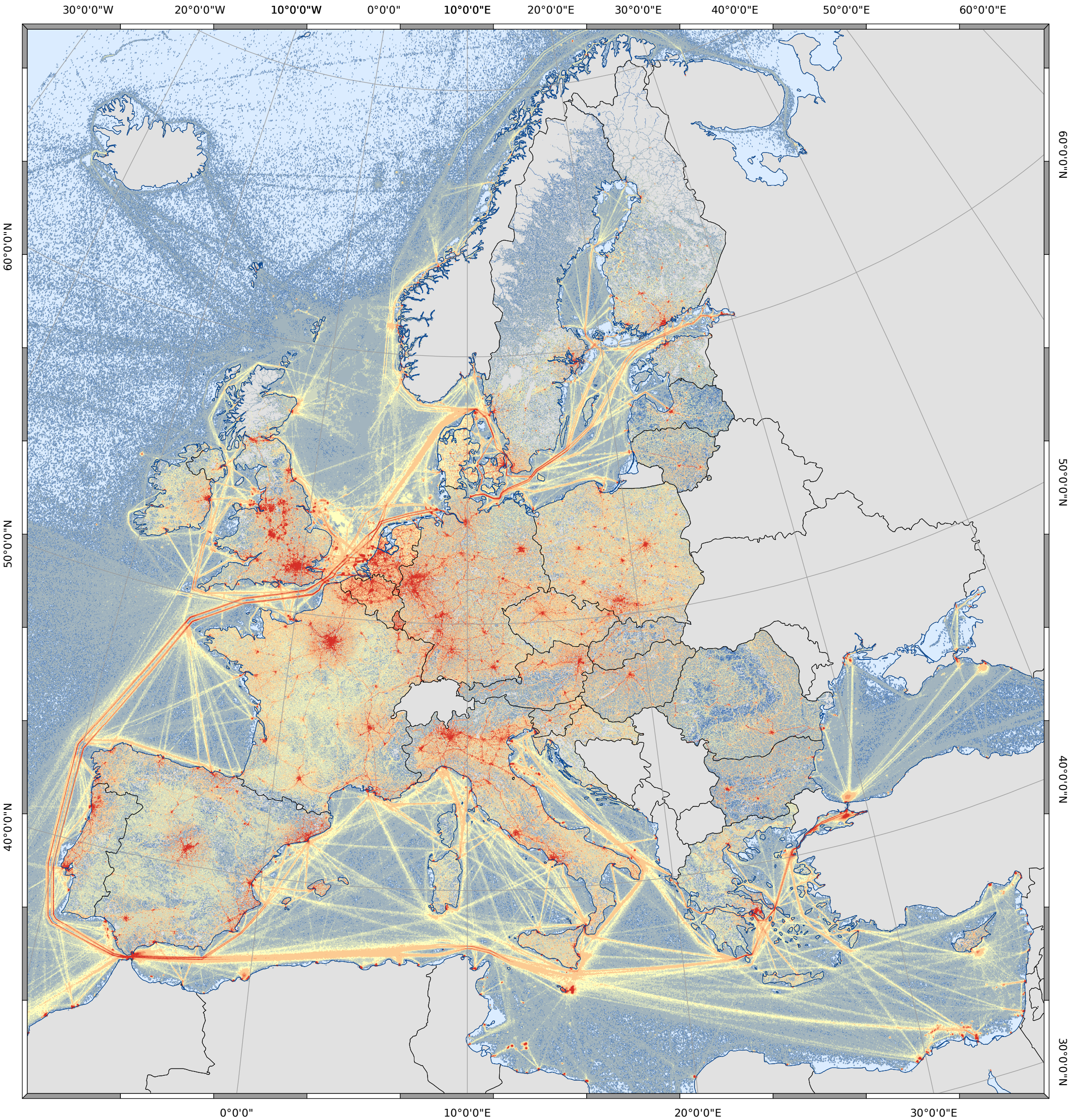
Spatial Distribution of NOx Atmospheric Emissions over Europe Year 2010

A. Alessandrini, D. Guizzardi, G. Janssens-Maenhout, E. Pisoni, M. Trombetti, M. Vespe
European Commission, Joint Research Centre, Italy



NOx Emissions [Tonnes] Year 2010

- < 0.01
- 0.01 - 0.2
- 0.2 - 0.5
- 0.5 - 1
- 1 - 4
- 4 - 7
- 7 - 10
- > 10
- No Emissions - Land
- No Emissions - Sea

MAP

The map shows NOx emissions in 2010, merging both shipping and land emissions. The map underlines the importance, from an air quality point of view, of shipping emissions over sea, that heavily contribute to total NOx emissions in some specific areas.

SHIPPING DATA

The data used for the spatial gridding of shipping atmospheric emissions are based on the Long Range Identification and Tracking system (LRIT), a space-borne real ship track system providing vessel position information in real time. LRIT in the European seas has virtually no spatial limitations and it is possible to reliably characterise vessel movements in wide areas since large merchant vessels do not change course at a high frequency rate, except in ports. Access to global LRIT data was granted by the National Competent Authorities for LRIT of States participating in the Cooperative Data Centre (CDC): all EU Member States, Iceland, Norway, and Overseas Territories of EU Member States. Every LRIT message is transmitted using satellite communications and includes vessel identification and position as extracted by on-board GPS measurements.

Map Projection: Lambert Azimuthal Equal Area (Datum ETRS1989)
Source Data: GAINS Total emissions per country
Year 2010
Country boundaries: Eurographics
Ancillary Data: LRIT
Spatial Resolution: 1 Km

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CONTACT DETAILS: marco.trombetti@ec.europa.eu

0 250 500 750 1,000 Km

EMISSION DATA

Ship emission values are retrieved from the EMEP database (Emission Monitoring and Evaluation Programme, under the Long Range Transboundary Air Pollution Convention of the United Nations Economic Commission for Europe). This database provides emissions data from international shipping activities and the data are provided per sea for several pollutants covering the whole European continent. Emissions from all the other economic activities, for the EU 28 member states over sea and land, are modelled data coming from the Greenhouse Gas and Air Pollution Interactions and Synergies Model (GAINS).

METHODOLOGY

The gridding methodology is based on estimates of the vessel density. The density of LRIT messages are computed assuming a uniform sub-sampling of the vessel trajectories every 6 hours. One year of LRIT data are used for the gridding of the annual emission inventories. The ship density is calculated as number of messages received throughout the year for each cell.
The downscaling process was implemented for each of the considered marine areas, because of the details in the emissions data. The analysis is implemented at 100m resolution and then resampled and shown at 1km resolution.