

## Sea salt concentrations in the Netherlands from a European perspective

A.M.M. Manders, M. Jozwiecka and M. Schaap

TNO, Unit Environment, Health and Safety, PO Box 80015, 3508 TA Utrecht, The Netherlands

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### Introduction

It is known that particulate matter (PM) causes adverse health effects. Therefore, legislation for PM10 and PM2.5 becomes more and more stringent in Europe. Sea salt does contribute to the total concentration of PM. However, it cannot be influenced by measures and it is unlikely to cause adverse health effects. These are arguments that are used to subtract the sea salt contribution from total PM when the exceedance of the limit values for PM occur. EU legislation allows this.

In The Netherlands, sea salt contributes significantly to the PM concentrations on some days. The Dutch government has implemented a derogation guideline for sea salt. Here, we present an overview of recent sea salt observations, completed with model results. In our presentation, we compare the Dutch situation to other European countries and will discuss the implications of the newest findings for the derogation guideline.

### Methodology

There is a fairly limited but growing set of sea salt concentration observations. We will present the first extensive compilation of measurements of sea salt over Europe, originating from several countries and campaigns. The compilation is based on sodium observations. Both annual mean concentrations and time variability were investigated to give an overview that is as complete as possible.

To further complete the picture, sea salt concentrations were modelled with the LOTOS-EUROS model (Schaap et al 2008). The modelled concentrations were compared to the observations and showed good agreement, with a good time correlation but with a structural overestimation for the PM10 fraction. The overestimation is within the uncertainties of the parameterizations of the sea salt source function. When a scaling factor is used, based on the measurements, the model results can be used to describe the concentrations over Europe.

### Results

The results (Figure 1) show that sea salt concentrations in the Netherlands are comparable with other coastal areas (Denmark, Northern Germany, Belgium). Annual mean concentrations are about  $4 \mu\text{g}/\text{m}^3$  close to the coast (Rotterdam area) to  $2 \mu\text{g}/\text{m}^3$  at 200 km land inwards.

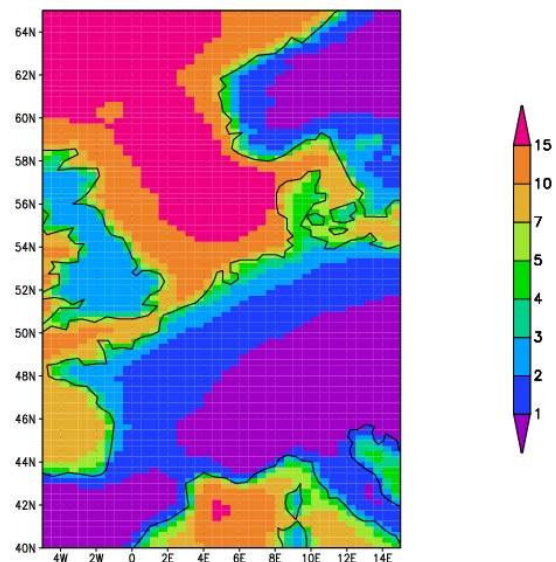


Figure 1 Scaled modelled annual mean sea salt aerosol concentration in PM10 in  $\mu\text{g}/\text{m}^3$

The sea salt concentrations are highly variable. On individual days, concentrations near the coast may be up to  $16 \mu\text{g}/\text{m}^3$  (Rotterdam) to  $10 \mu\text{g}/\text{m}^3$  land inwards. These high concentrations occur for strong winds from the sea, bringing relatively clean air. In contrast, in cases for which PM10 threshold levels are exceeded, winds are generally from over land. Therefore, the sea salt concentrations are in general negatively correlated with total PM10 and the contribution to PM10 limit value exceedances is very small.

### References

Schaap, M. et al. (2008) Int. J. Environment and Pollution, Vol. 32, No.2