**Introduction**

Sea salt aerosols affect metallic structures. Offshore wind turbines are exposed to corrosive attack affecting their efficiency and their components' lifetime.

According to the specifications in ISO9226 and ISO9223, data on the corrosivity of the atmosphere are essential for the development and specification of optimized corrosion protection for manufactured products.

Since 1) there are only a few observations of atmospheric composition and 2) corrosivity determination tests need long exposition periods model systems can be a useful tool to assess corrosion conditions. This work demonstrates that air quality modelling systems such as CALIOPE can provide predictions of the atmospheric composition and meteorological conditions.

**Methods and evaluation**

Marine aerosol concentration in Europe is assessed by using the CALIOPE air quality modelling system (http://www.bsc.es/caliopo/). The system integrates the WRF-ARW meteorological model coupled with the CMAQv5.0.2 photochemical model. For this study, anthropogenic emissions come from the EURODETA trend exercise where annual totals are estimated by the GAINS model and spatialization and disaggregation are processed by the Institut National de l'Environnement Industriel et des Risques (INERIS).

The simulations are run for three years (Fig. 2): 1990, 2000 and 2010, which have been selected to represent typical periods of high (1990), normal (2000) and low (2010) wind speeds in the region of study (Northern Europe). Sodium, chloride and total sulfate aerosols are studied. A comprehensive evaluation of the model is performed using aerosol observational data from the EBAS database (http://ebas.nilu.no) for locations subjected to conditions similar to the marine atmosphere of the area of study (Fig. 3).

**Results**

This study has been motivated by the interest of EDP in assessing marine aerosol concentration in a specific location in Europe where a new wind farm is under consideration. For this specific location a comprehensive statistical characterization of marine aerosol concentration has been also provided.

**Conclusions**

- Given the scarcity of observations, and the cost of in-situ measurements, air quality modelling systems such as CALIOPE can provide an estimate of marine aerosol concentration in any location of interest.
- Differences between the marine aerosol concentration values of the three years can be attributed to differences in average wind speeds (Fig. 4). The study years have been selected as a comprehensive representation of the different wind scenarios Northern Europe can be subject to.
- A reduction in the concentration of sulfate aerosols is observed with the progress of the years due to the implementation of European directives reducing the sulfur content of fossil fuels (e.g. Directive 1999/32/EC).

**Future work:**

- Relate estimated aerosol concentrations with corrosive impact.
- Develop a global marine aerosol concentration atlas based on the NMME/BSC-CTM model (https://www.bsc.es/earth-sciences/nmmbsc-project).

**References**