2016 Workshop on Solutions for Maritime Situational Awareness (SIMSA 2016)
12th February 2016, Helsinki, Finland
Maritime Research at FGI

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Finnish Geospatial Research Institute (FGI)

- Governmental research institute for geospatial information science and technology
  - Part of the National Land Survey of Finland
  - Under the Finnish Ministry of Agriculture and Forestry
- Five departments
  - Geodesy and Geodynamics
  - Geoinformatics and Cartography
  - Remote Sensing and Photogrammetry
  - Navigation and Positioning
  - Spatial Data Information Services
- Current staff: about 120
Key Research Areas of FGI

1. Reference Systems
   - National coordinate, height and gravity systems
   - Nummela standard baseline and Metsähovi research station
   - Deformation networks (Nuclear safety)
   - Photogrammetric test field

2. Changing Earth
   - Land use change
   - Land uplift and deformation
   - Multitemporal remote sensing data analysis
   - Global gravity change
   - Safety and environmental aspects
   - Change of land topography
   - Vegetation

3. Mobile Geomatics
   - Mobile mapping
   - GNSS technologies
   - Indoor – outdoor navigation
   - Smart mobile geospatial solutions
   - Mobile GIS

4. Spatial Data Infrastructures
   - Interoperable, standardized data services
   - Harmonization and quality of geospatial data
   - Network-based processing services
   - Use and usability of GI-data and applications
   - Visualization and cartographic presentation
FGI’s Department of Navigation and Positioning

- Current staff: 18, with 9 PhDs
  - 9 international and 9 Finnish
  - 7 different nationalities
- Three research groups:
  - Satellite and Radio Navigation (SaRaNa)
  - Sensors and Indoor Navigation (SINa)
  - Intelligent Mobility and Geospatial Computing (IMGC)
    - Also MARITIME
- A navigation laboratory with state-of-the-art equipment (signal simulators, roof antennas, repeaters, receivers and sensors)
FGI’s projects related to Maritime

- **ARCSAT**: Arctic Real-Time Satellite Services for the Public and Commercial End-Use
  - Ice aware navigation for the Arctic sea
- **ESABALT**: Enhanced Situational Awareness to Improve Maritime Safety in the Baltic
- **STORMWINDS**: Strategic and Operational Risk Management for Wintertime Maritime Transportation System
- **VORIC**: Vessel Operations and Routing in Ice Conditions
- **FEGNOS**: Finland’s EGNOS Monitoring and Performance Evaluation
Ice-aware routing

• Is it possible to create an algorithm that generates optimal maritime shipping routes, taking into account ice conditions and available ice breaker assistance?

Photos by Tapio Nyman and the Canadian Coast Guard
What is needed for ice-aware routing?

1. Sea spatial model
2. Ship maneuverability model
3. Sea ice model
   - Describes the sea ice conditions at a given point in space and time
4. Ship performance model
   - Describes how the ship performs as a function of ice conditions
   - Also, takes into account possible ice breaker assistance
5. A cost function ($A^*$)
Ice-aware maritime route optimization in the Baltic Sea

Source: Jakub Montewka, FGI
Ice navigation support system

Earth Observations
- Cosmo-SkyMed
- Radarsat
- NOAA
- Modis
- Sentinel-1

Other data sources: AIS, icebreaker (IB) waypoints

Environmental and ship models
- Ice drift, ice thickness, ice charts, iceberg monitoring

Route optimisation

Data collecting

Data delivery (internal, external)

Ship parameters

* Observations
* Engine power
* User needs

* Oceanographic and weather observations forecasts, and analyses
* Route suggestions

Icebreakers
- Merchant vessels
- Bridge integrators

Authorities
- Ice service
- Logistics and port operators
Enhanced Situational Awareness to Improve Maritime Safety in the Baltic (ESABALT)

Common software platform for the crowdsourcing of maritime information for the benefit of all maritime stakeholders

www.esabalt.org
ENC 2016

www.enc2016.eu

24th European Navigation Conference - 2016

Helsinki, Finland, 30th May – 2nd June 2016

IMPORTANT DEADLINES

- Full-paper submission: 28th February, 2016
  (full-paper-review track)
- Abstract Submission: 28th February, 2016
  (abstract-review track)
- Acceptance Notification: 4th April, 2016
- Early Registration: 15th April, 2016
- Exhibition and sponsorship packages via www.enc2016.eu