Webinar - R-Mode for the Baltic Sea

BUNDESAMT FÜR SEESCHIFFFAHRT UND HYDROGRAPHIE

Benefits from R-Mode - Resilient PNT

Serving Life at Sea, Shipping & Protection of the Sea

Federal Maritime and Hydrographic Agency of Germany

Tobias Ehlers – Radionavigation Systems

BSH
Bundesamt f. Seeschifffahrt & Hydrographie

BUNDESAMT FÜR SEESCHIFFFAHRT UND HYDROGRAPHIE

Hamburg

Rostock

VS CAPELLA

VWFS DENEB

VWFS ATAIR

VWFS WEGA

VS KOMET

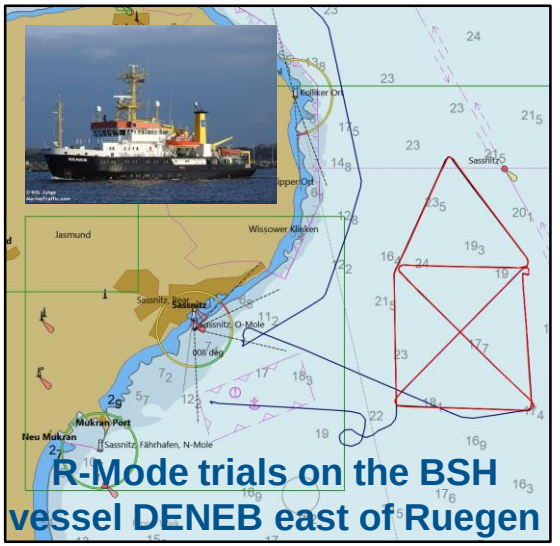
- Maritime authority of the Federal Republic of Germany
  within the Ministry for Digital and Transport (BMDV)
- Approx. 1000 employees, located in Hamburg & Rostock
- Services for maritime shipping: Flag state services, **safety in navigation**, **participation in international committees, type approval and R&D of navigation systems**, security in shipping and environmental protection
- Publishing nautical and hydrographic information (surveys and charts)
- Marine monitoring, forecasting services (e.g. tides, sea state, ice-warnings)
- Order of the seas (spatial planning and approval of off-shore installations)
- National and international contributions to reports on the state of the seas

BSH & the R-Mode Baltic Project

BUNDESAMT FÜR SEESCHIFFFAHRT UND HYDROGRAPHIE

Participation in R&D of navigation systems to support

- **sustainability in future developments driven by user needs,**
- **the engagement of IMO towards resilient PNT,**
- **the development of improved equipment standards and**
- **to obtain and maintain knowledge of key technologies within the maritime domain.**



R-Mode trials on the BSH vessel DENEB east of Ruegen

→ Keeping pace with developments and serve

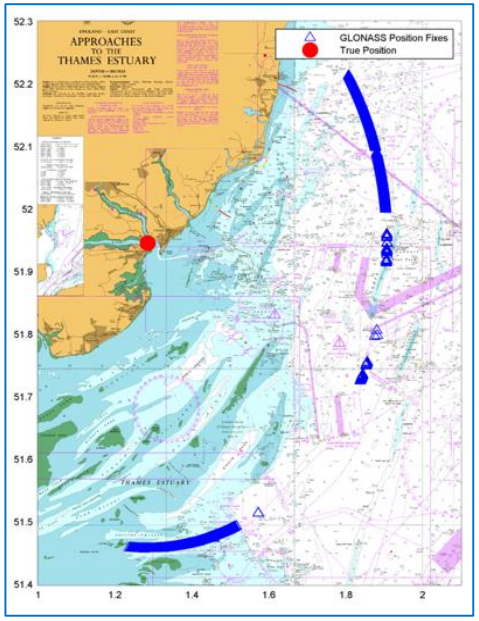
Life at Sea, Safety of Shipping & Protection of the Sea

Why R-Mode? – Today‘s weak spots

BUNDESAMT FÜR SEESCHIFFFAHRT UND HYDROGRAPHIE

Identified issues in today‘s navigation data provision

- **Solely GNSS services are the primary source of position and navigation data on-board of SOLAS vessels**
- **GNSS signals suffer from disturbances and lack of local and on-site integrity information**
- **IALA differential services are the only independent sources for local system integrity**
- **Circumstances at the receiver itself stay unknown**
- **Threats like jamming occur on a daily basis**
- **Spoofing attacks are rare but have been reported rising throughout the world and in the eastern Baltic Sea**



General Lighthouse Authorities of the UK and Ireland – Are you really where you think you are?

R-Mode & IMO

BUNDESAMT FÜR SEESCHIFFFAHRT UND HYDROGRAPHIE

The Compelling Need: Safe, Reliable and Resilient Navigation

The gap-analysis of the IMO within the eNavigation Strategy and its Strategic Implementation Plan (SIP-RCO 5) show a demand for

- resilient PNT (uncorrelated integrity and ranging)
- a backup for GNSS
- immunity against GNSS jamming & spoofing


IMO INTERNATIONAL MARITIME ORGANIZATION

E

4 ALBERT EMBANKMENT
LONDON SE1 7SR
Telephone: +44 (0)20 7735 7611 Fax: +44 (0)20 7587 3210

MSC.1/Circ.1595
25 May 2018

E-NAVIGATION STRATEGY IMPLEMENTATION PLAN – UPDATE 1

IMO – What‘s there? - The MSR & PNT Guidelines

- MSR (MSC.401) defines an optional terrestrial component suitable for R-Mode to jump in!
- MSC.1/Circ.1575 defines methods for data processing and integrity assessments


RESOLUTION MSC.401(95)
(Adopted on 8 June 2015)

PERFORMANCE STANDARDS FOR MULTI-SYSTEM SHIPBORNE RADIONAVIGATION RECEIVERS

IMO INTERNATIONAL MARITIME ORGANIZATION

E

4 ALBERT EMBANKMENT
LONDON SE1 7SR
Telephone: +44 (0)20 7735 7611 Fax: +44 (0)20 7587 3210

MSC.1/Circ.1575
16 June 2017

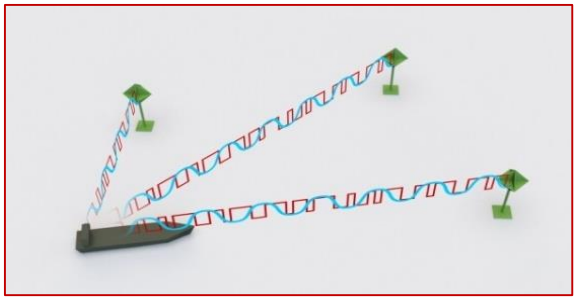
GUIDELINES FOR SHIPBORNE POSITION, NAVIGATION AND TIMING (PNT) DATA PROCESSING

Benefits from R-Mode

BUNDESAMT FÜR SEESCHIFFFAHRT UND HYDROGRAPHIE

The R-Mode technology potentially provides

- independent & uncorrelated sources of ranging information,
- GNSS independent ranging signals for positioning,
- data for high integrity evaluation as described in the IMO PNT Guidelines,
- immunity against navigation system failures due to GNSS jamming,
- a possibility to detect spoofing and
- provide terrestrial positioning in case of GNSS unavailability



Any additionally signal source for navigation data serves Safety of Navigation and thus Life at Sea !

Thanks for your attention

BUNDESAMT FÜR SEESCHIFFFAHRT UND HYDROGRAPHIE

Contact
Tobias Ehlers
Radionavigation Systems
tobias.ehlers@bsh.de
+49 40 3190 7331