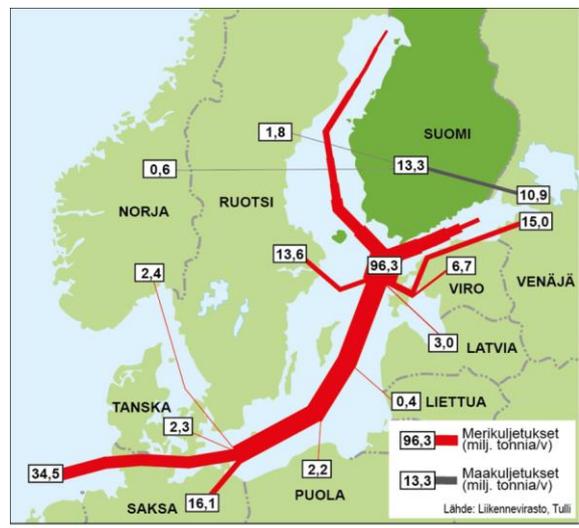


# Satellites Benefiting Citizens

## A showcase: Winter Navigation in the Baltic

*“Finland is an Island!”*



Suomen tuonnin, viennin ja transiton määrä ja kohdemaat vuonna 2013 (milj. tonnia). Transitoa oli 7,5 milj. tonnia.



**Geoff Sawyer & Marc de Vries**

# What it is about

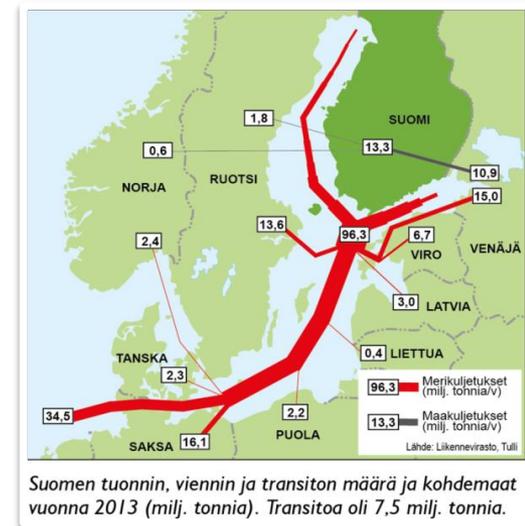
*Winter navigation in the Baltic has an outstanding importance for Finnish economy. Copernicus Sentinel-1 data contributes to make it more efficient.*

Satellite radar (SAR) imagery is used to observe ice conditions in the Baltic by Finland and Sweden. With their synoptic view, satellites allow icebreakers to keep sea-lanes (“Motorways of the Sea”) and ports open more effectively. This allows reducing transit times and uncertainties, which in turn has positive impacts on ports operations and down to goods transportation and availability for the local population.

We, EARSC and The Green Land, investigated these cascaded effects and the benefits brought by the use of satellite imagery for each tier down to such value chain. We found clearly identifiable impacts for each tier. According to our analysis, between €24m and €116m per annum of economic value is being generated in Finland and Sweden thanks to the use of satellite radar images. Copernicus Sentinel-1 mission will provide more frequent observations which will allow better interpretation between the passes.

# The case of Finland

- “Finland is an island!” : over 90% of Finnish imports and exports travel by sea.
- Decision in 1971 that all major Finnish ports (25) should be kept open through the winter
- In 2003, decision to use Satellite imagery to replace helicopters on board ice-breakers
- Whilst helicopters provide an instant view; conditions change under bad weather conditions when they may not be able to fly
- Satellite imagery provides a synoptic view of the whole of the Baltic which allows icebreaker captains to plot a route right through the ice fields



# From Satellites to Supermarkets

## The Ice Monitoring Value Chain

1. The Finnish Met Office (FMI) produce daily maps of the ice conditions that are used by ships, ports and media
2. Satellite imagery is used by icebreakers to keep sea-lanes and ports open; “Motorways of the Sea”.
3. Icebreakers guide ships to the ports so reducing transit time, fuel use, damages to ships (ice collisions) etc.
4. More precise arrival time allows ports to improve their planning of operations
5. Factories (paper mills / steel mills / oil refineries) can plan stock arrival and goods shipment.
6. Consumers benefit by greater assurance of the availability of food, fuel and medicines.

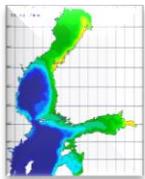


# From Satellites to Supermarkets

## The Economic Benefits

The Study shows that the Finnish & Swedish economies benefit from the use of satellite imagery coming from Copernicus;

Between **€24m and €116m** of economic benefit is made each year.



€2.3m pa

Icebreakers use imagery to find the best routes through the ice



€2.1-€3.3m pa

Ships save fuel and time



€5.8-€9.4m pa

Ports are able to operate more efficiently



€6.3-€63m pa

Factories are able to operate all year round

Citizens can be sure that the supermarkets (and petrol stations and pharmacies) are stocked.



€3.5-€17.5m pa

## Acknowledgments:

We should like to thank the following people for their assistance in preparing this report:

- Patrick Eriksson, Eero Rinne, Marja-Liisa Tuomola: Finnish Meteorological Institute
  - Jarkko Toivola, Esa Pasanen, Antti Arkima: Finnish Traffic Agency
  - Ulf Gullne, Johny Lindvall: Swedish Maritime Administration
  - Markus Karjalainen: Arctia Shipping
  - Robin Berglund: VTT
  - Pentti Kujala: Aalto University
  - Jukka Kailio: Port of Helsinki
  - Mikaela Dahlman-Tamm: Sveriges Forskningsforbund
- With a particular special thanks to Patrick Eriksson for his role in helping to identify some of the initial contacts and to help organising the field trip to Helsinki in May 2015.

This is the first of three case studies analysed within ESA project “Copernicus Sentinels products economic value: a bottom up study survey”. The full report is available on line at [www.earsc.org](http://www.earsc.org)  
For further Information email: [secretariat@earsc.org](mailto:secretariat@earsc.org)