



The contribution of sea salt aerosol to PM₁₀ in the Netherlands and a methodology to correct the annual PM₁₀ concentration and number of PM₁₀ exceedance days for sea salt aerosol.

H. Denier van der Gon (1), J. Matthijsen (2), M. Schaap (1), H. van Jaarsveld (2) and R. Hoogerbrugge (3)

(1) TNO Built Environment and Geosciences, Apeldoorn, The Netherlands

(2) Netherlands Environmental Assessment Agency (MNP), Bilthoven, The Netherlands

(3) National Institute for Public Health and the Environment (RIVM), Bilthoven, The Netherlands

(hugo.deniervandergon@tno.nl / Fax: +31 55 5493253 / Phone: +31 55 5493267)

The Netherlands is among the EU-25 countries that presently cannot comply with the current EU limit values for particulate matter (PM₁₀). Recently, the EC has indicated that the ambient PM₁₀ concentrations may be corrected for natural contributions. Sea salt (SS) aerosol is of natural origin and the dominant aerosol mass component in marine areas and may contribute significantly to the PM₁₀ mass over the continents, especially at coastal locations. Due to its geographical location the Netherlands receive considerable amounts of SS aerosol. Hence, it is in the interest of the Netherlands to investigate the SS contribution to annual average ambient PM₁₀ concentrations as well as the contribution of SS on PM₁₀ exceedance days. We collected available SS aerosol data to derive the average SS contribution to PM₁₀ by location and wind direction for the Netherlands. We estimated that – based on available observations – the annual average SS contribution to PM₁₀ varies from 7 $\mu\text{g}/\text{m}^3$ at the coast to $\sim 3 \mu\text{g}/\text{m}^3$ at the eastern border of the Netherlands. The pattern over the Netherlands is approximated by using the chemical composition of precipitation as monitored at Dutch meteorological stations resulting in a gridded concentration map that can be used to correct measured annual average PM₁₀ concentrations. Next, an analysis is

made of the relationship between SS aerosol and exceedance of the PM10 limit value of $50 \mu\text{g}/\text{m}^3$ (24-h average) for two locations in the Netherlands; a coastal station and an inland station located near the Eastern border. The estimated average daily sea salt contributions at the coastal location and the inland location are $5.1\text{-}12.2 \mu\text{g}/\text{m}^3$ and $2.5\text{-}6.1 \mu\text{g}/\text{m}^3$, respectively. However, the estimated contribution at PM10 exceedance days for the coastal location and the inland location was $3.1\text{-}7.5 \mu\text{g}/\text{m}^3$ and $2.0\text{-}4.8 \mu\text{g}/\text{m}^3$, respectively. The contribution at PM10 exceedance days is relatively low because sea salt does not correlate with high PM10 concentrations. These results could be used to develop a preliminary methodology to correct the annual number of PM10 exceedance days for SS aerosol which is currently applied in the Netherlands. Correction of the PM10 data for sea salt reduces the number of exceedance days by 10-25% depending on the year and location.