

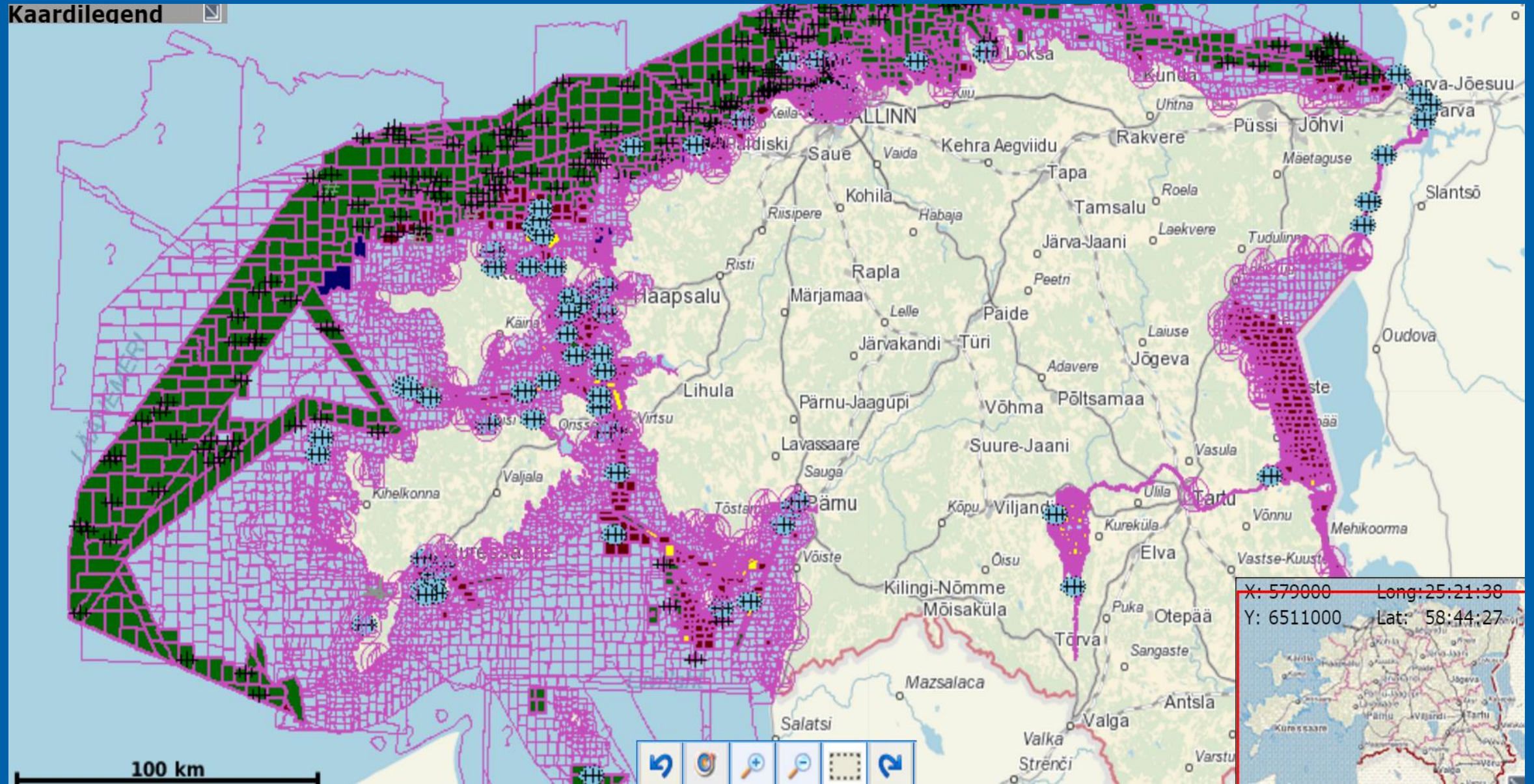


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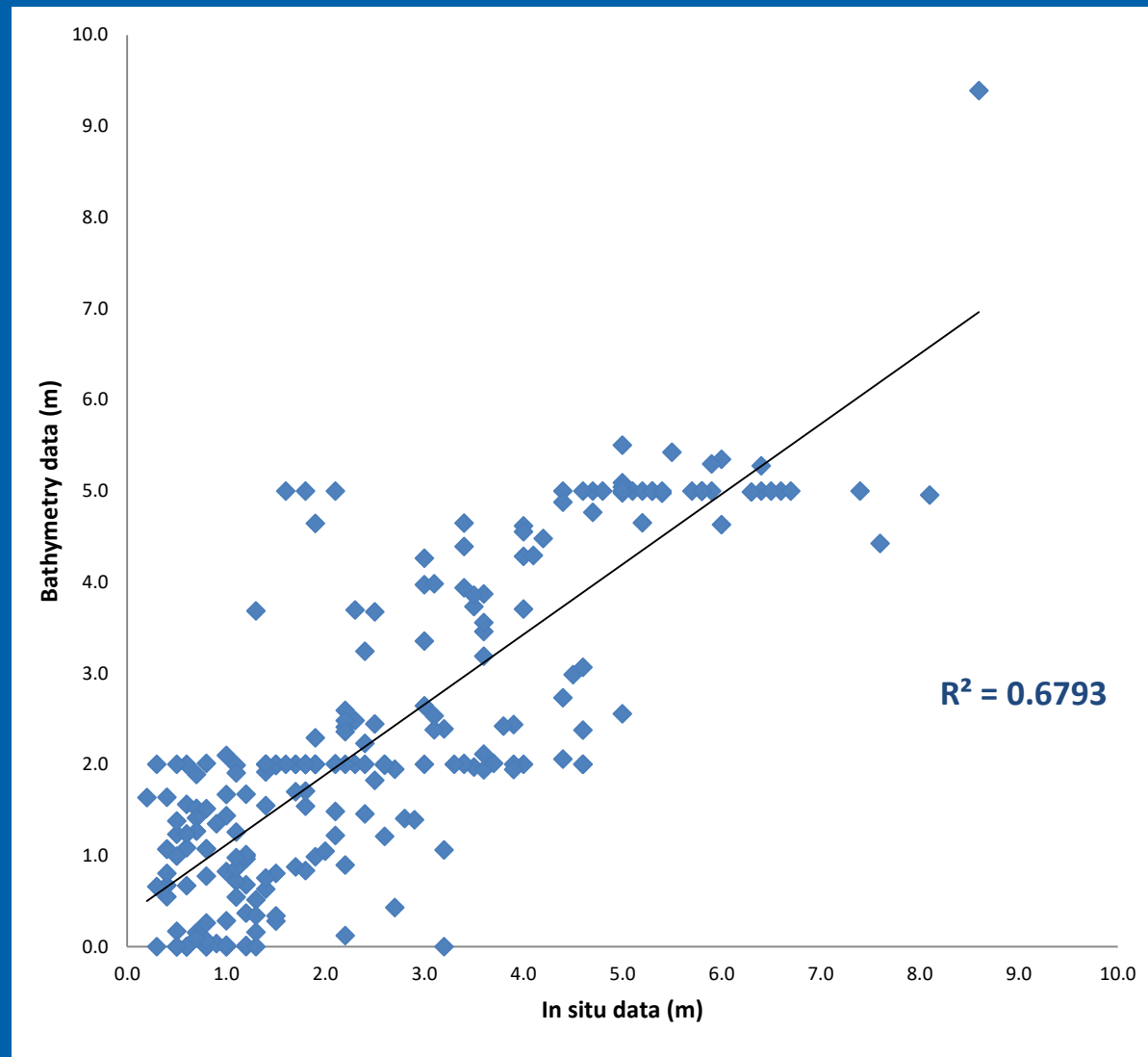
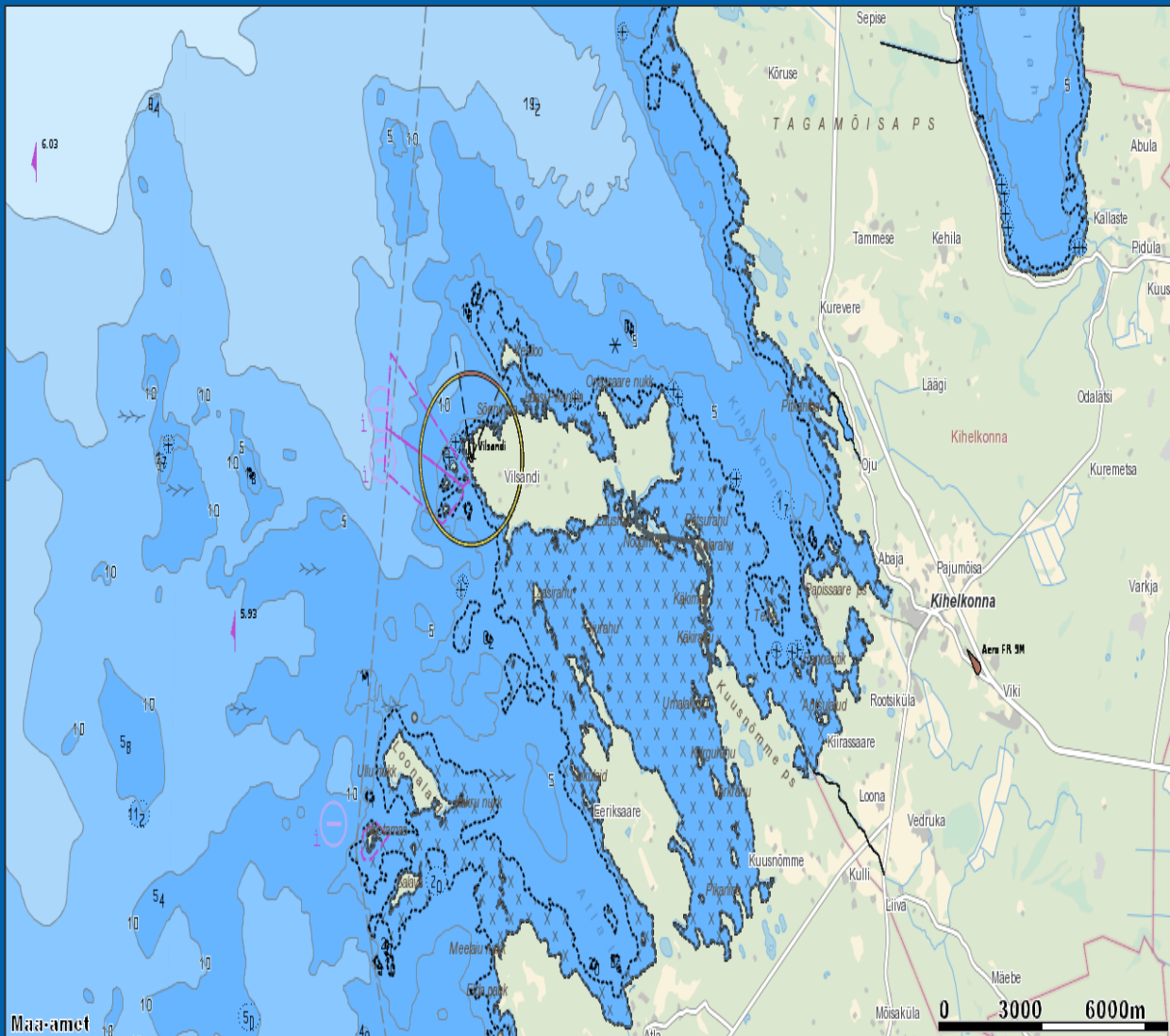
Remote Sensing Bathymetry in Optically Complex Waters

Tiit Kutser

Estonian territorial waters mapped with sonar



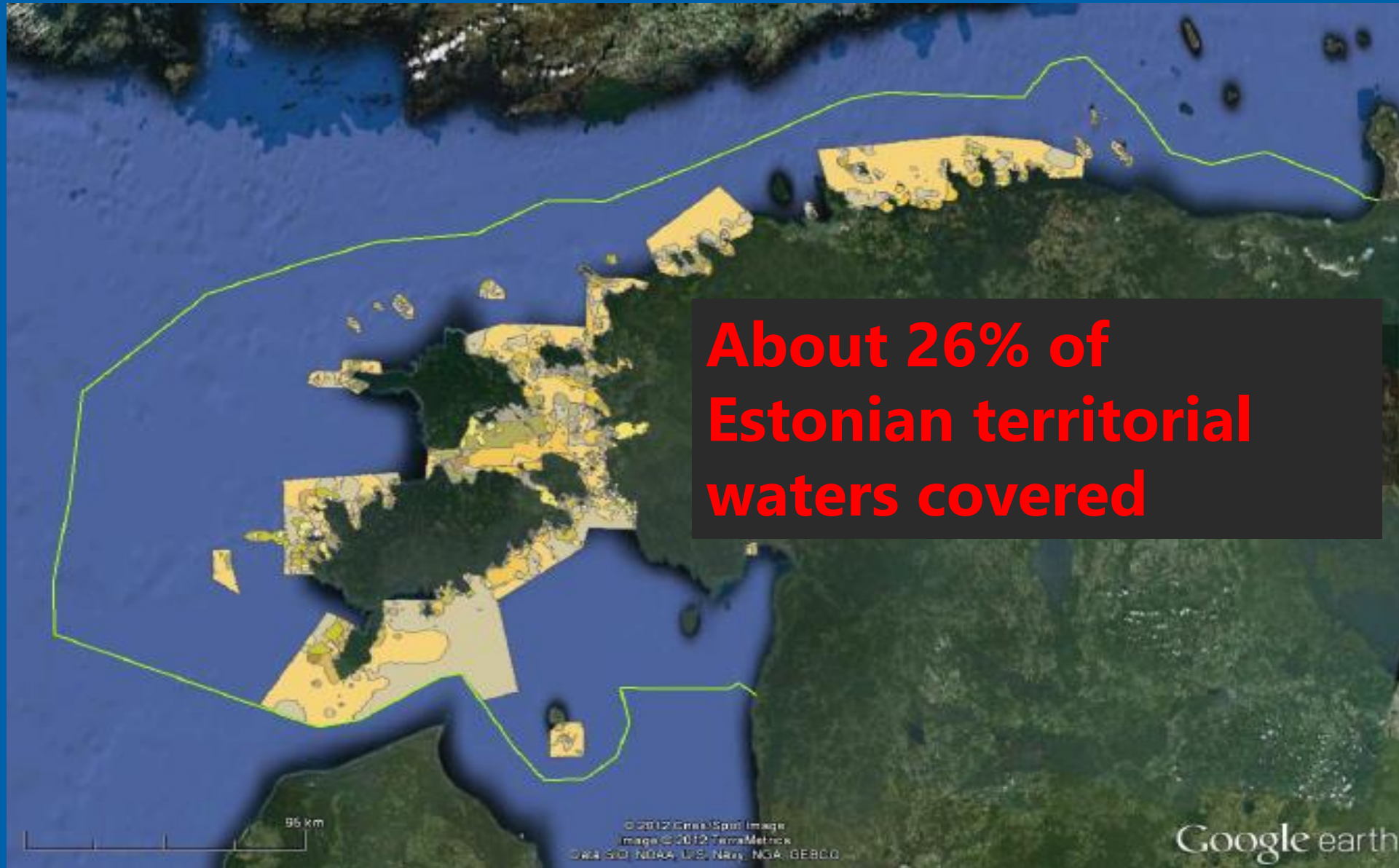
Shallow water bathymetry is a problem





Sentinel-2

Habitat mapping since 2005



Habitat mapping since 2005

Drop video

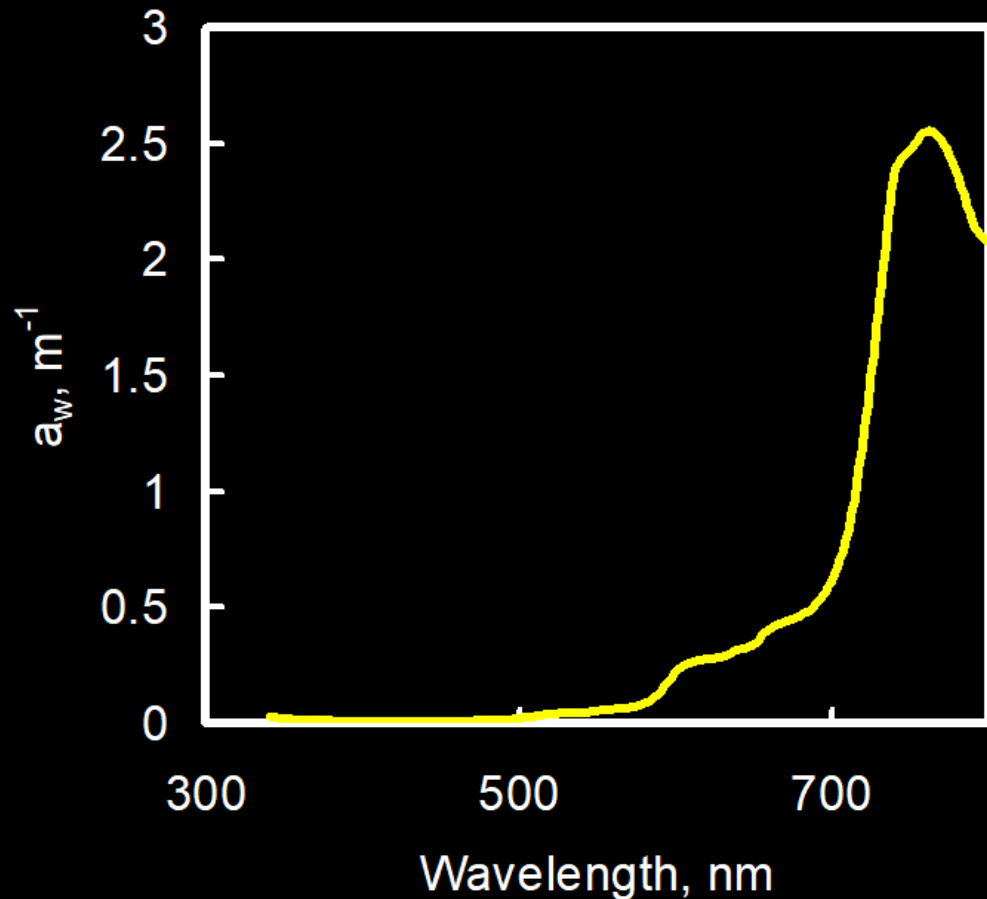
$\sim 1.2 \text{ km}^2 = 0.00003\%$

Grab samples

$\sim 170 \text{ m}^2 = 0.0000004\%$

Absorption by pure water

Absorption coefficient



Absorption very strong in red and NIR

Small change in water dept = detectable difference in RS signal in red and NIR

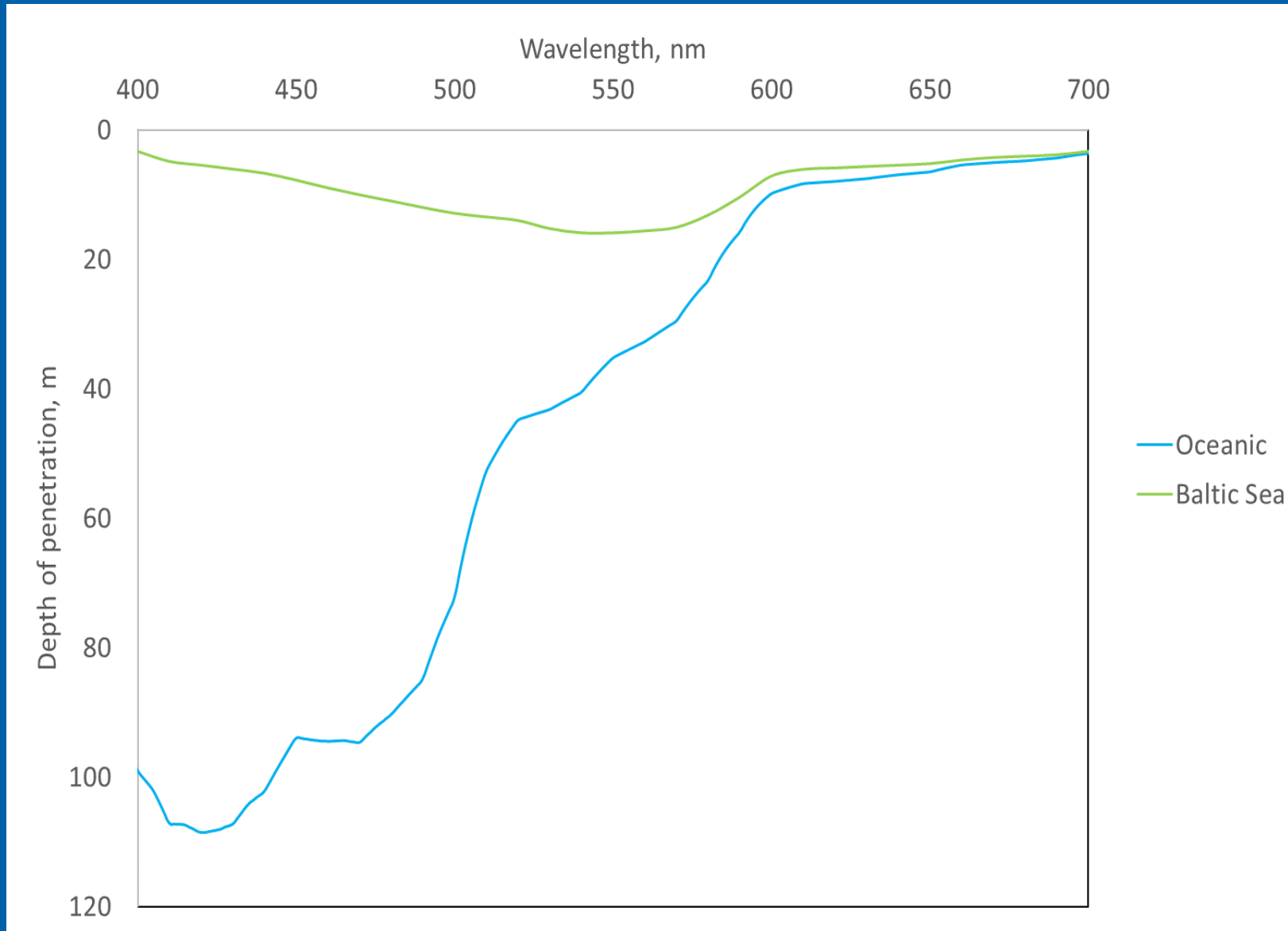
High accuracy in depth estimation

10 cm depth variations easily detectable

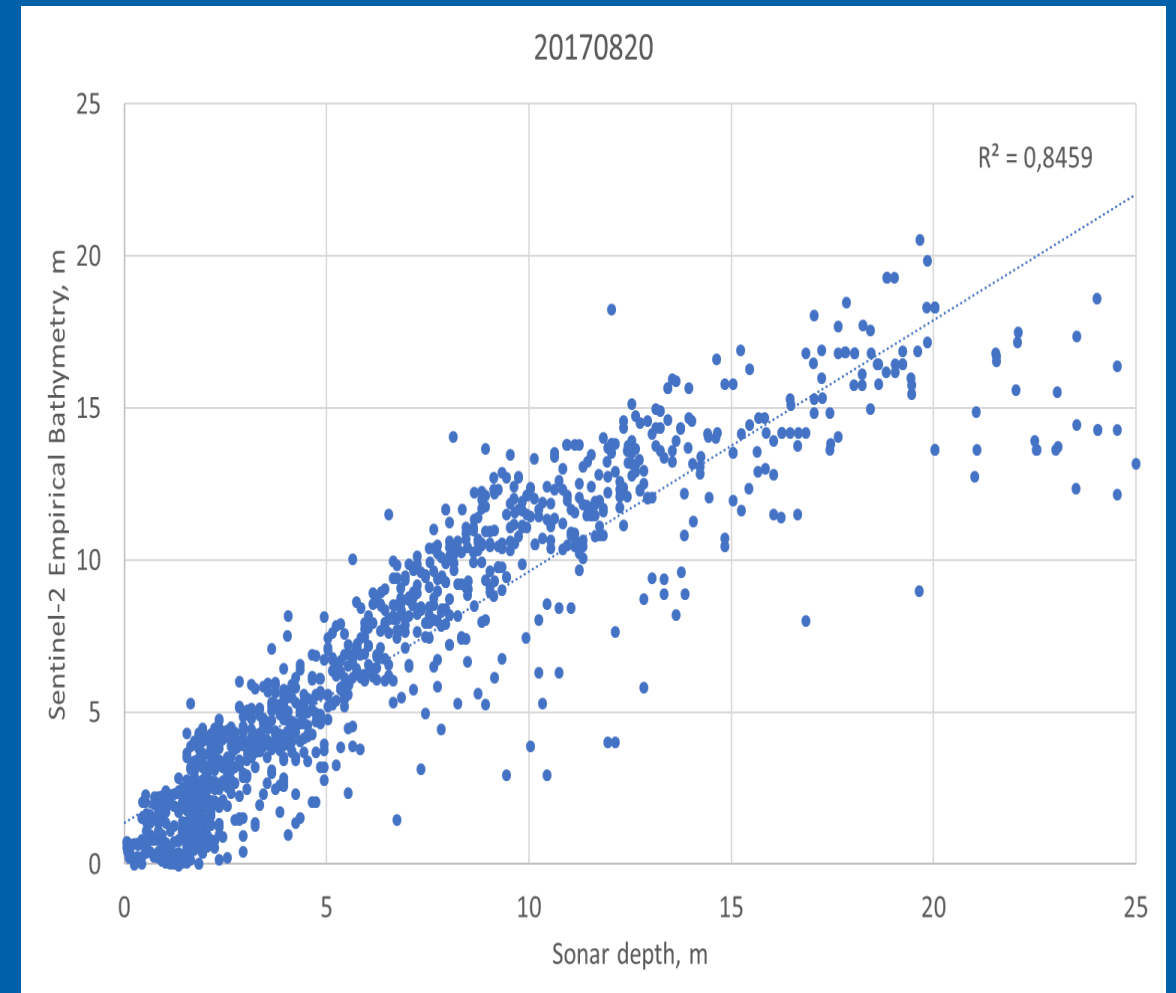
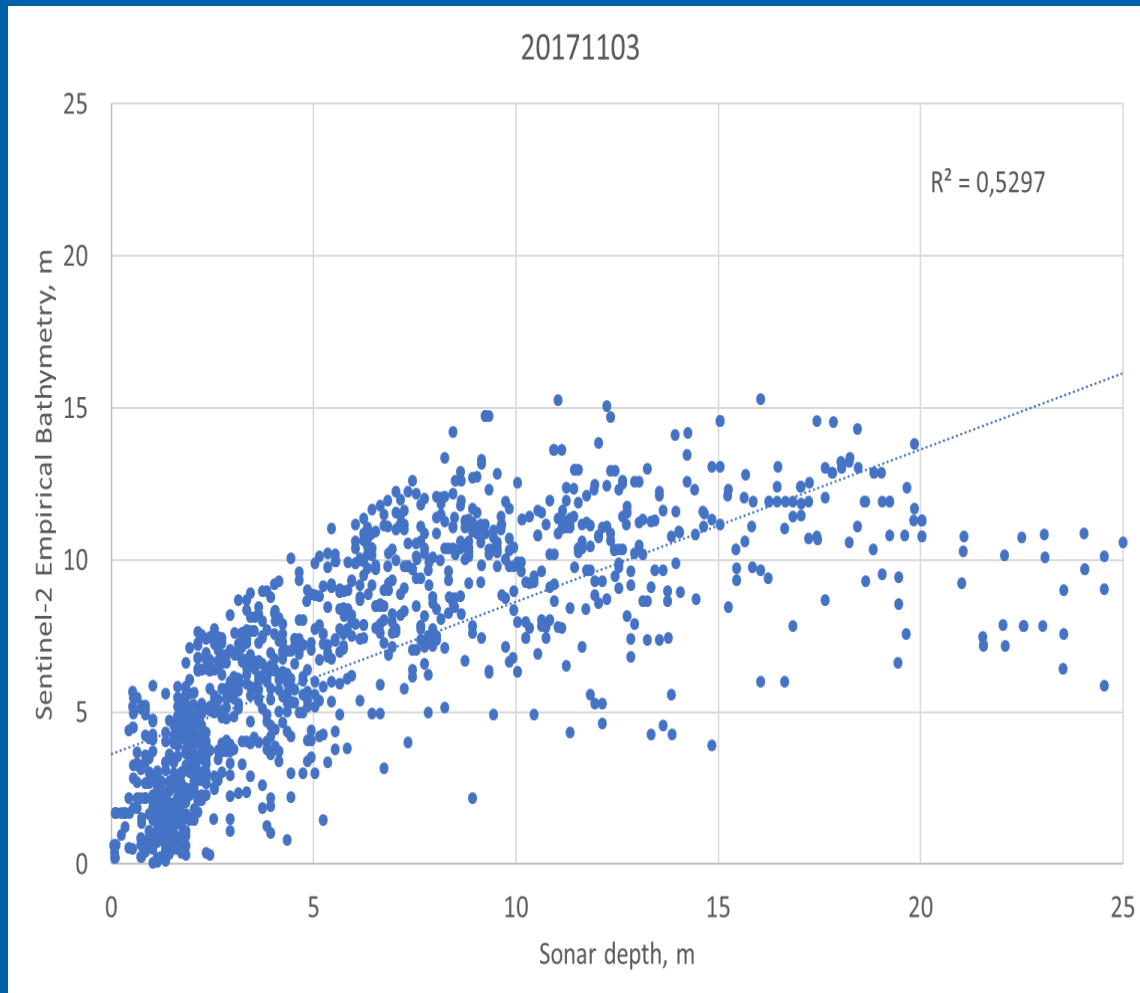


QuickBird

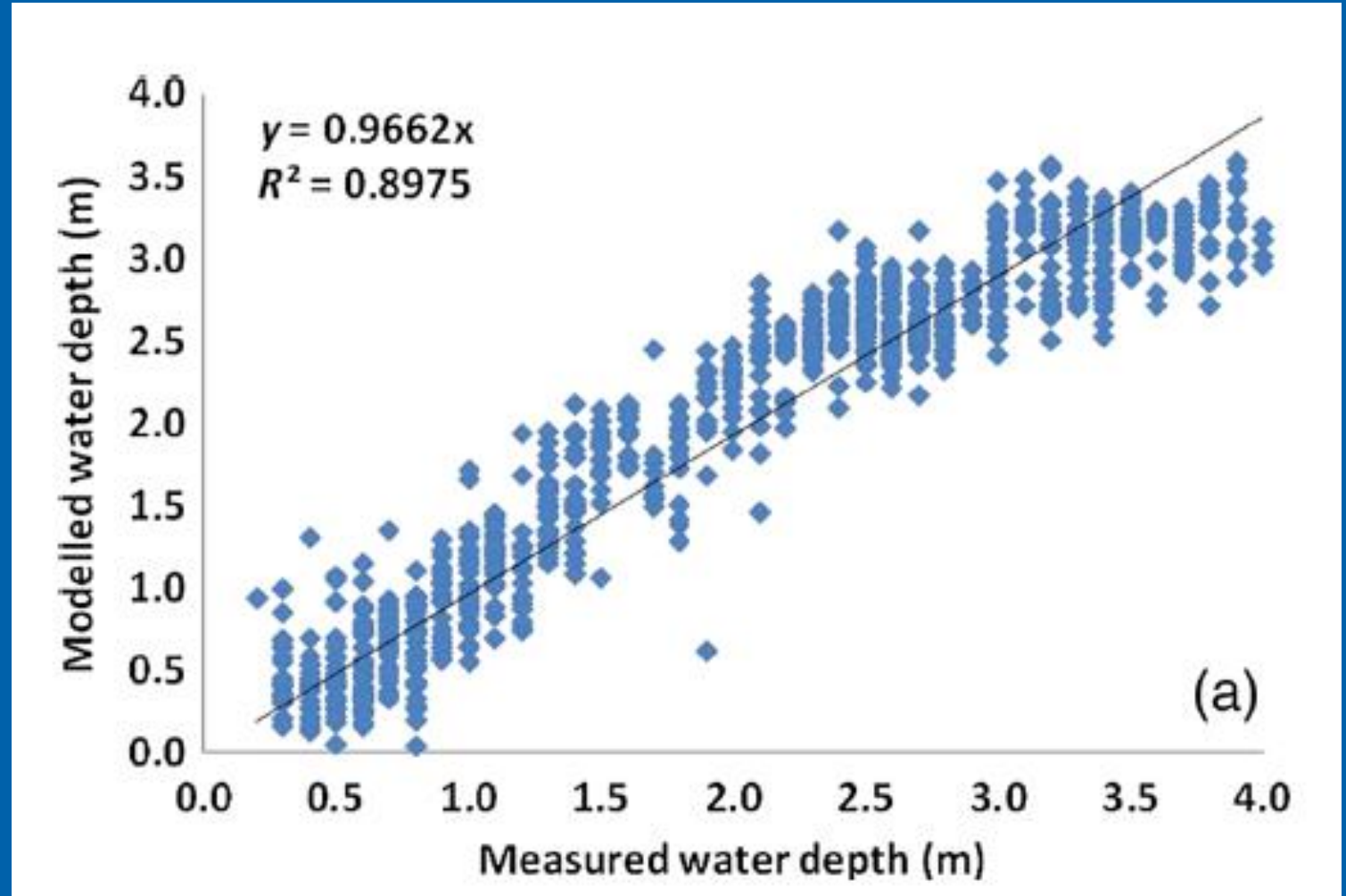
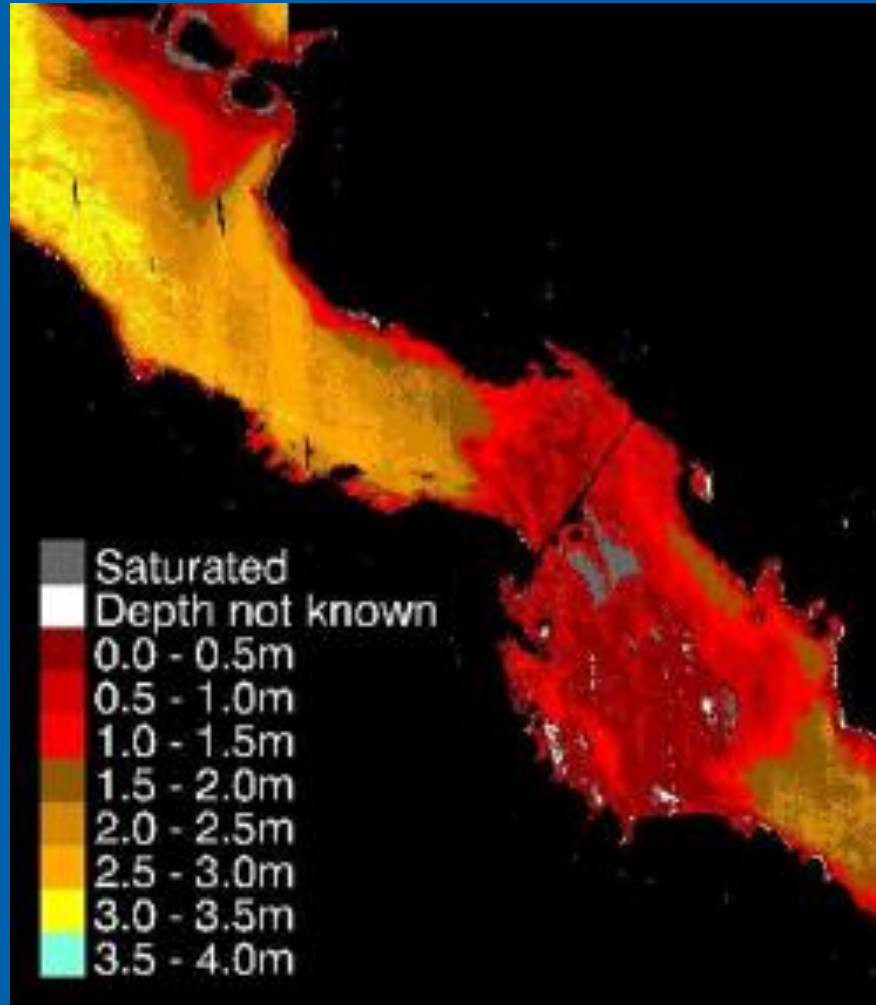
Baltic Sea vs. Oceanic waters



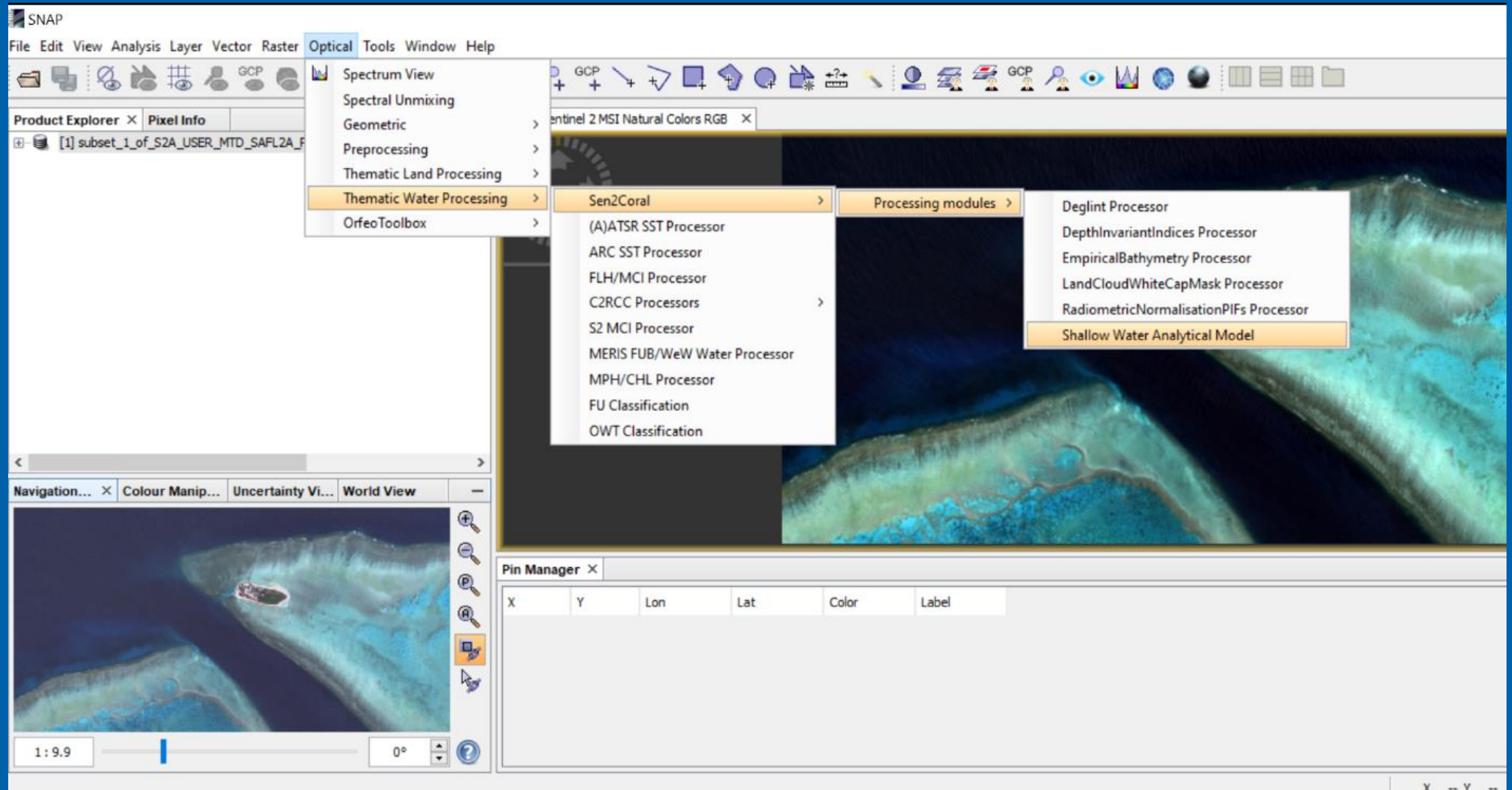
Lizard Island. Sentinel-2. Different dates



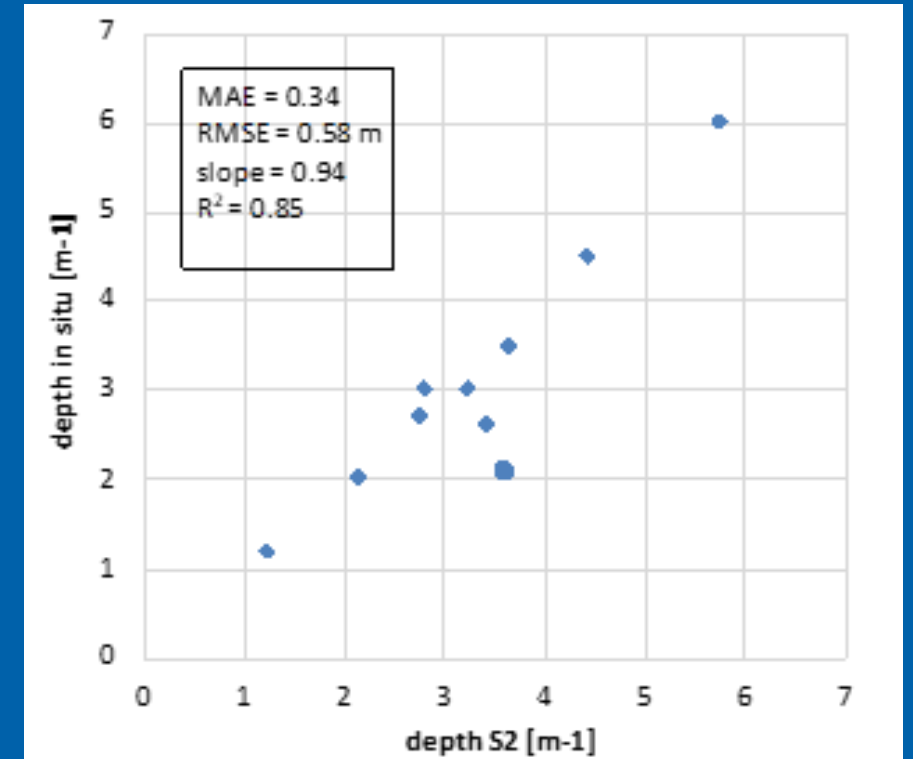
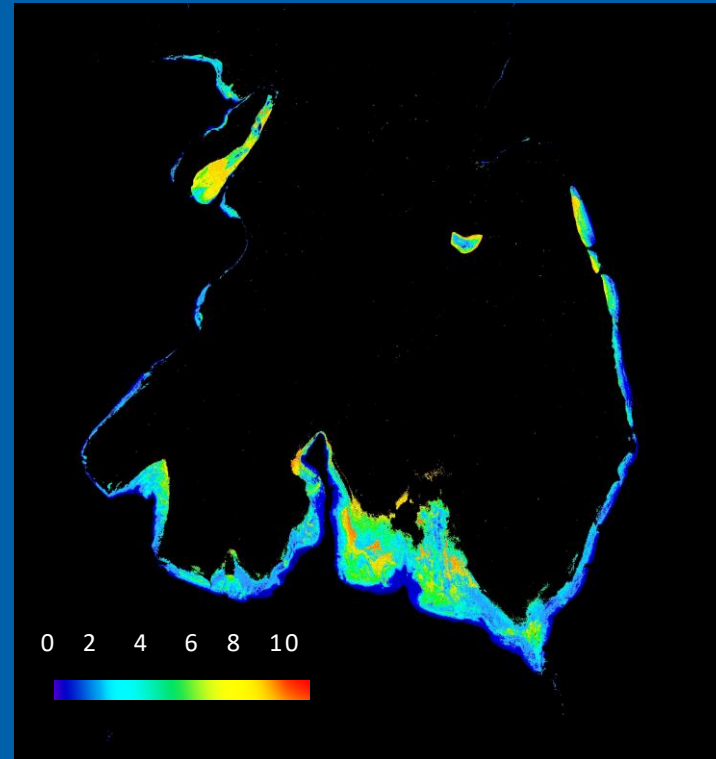
Estonian west coast. HySpex imagery



Sen2coral plugin for SNAP

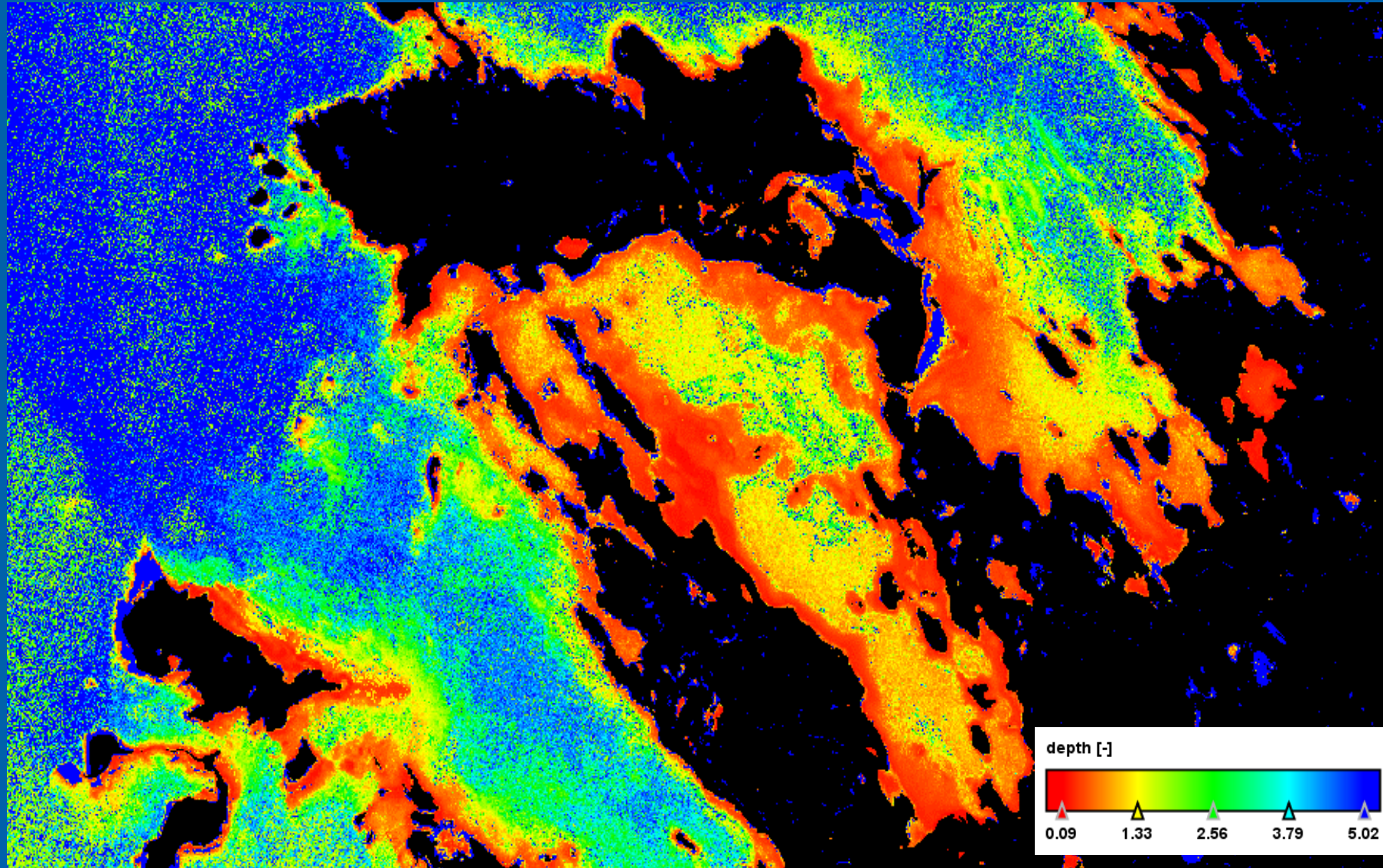


Lake Garda. Sentinel-2

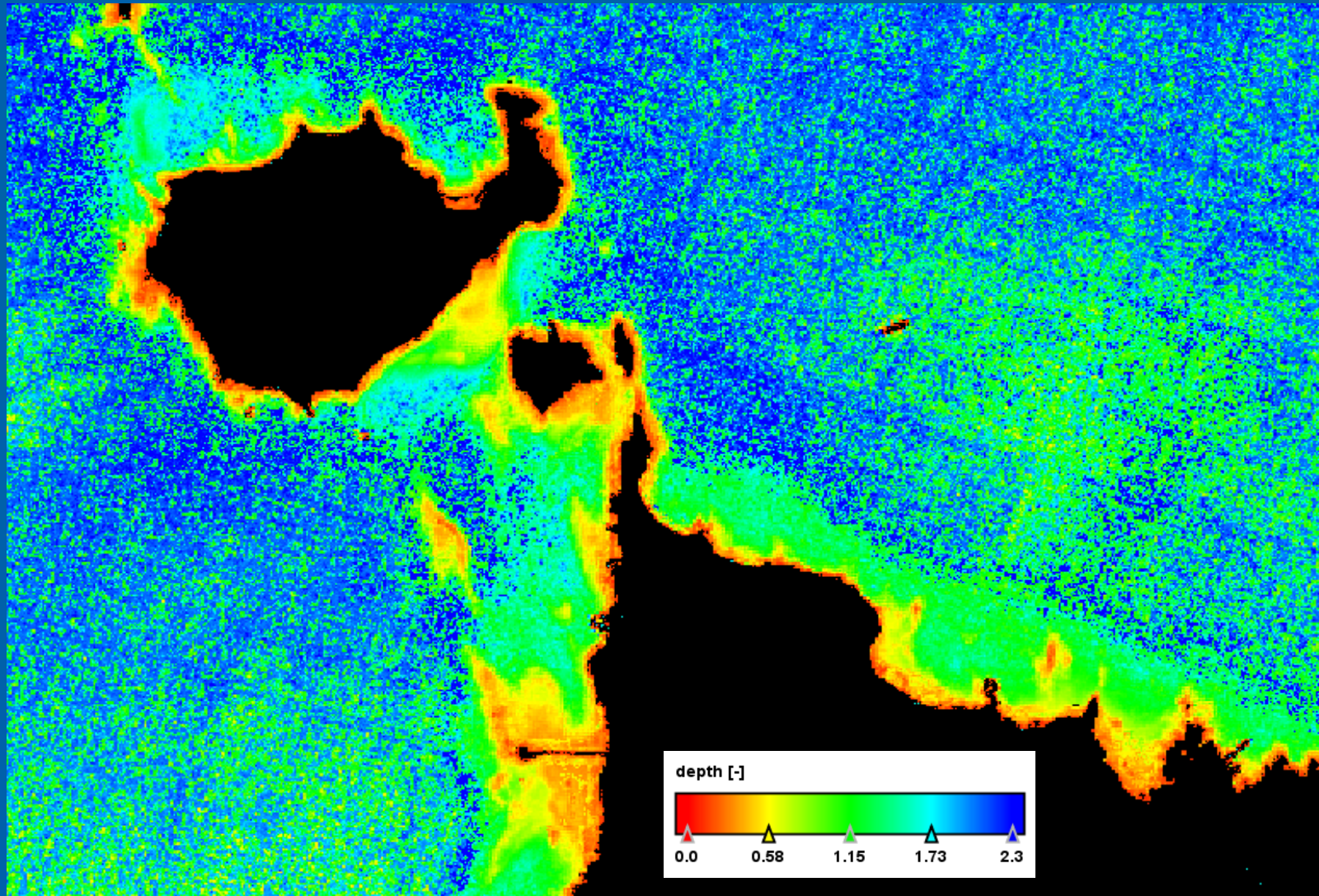


By Claudia Giardino

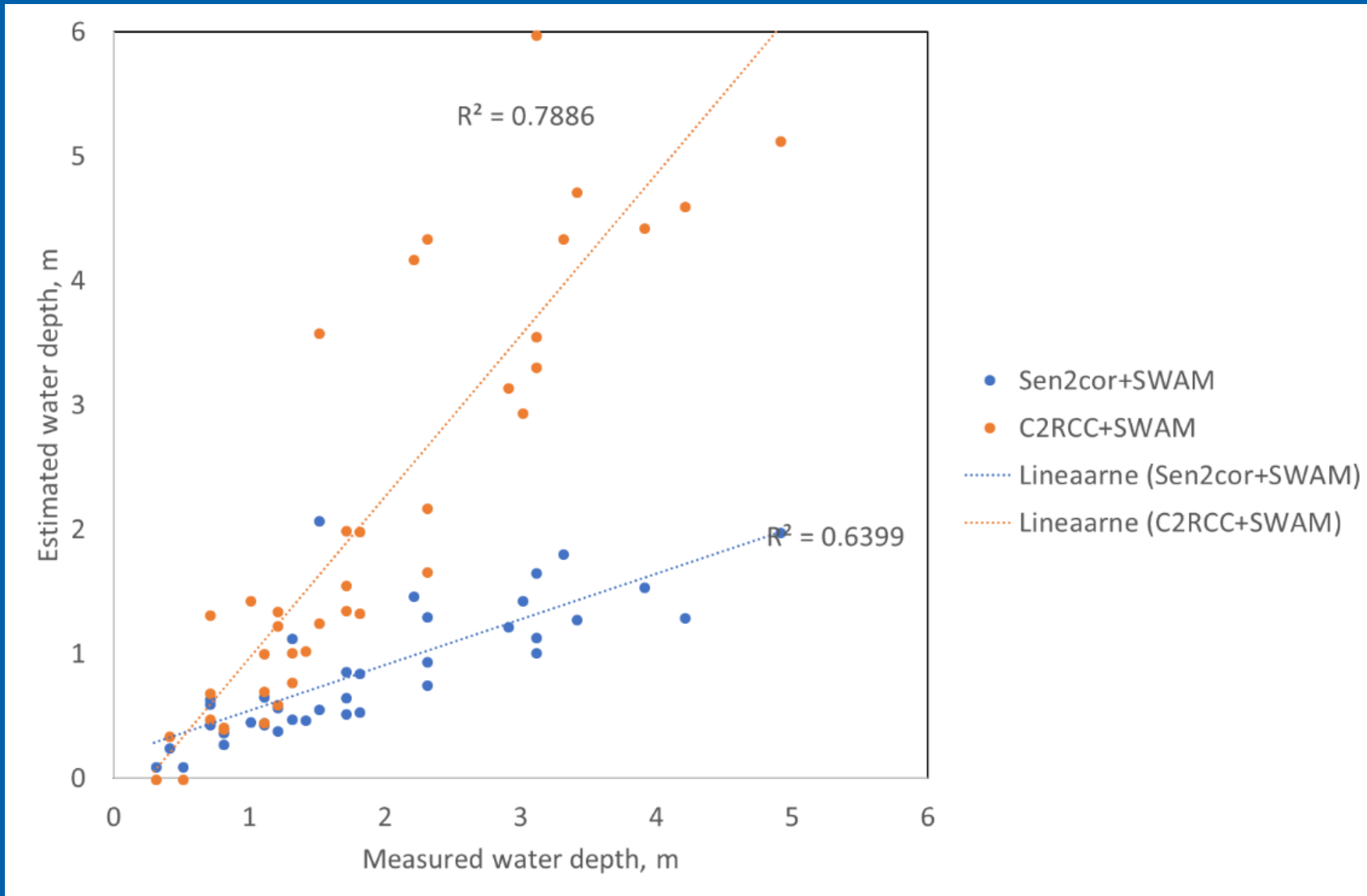
Estonian west coast. Sentinel-2



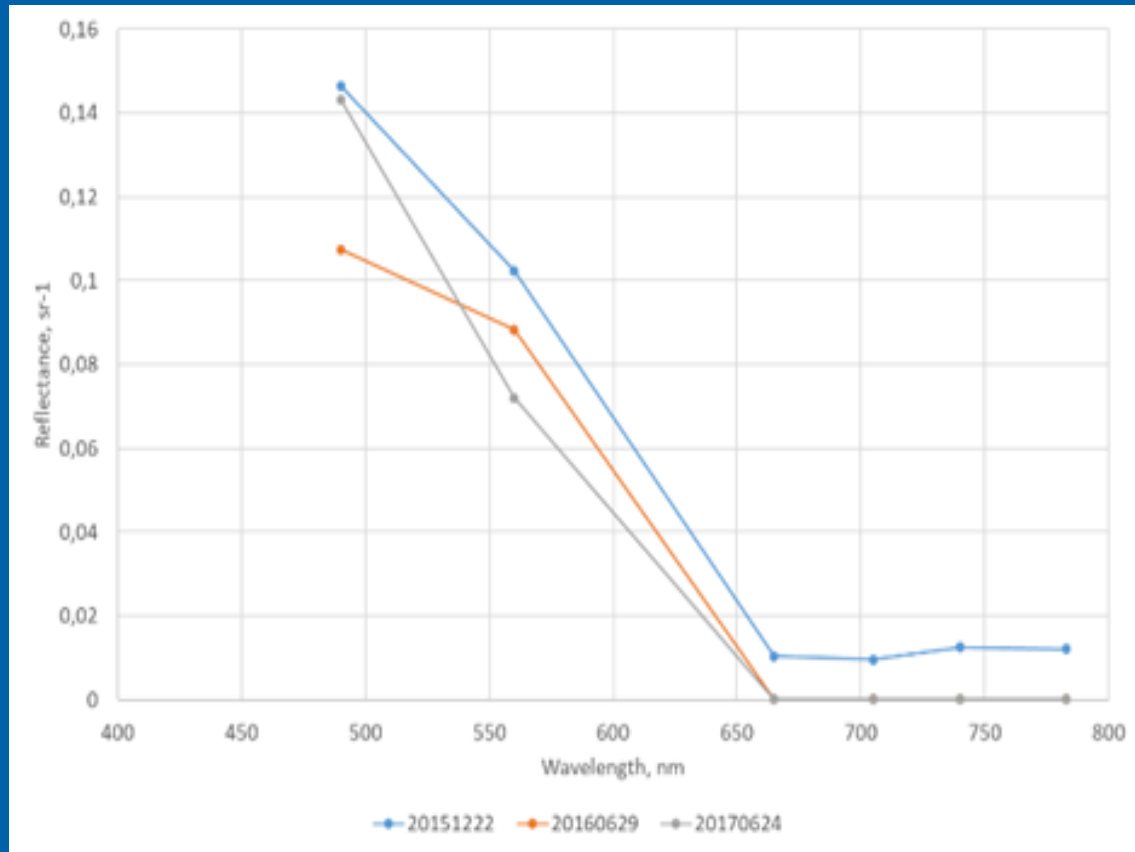
Estonian north coast. Sentinel-2



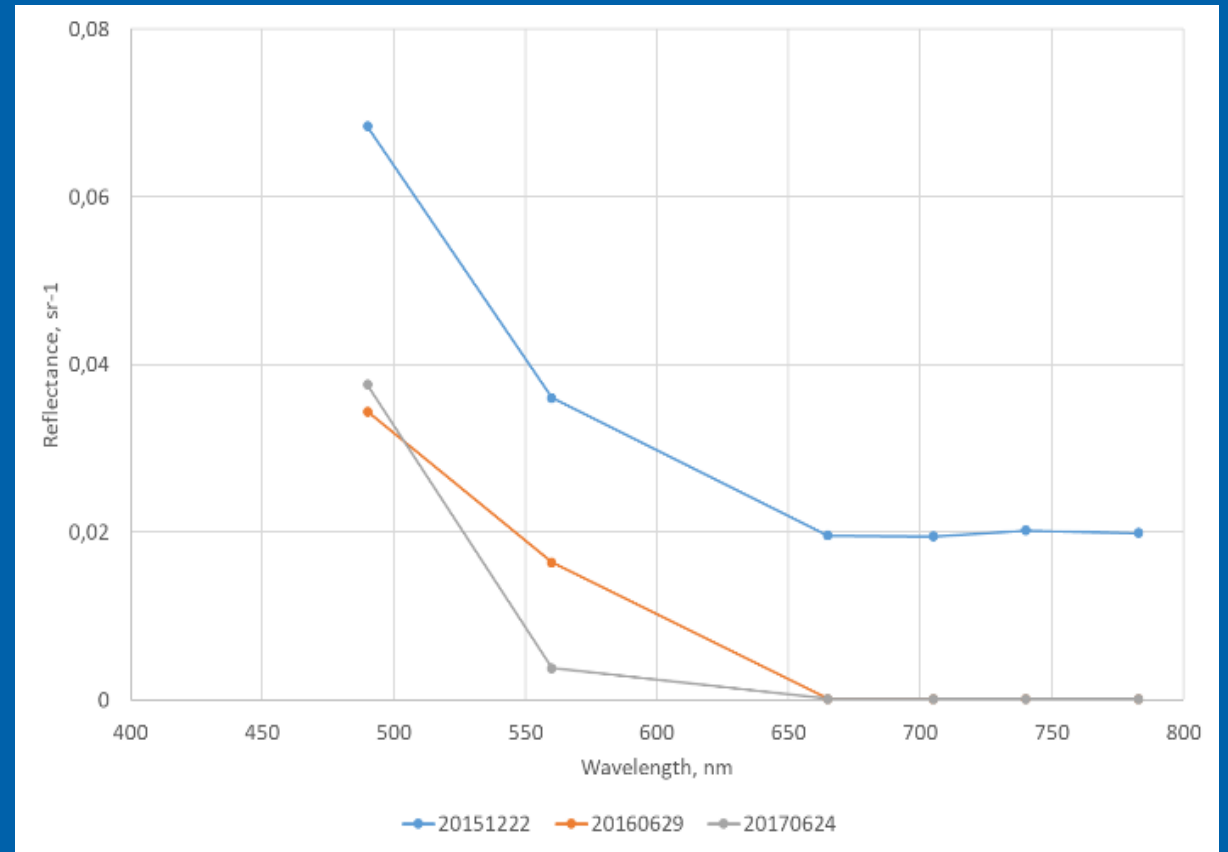
Impact of atmospheric correction



Impact of glint and atmospheric correction

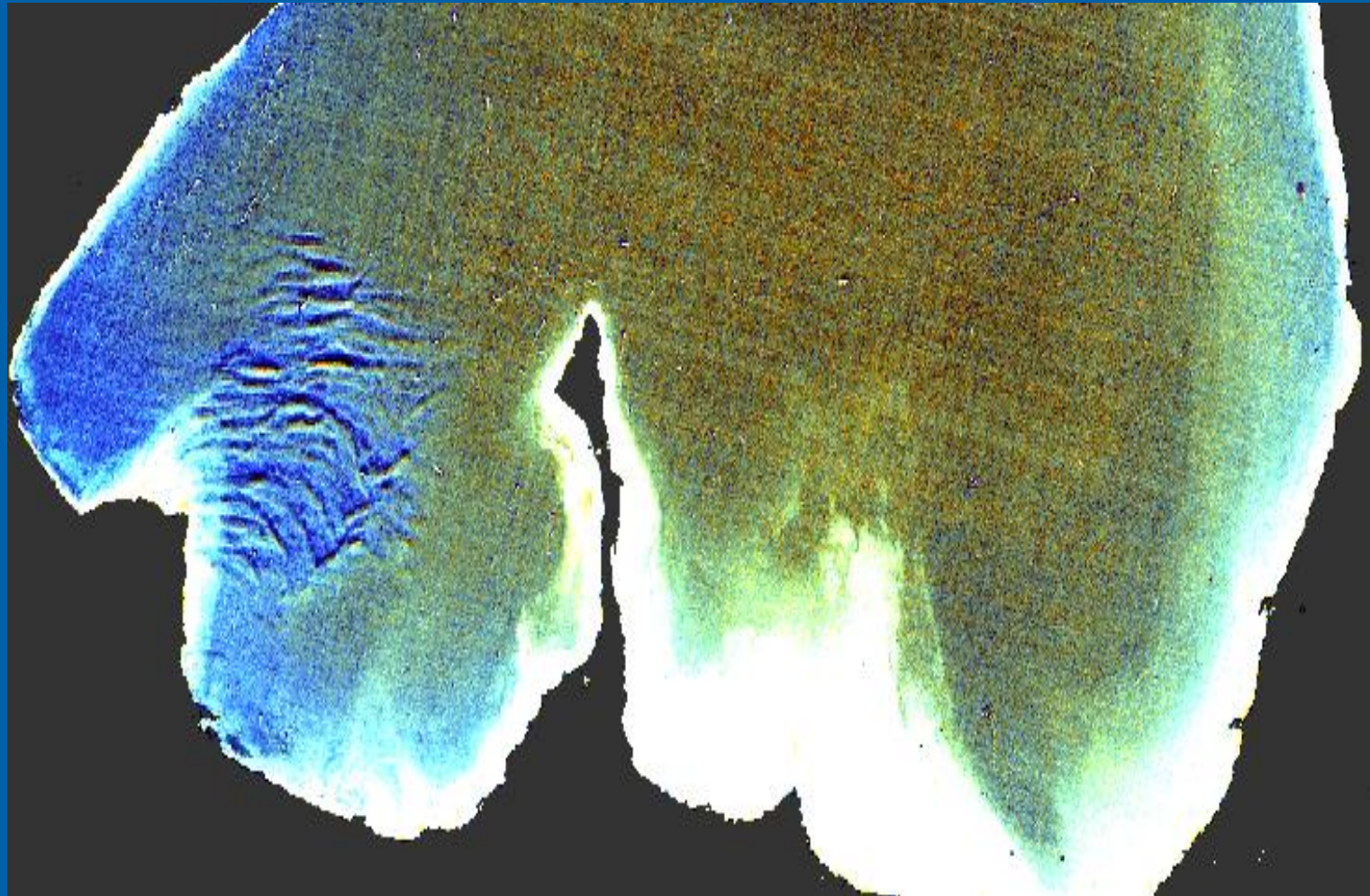


Bright sand in shallow water



Deep water

Impact of wind?



SDB for fish stock recovery



Some former bays potentially very good fish spawning sites

Fish likes vegetation, but not when it is reaching the surface

With remote sensing we should be able to recognise suitable areas

Validation tool





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Thank you for your attention!