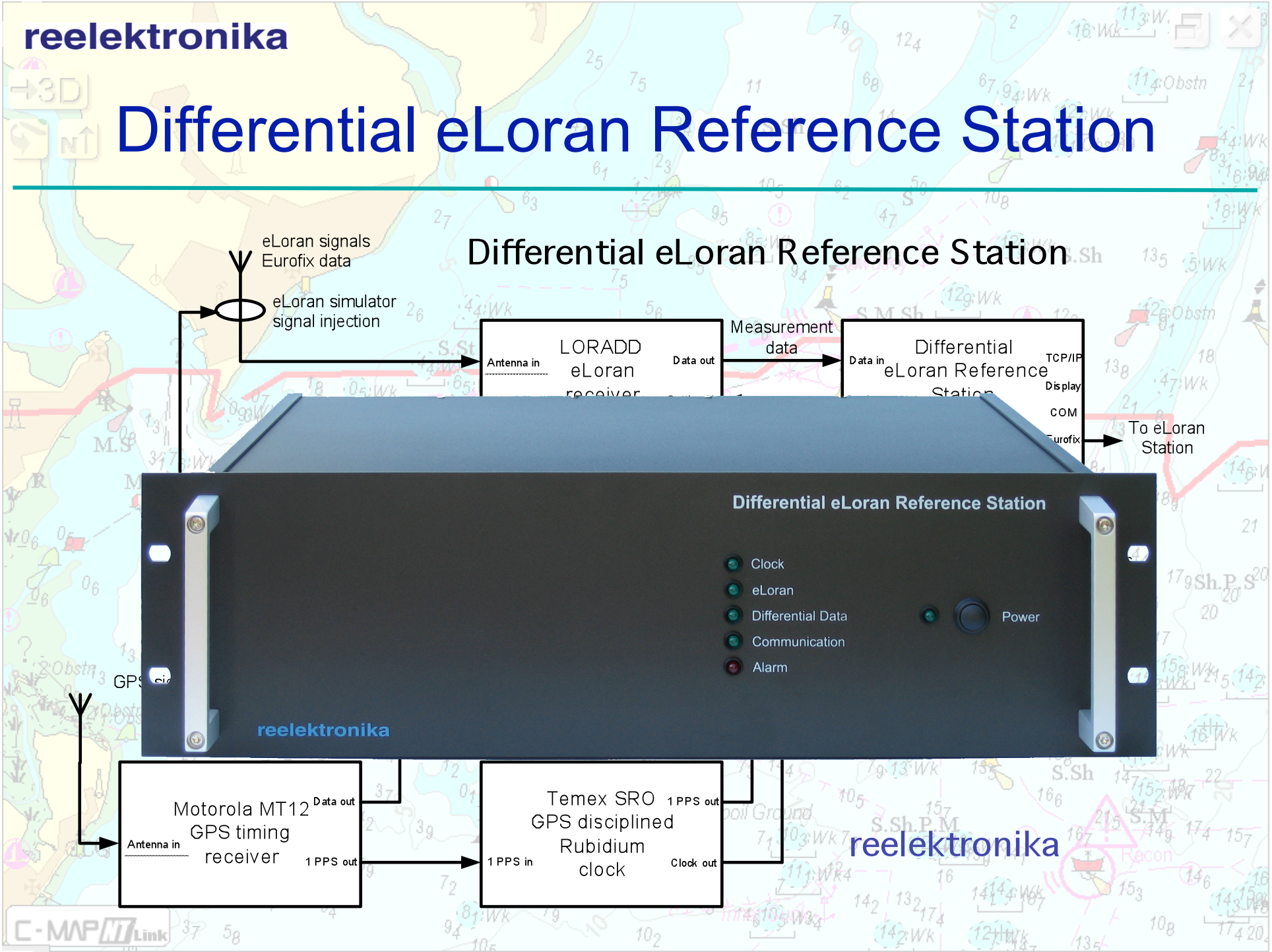
ASF Maps for:

- Lessay
  (6731M & 7499X)
- Anthorn
  (6731Y)
- Sylt
  (6731Z & 7499M)

Grid size: 0.01 degrees

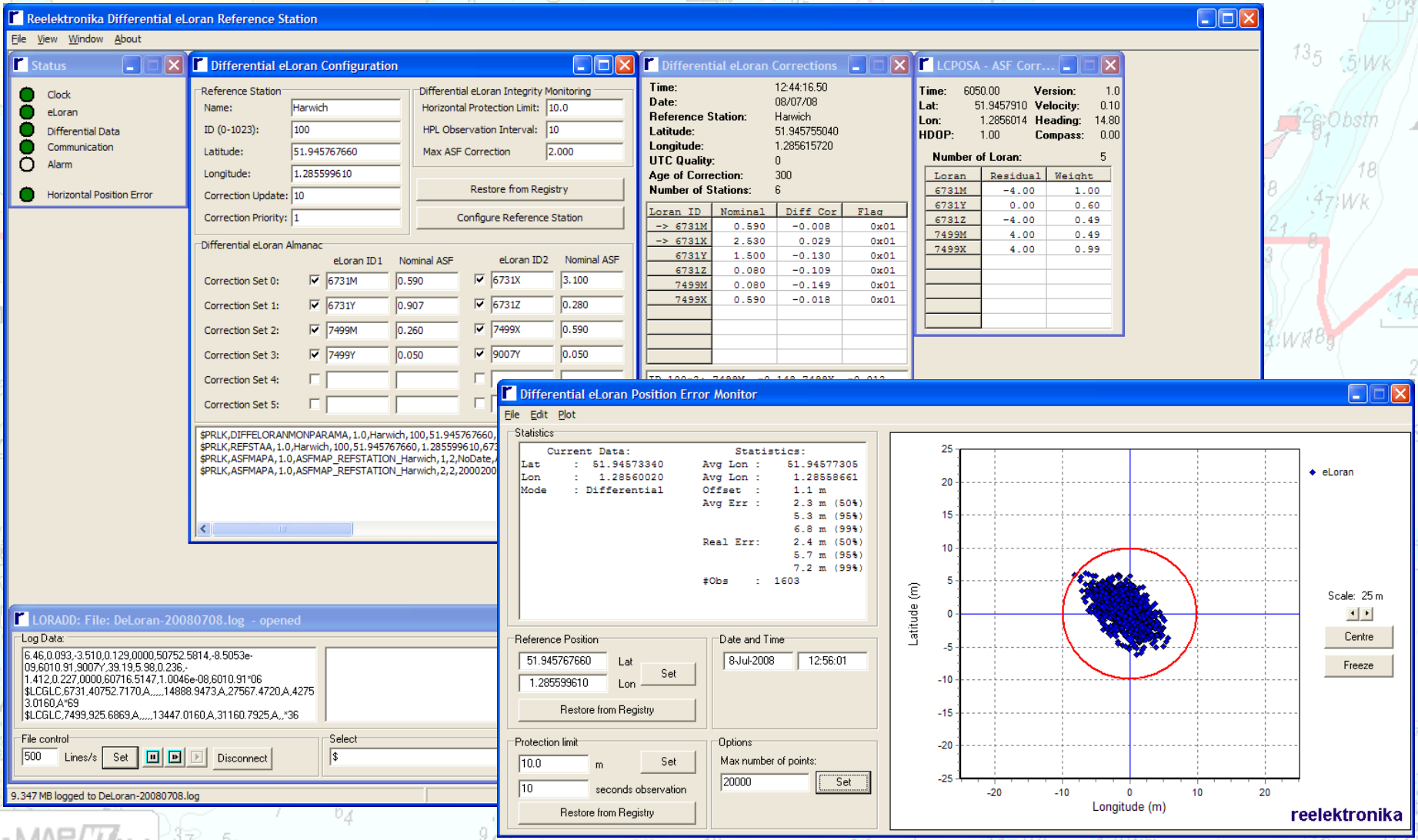
reelektronika

Differential eLoran Reference Station



reelektronika

Differential eLoran Reference Station interface



reelektronika

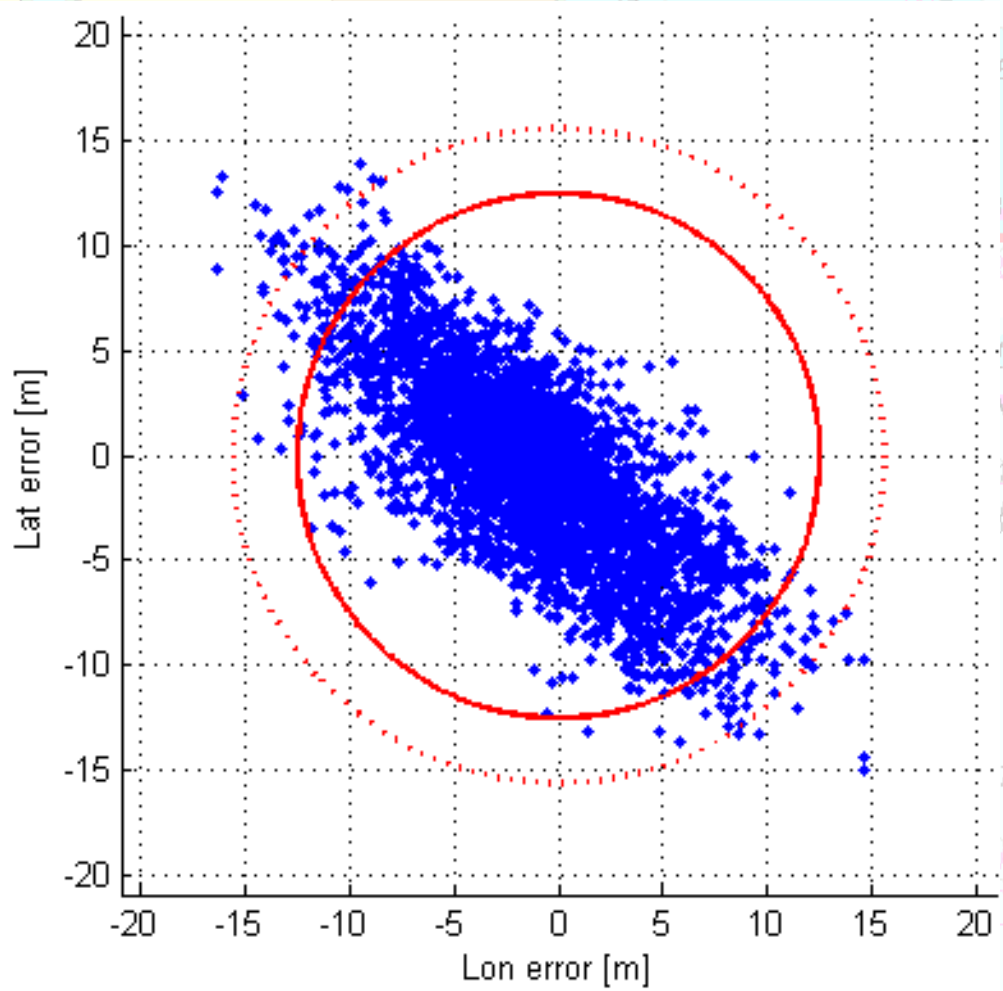
HEA User equipment

The Differential eLoran user calculates position based on:

- eLoran Time [illegible]ents
- Correcte[illegible]
- Correcte[illegible]ections from eLoran Re[illegible]oadcast by eLoran transmi[illegible]
  - Differential correctio[illegible]mpensate for changes in ASF map data and possible transmitter timing errors

reelektronika

Differential eLoran vs DGPS truth



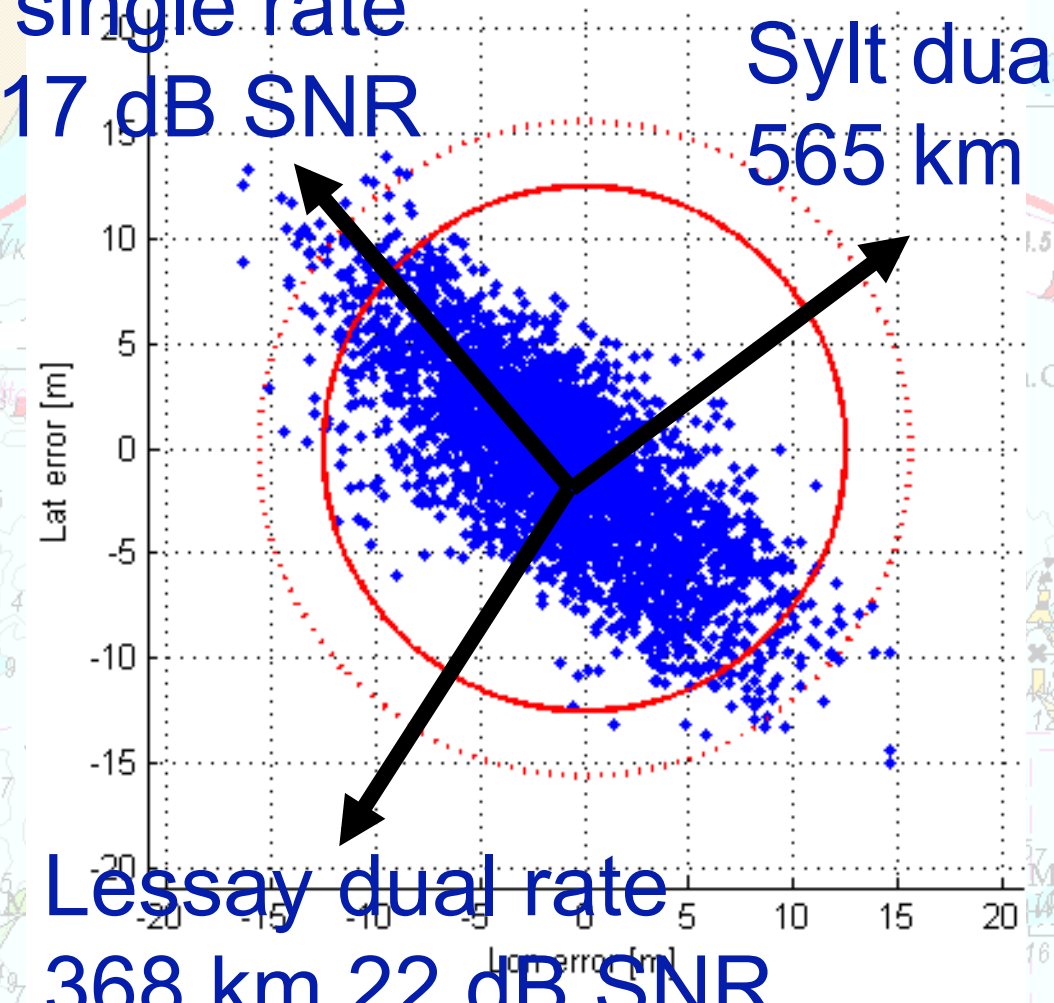
Accuracy

12.6 m (95%)

reelektronika

Geometry, distance and SNR

Anthorn single rate
448 km 17 dB SNR



Sylt dual rate
565 km 16 dB SNR

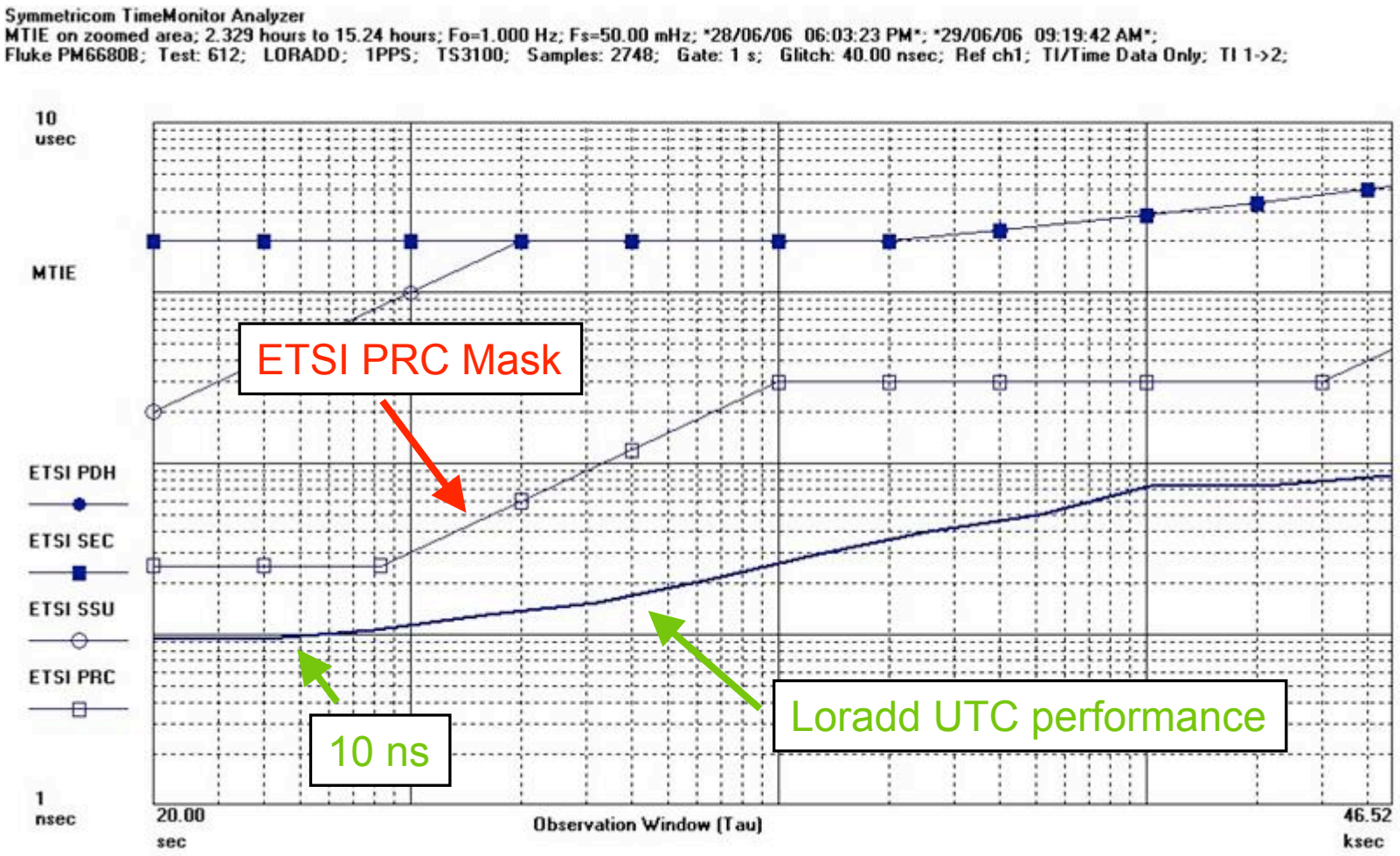
Lessay dual rate
368 km 22 dB SNR


eLoran Timing equipment

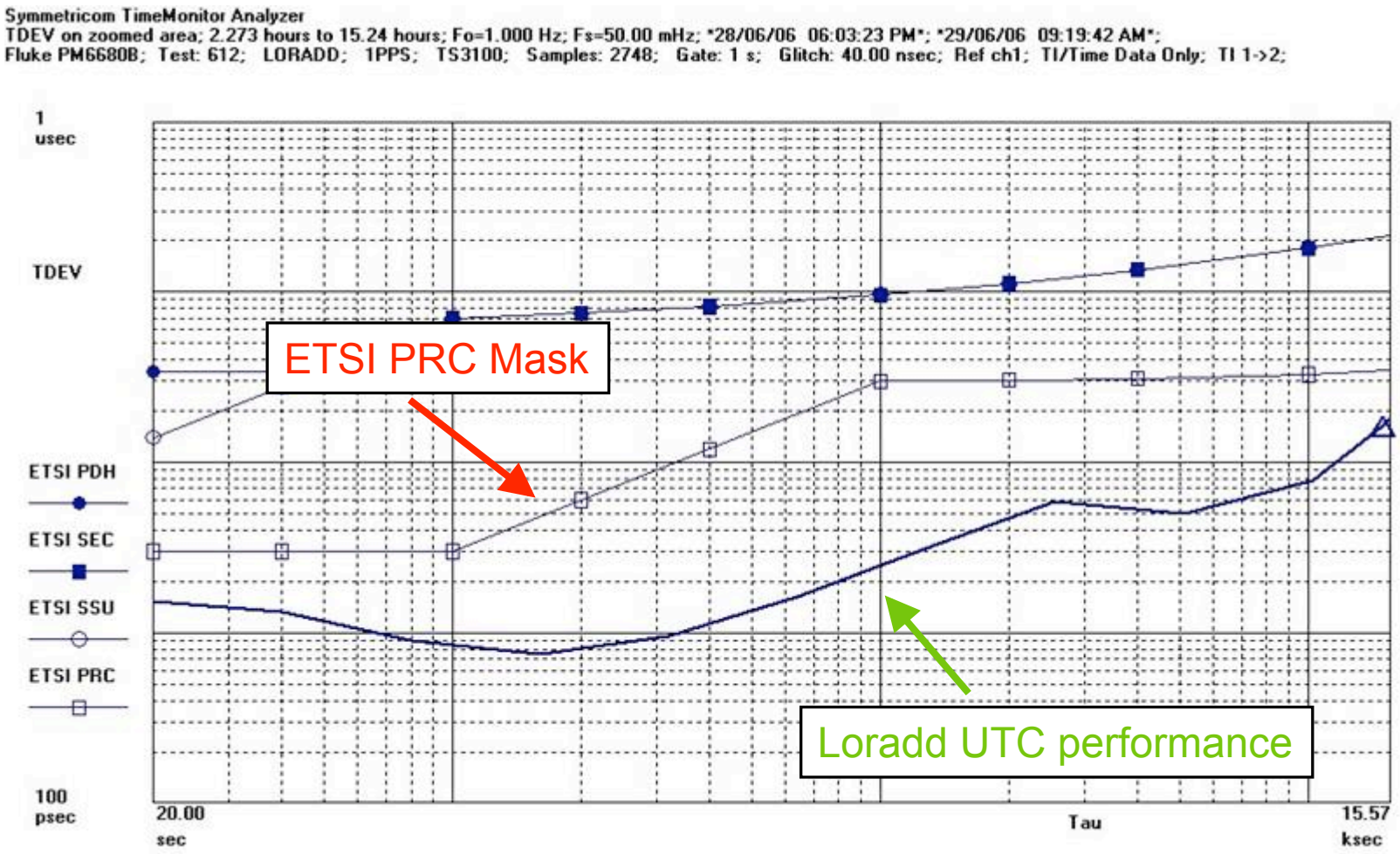
Loradd UTC series

- All functionalities of a normal LORADD receiver
- Ovenized crystal for improved stability and hold-over (SRS SC10)
- 10 MHz, 2.048 MHz and 1.544 MHz outputs
- 1 PPS (Loran derived) output
- 1 PPS (GPS derived) output
- Loran Timing Source Station selectable
- Eurofix & 9th pulse capable

Test results - MTIE



Test results - TDEV



Working on… Loradd-F

- Loradd-F
- Low-cost XO

- No GPS
- 10 MHz output via SMA

For more information

Visit our booth in the Assembly Hall

reelektronika