MapEIre

Spatial and temporal distribution of emissions is of great importance in order to be able to model concentrations of air pollutants and assess human exposure to air pollution. The MapEIre project has developed detailed emission mapping models for Ireland.

Spatial distribution

In the MapEIre project, a model has been developed, covering Ireland at a resolution of 1 km x 1 km, and covering 138 sectors and 32 pollutants. The model integrates official statistics and spatial information to produce the high-resolution emission maps. The official statistics include, but are not limited to, population census, animal census, transport statistics, and building heat demand. To achieve the best quality of the input data, Irish stakeholders, institutions and organisations have contributed and kindly provided knowledge and data to the project.

For each combination of sector and pollutant, a spatial distribution key (GeoKey) has been assigned. The development of GeoKeys are done using the best available spatial datasets. The datasets vary from being information on the exact location and emission or activity level of a source, e.g. a power plant, to a line theme, e.g. the road network and to a polygon theme, e.g. land parcels. Some of these spatial datasets are further combined e.g. land parcel information is combined with information on the density of animals. In other sectors point source information is combined with various polygon themes.

Where possible time-series have been prepared for the GeoKeys to take into account changes in spatial emission patterns over time.

The results from the model is an emission for each sector and pollutant for each km2 grid cell. The results can be visualised on maps, and an example for NO_x is shown in Figure 1.
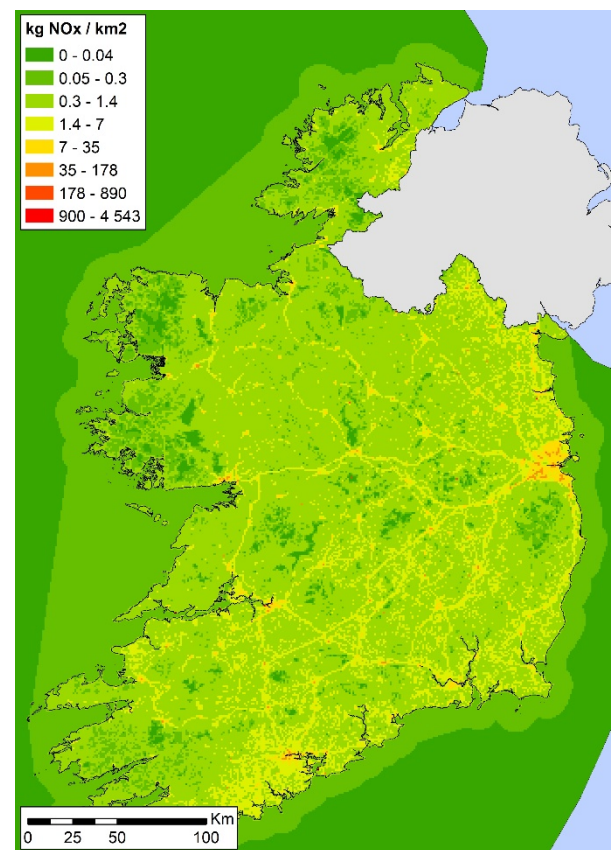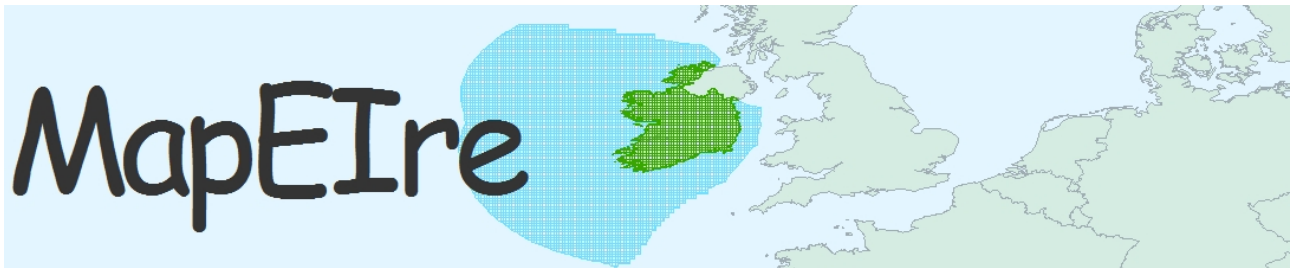

Figure 1 National total NO_x emissions in 2016

Further information, including downloadable results, is available from the project website **www.MapEIre.dk**

MapEIre

Temporal distribution

For each of the sectors and pollutants covered by the spatial model, temporal profiles have been developed. The temporal profiles are made at three levels: monthly, daily and hourly.

The temporal profiles have been developed using the best available data from statistics and studies carried out in Ireland or internationally. In cases where sufficient information was not available, expert judgements have been used to develop temporal profiles.

An example of a temporal profile for road transport with cars and heavy-duty vehicles is shown in Figure 2.
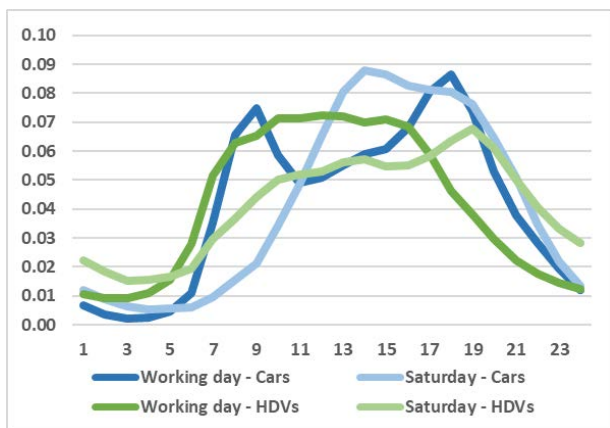

Figure 2   Hourly profiles for cars and HDVs

Dublin

As part of the project, a detailed case study was made for Dublin. The spatial resolution for Dublin was increased to 100 m x 100 m and calculations were carried out for NO_x, NMVOC, SO_2 and PM_{10}. An example of the results for NO_x emissions in Dublin is shown in Figure 3.
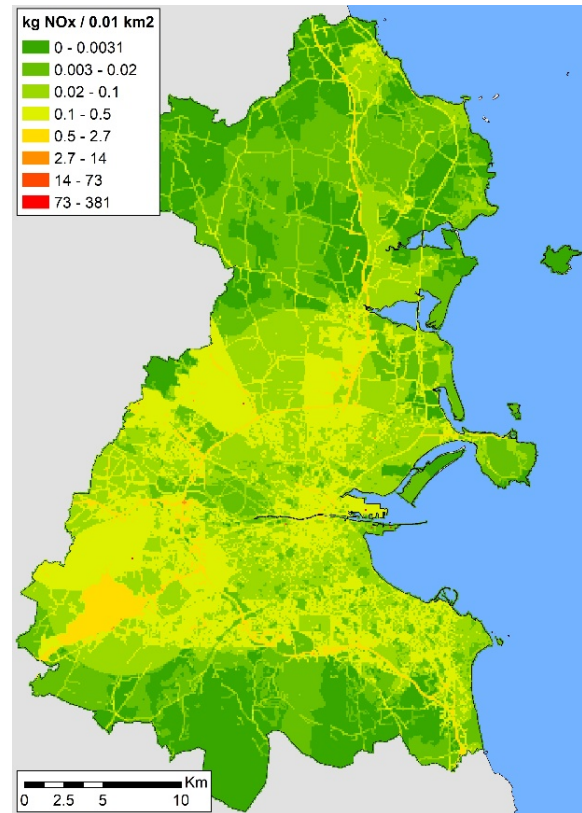

Figure 3   Dublin's total NO_x emissions in 2016

Acknowledgments

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