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We maximize marine performance by providing

THE FULL PICTURE

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EGNOS TRAN
Final Presentation

GNSS Final Presentations

ESTEC, The Netherlands

21 April 2004

Presentation outline

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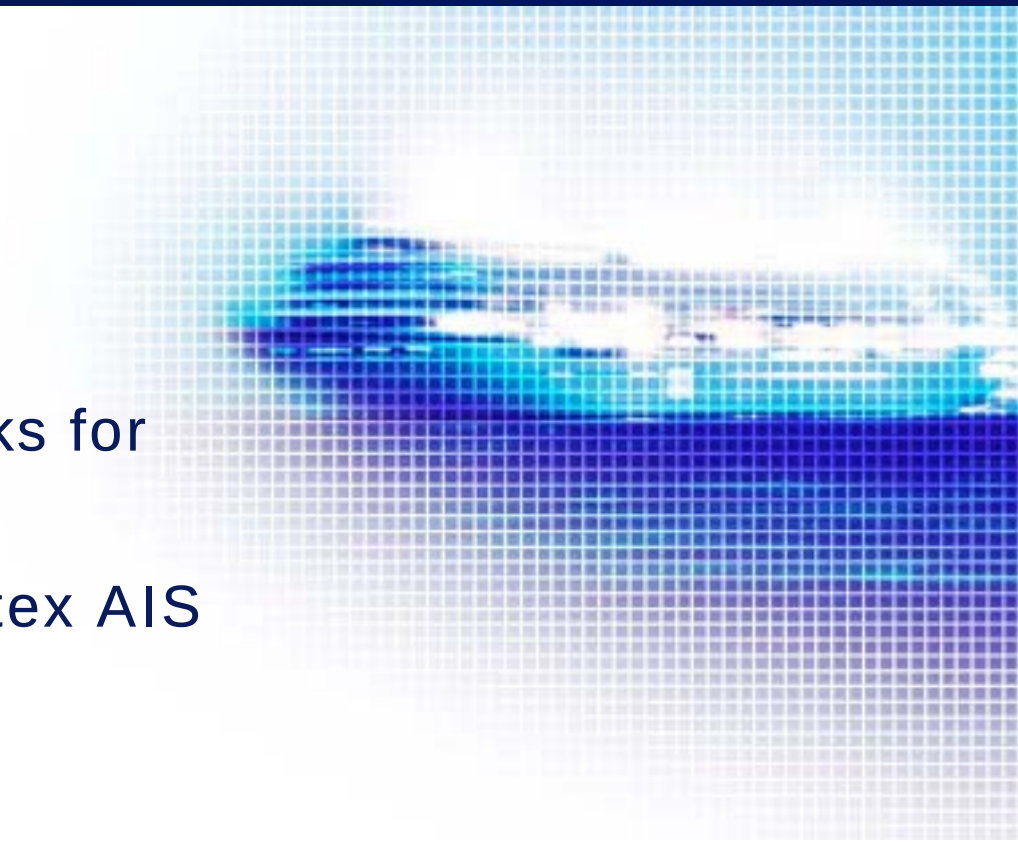
- Introduction
- Need and motivation for EGNOS augmentation
- Candidate augmentation networks for maritime applications
- EGNOS augmentation using Seatex AIS
- EGNOS TRAN demonstrations
- AIS in European GNSS projects
- Conclusion

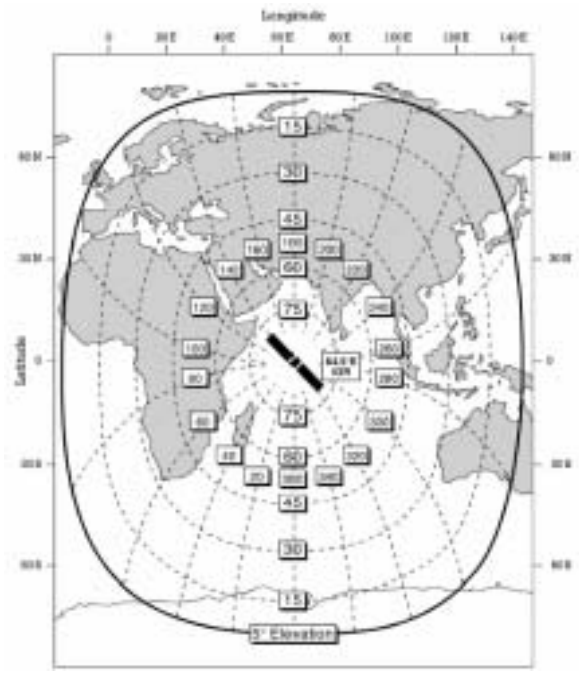


Introduction

- Artes-5 contract awarded to Kongsberg Seatex - August 2001
- Project partners:
  - Telenor
  - Norwegian Coastal Administation
- EGNOS TRAN (Terrestrial Regional Augmentation Network)
- Two parallel ESA contracts:
  - Land and aviation applications (Telespazio)
  - Maritime applications (Kongsberg Seatex)
- Main objective is to demonstrate alternative methods for redistribution of Egnos data to overcome limitations in areas where Egnos coverage is poor
- Purpose of maritime application is to demonstrate safe navigation during transport of passengers and goods

The need for EGNOS augmentation

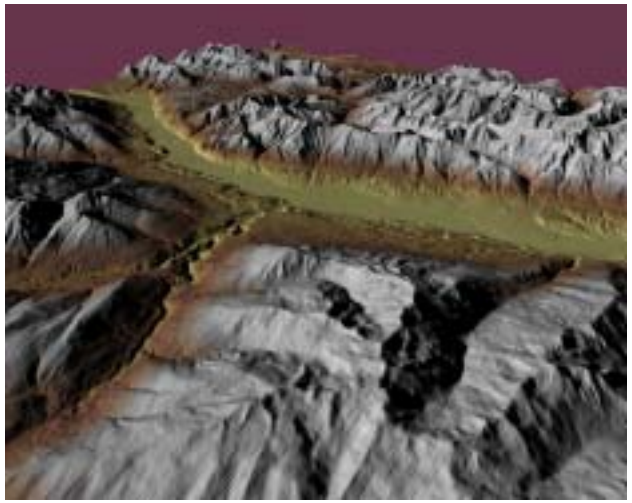
Urban canyons



Inmarsat IOR 64,5 E

High latitudes

Difficult Terrain



... for aviation

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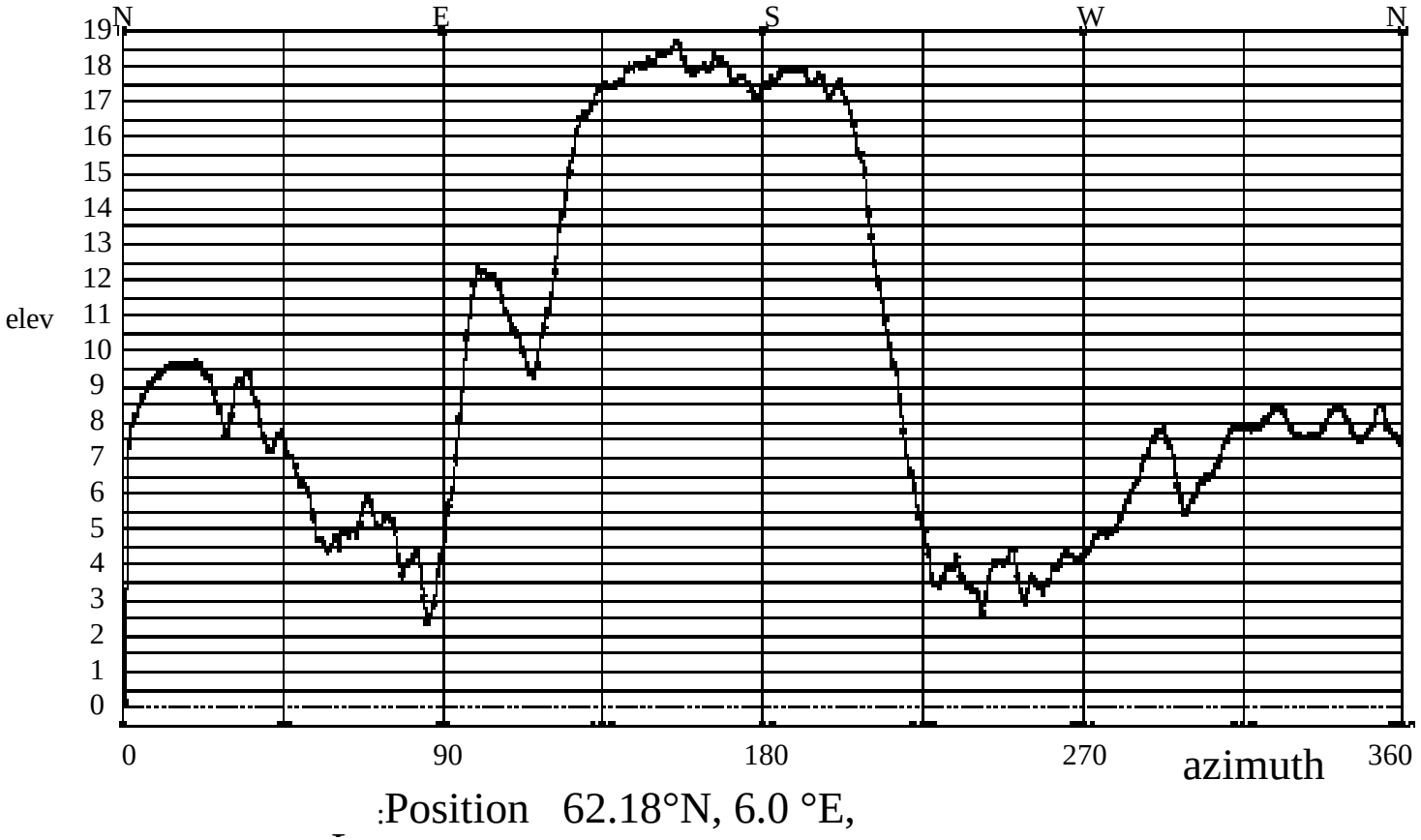
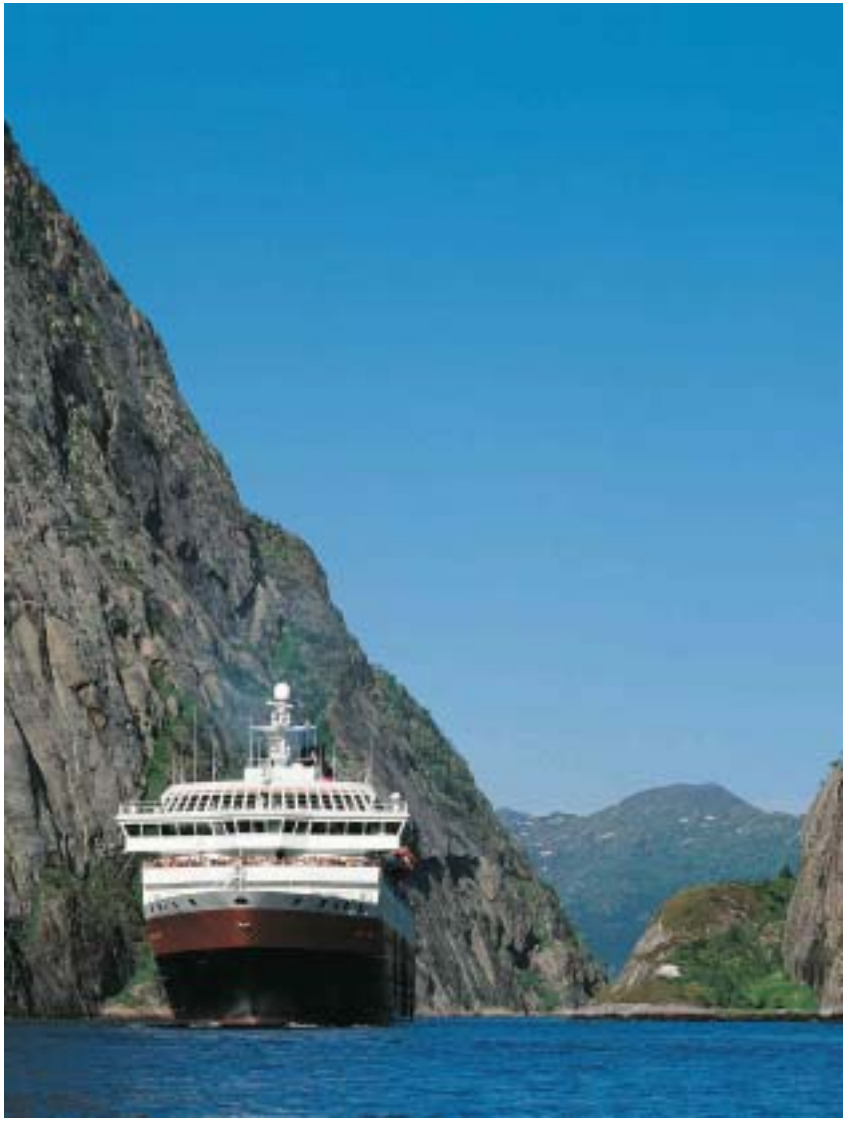
Horizon diagram - **Ørsta Volda**



:Position 62.18°N, 6.0 °E,

... for maritime applications



EGNOS will provide improved accuracy and integrity information to many maritime users.

However, augmentation may be needed in areas like:

- high latitudes
- fjords
- harbours
- inland waterways
- bridges etc.

Categorisation

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- Limited visibility in certain areas
- Integrity and corrections can be retransmitted (not EGNOS range)
- Improve accuracy (differential EGNOS)
- Increase range limits of RTK systems

	GPS	EGNOS	Augmented EGNOS
Accuracy	low	medium	HIGH
Availability	high	limited	HIGH
Integrity	low	high	HIGH

Candidate Networks

- GSM / GPRS / UMTS
- Inmarsat services
- LW / MW
- FM RDS / FM Darc
- IALA radio beacons
- Loran C
- UHF / VHF / HF
- AIS
- Wire-less internet

Preferred Maritime Augmentation Networks

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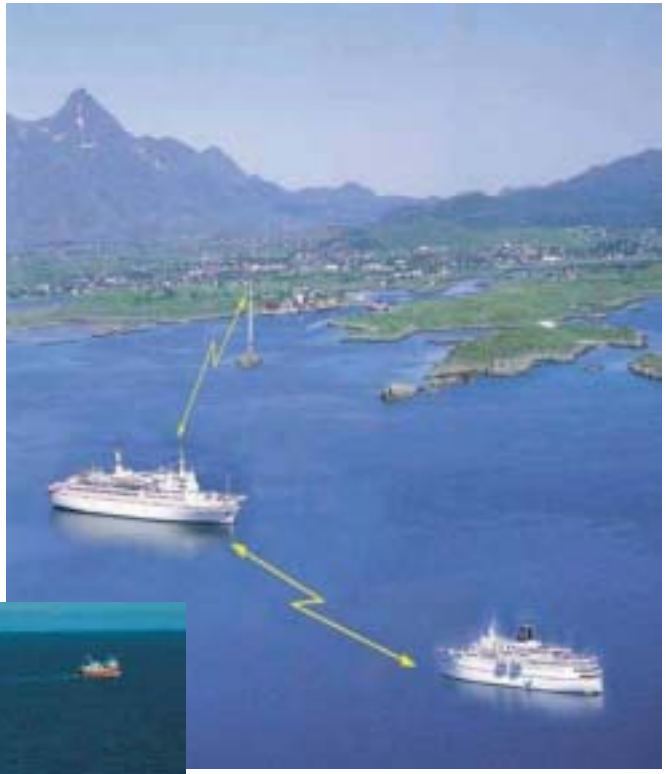
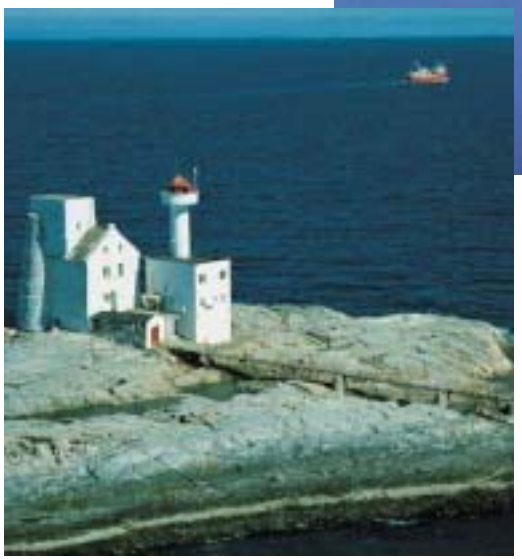
1. AIS (Automatic Identification System)
   - International standard
   - Mandatory for many vessels

2. GPRS
   - Flexible system with low user cost
   - Good coverage in coastal areas and harbours

3. IALA radio beacons
   - Widely used
   - Cheap user equipment
   - Free of charge service
   - Based on RTCM standard





AIS – Automatic Identification System

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AIS is a new international system mandatory for all SOLAS vessels in order to enhance safety at sea, harbours and inland waterways.

Main purposes:

- Collision avoidance
- Coastal surveillance
- Improved efficiency
- Search and rescue

AIS for safety reasons

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- Increasing traffic
- Faster ships
- Larger ships
- Several major accidents world-wide
- Increasing information demand
- Increasing demand for safety of personnel and environment
- Increasing need of efficiency

International Standardisation

- IMO (International Maritime Organisation) specifications regarding system functionality
- ITU (International Telecommunication Union) specifications regarding communication system and frequency allocation
- IEC (International Electro technical Commission) overall specifications including testing and type approval
- Mandatory carriage requirements by IMO / SOLAS from July 2002

IMO

SOLAS
The international convention for Safety Of Life At Sea

ITU

IEC

Transmission of AIS data

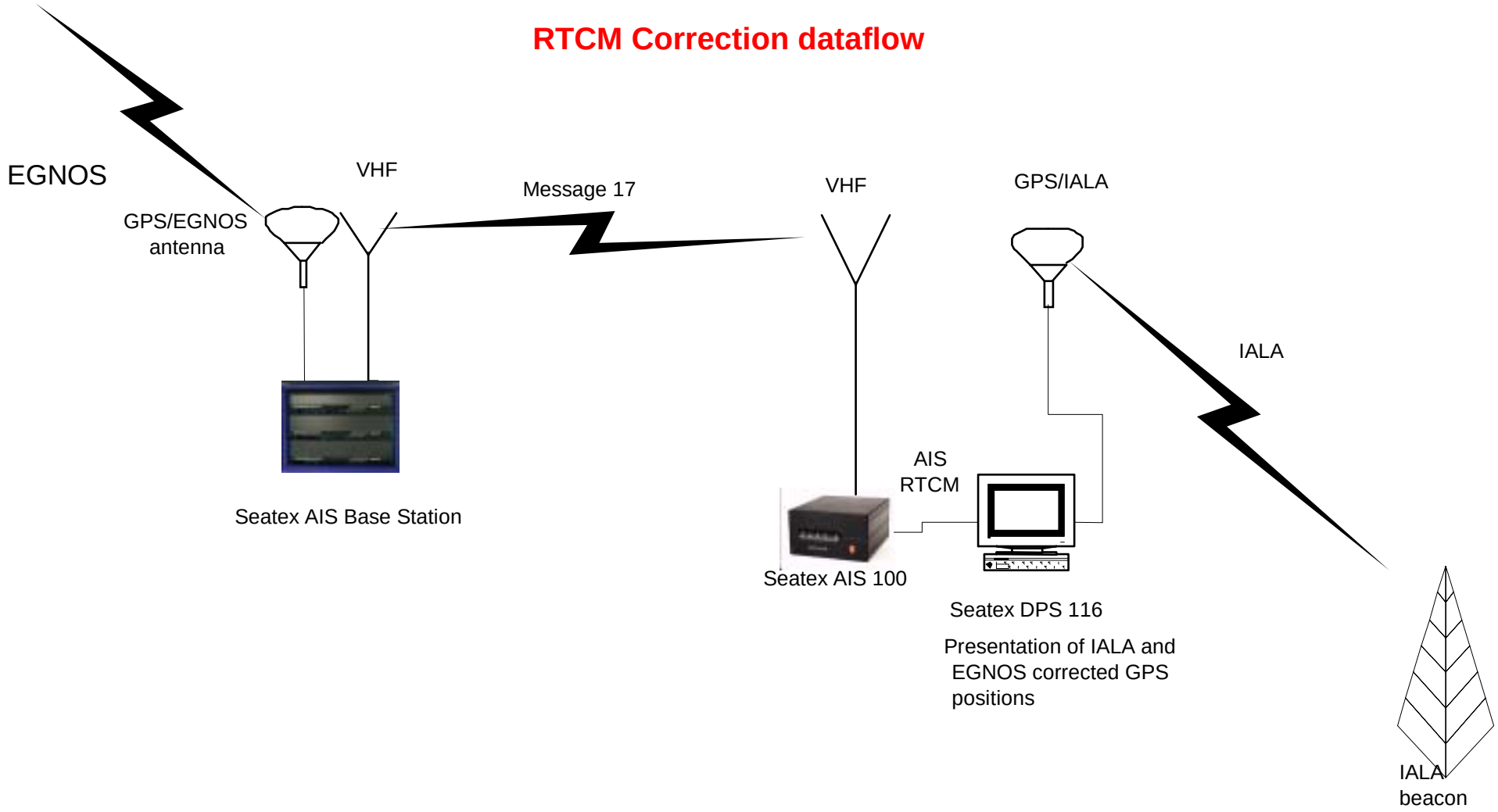
AIS data is broadcast between:

- vessels
- vessels and base stations
- vessels and AtoN

Categories of data transmitted:

- static data
- dynamic data
- voyage related data
- short message service (SMS)

Data flow of EGNOS TRAN corrections



Test area in Trondheim fjord

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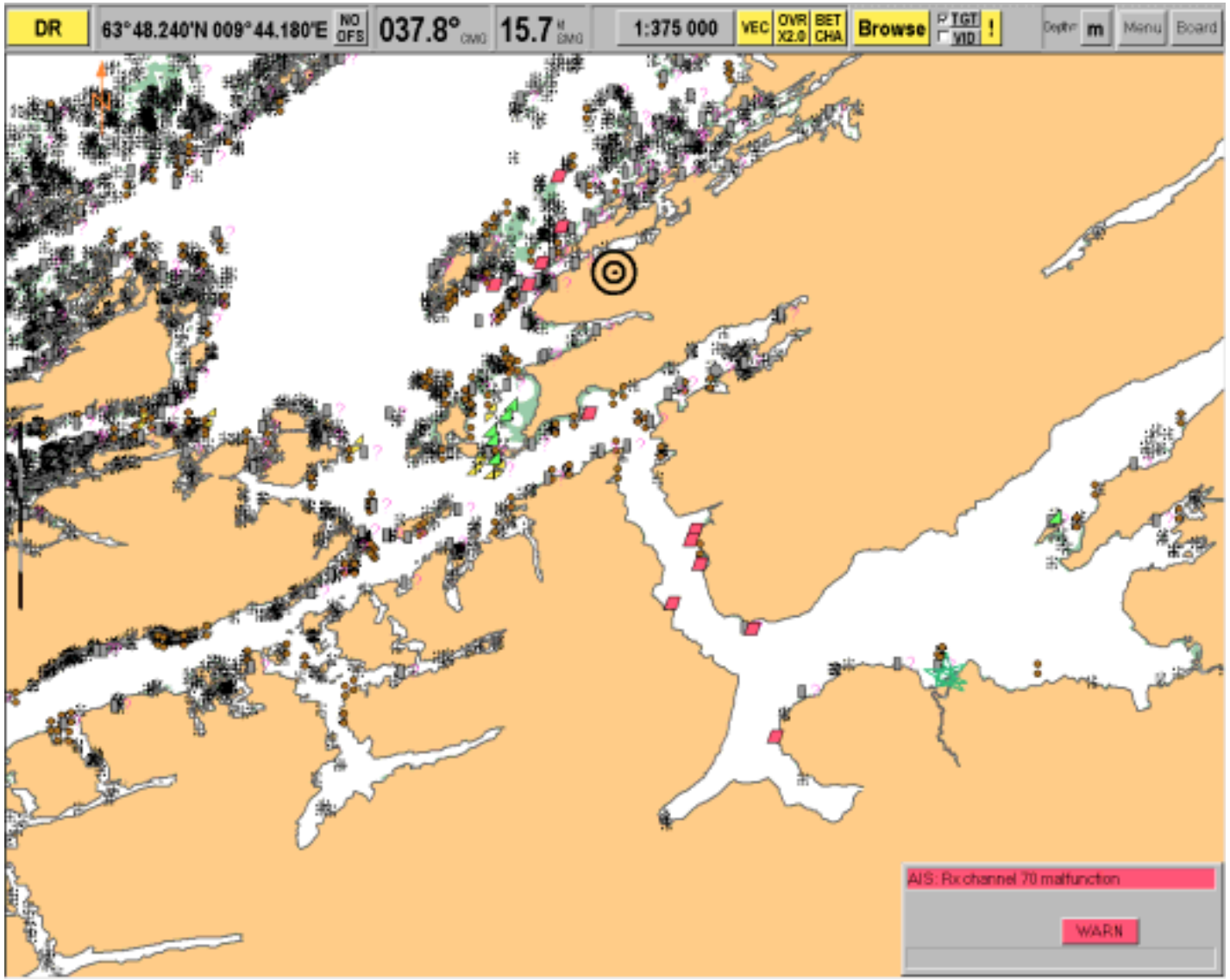

EGNOS TRAN AIS Base Station

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EGNOS TRAN AIS Base Station - Installation

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EGNOS TRAN AIS Base Station - View

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EGNOS TRAN AIS User Equipment

The Seatex AIS 100 Mobile Unit is used to receive EGNOS TRAN corrections from an AIS Base Station. These corrections are converted into standard RTCM format and output to an external navigation unit.

EGNOS TRAN Datalogger

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- The Seatex DPS 116 receives standard RTCM differential corrections from the Seatex AIS 100 Mobile Unit
- Calculates the EGNOS TRAN position
- The Seatex DPS 116 is also used as a data logger for:
  - EGNOS TRAN corrections
  - EGNOS corrections
  - IALA corrections
  - GPS raw data

EGNOS TRAN Public demonstration

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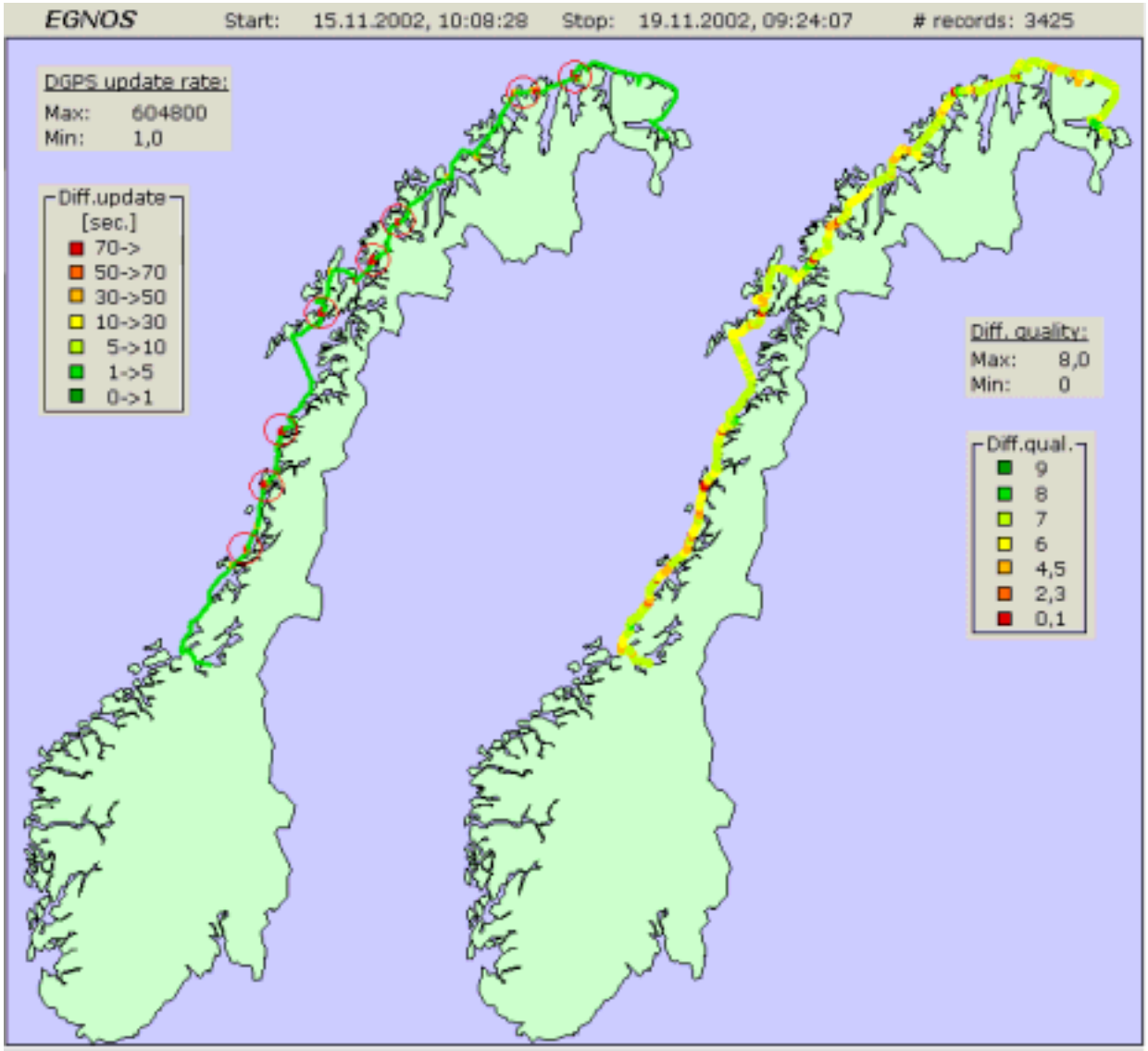
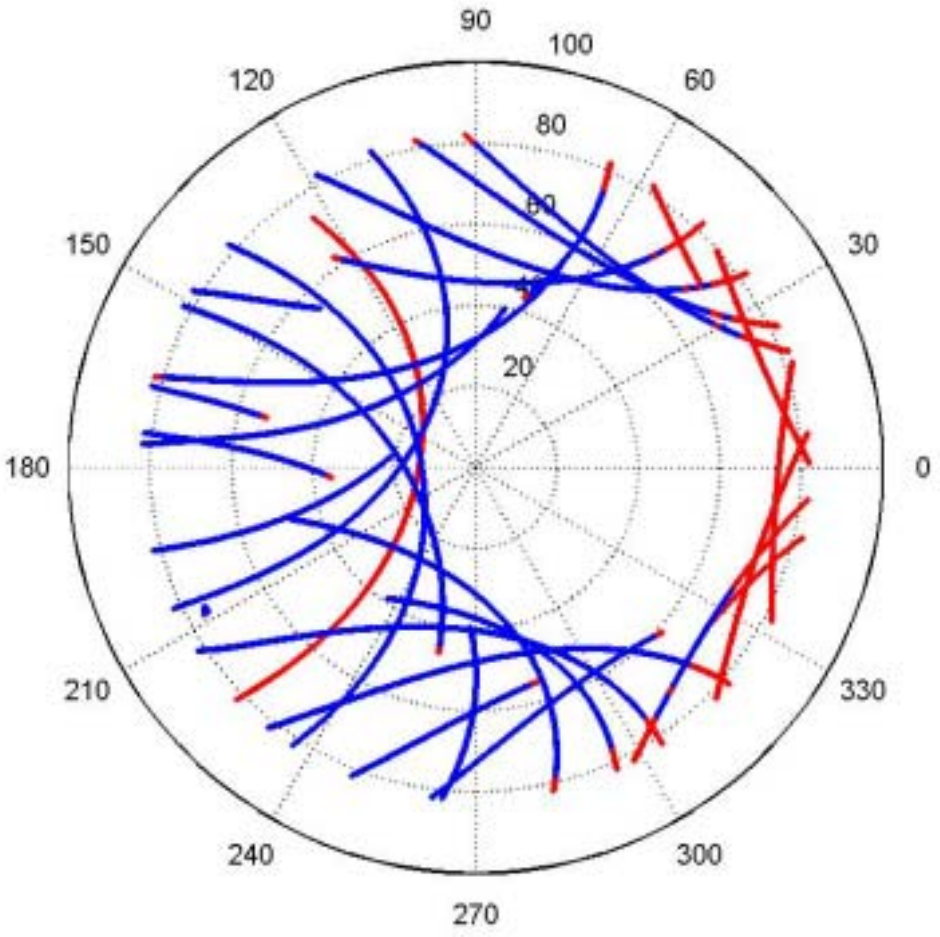
The testing took place from September 2002 – December 2003.

Public demonstration at the vessel MS Nordlys in June 2003.

Areas with lack of EGNOS coverage



ESTB problems during test period



- ESTB corrections sometimes not available for all GPS satellites in view (especially for ”northern” satellites)
- Resulting in poor performance in periods
- Availability of RIMS sites at high latitudes is essential
- Situation expected to improve with final EGNOS system

AIS in other European GNSS projects

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GALEWAT (ESA): Inland navigation using EGNOS

MARGAL (GJU): Introduction of AIS as a local component for EGNOS and Galileo

- Interoperability between inland waterways and ports
- Harmonised Seamless Service

Conclusion

- EGNOS will improve the accuracy and integrity for most maritime users
- EGNOS augmentation will be needed in some areas to improve the availability of service
- AIS works fine as a regional augmentation network for EGNOS
- AIS is a candidate to be used as a Galileo Local Element for marititime users

- Project web-site:

  http://www.kongsberg-seatex.no/etran.html

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