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Relation between Particulate matter (PM10) and Aerosol Optical Thickness based on weather types

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The abundance of very small particle, i.e., particle matter (PM10) concentration, is one of the major indicators of air quality and is therefore subject to ground-based measurements. Remote sensing measurements of aerosols provide maps of aerosol optical thickness (AOT), which is related to particle abundance. This work investigates the possibility of retrieving the PM10 concentration from AOT, at hourly values. We used a data set where measurements of the air quality networks are combined with ground-based measurements of AOTs. It is found that a linear model fails at accurately retrieving the PM10 but that the model performance may be significantly improved by conditioning such a linear relationship with auxiliary parameters, such as meteorological variables.
We have found that for a given region, meteorological situation classification in weather scenarios is a pertinent approach for building a relation (PM10,AOT). Each type of weather scenario gives accurate particle matter (PM10) concentration retrieval from AOT. The interest of taking into account the weather type as a supplementary variable in the relationship (PM10, AOT) appears clearly.

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