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Forecasting the weather
- ensemble techniques
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Seasonal Characterisation of Tropospheric Ozone and Water Vapour Accumulation Cycles in the Mediterranean Basins

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The Mediterranean Sea acts as a source of heat and moisture for the surrounding regions, but not only because it is a closed and warm sea. The Mediterranean Basin is located in the mid-latitudes (i.e. high solar isolation), and it is almost completely surrounded by mountains.
The determination of the main atmospheric accumulation mode and its seasonal variability is a relevant issue for integrating some of the feedbacks driving climate change, e.g., precipitation regimes, secondary pollutant production, ventilation conditions, etc.
This study is based on a numerical methodology to analyse non-steady principal harmonics in noisy meteorological time series. The methodology combines both the continuous wavelet transform and the development of a parametric model that includes the time evolution of the principal and most statistically significant harmonics of the original time series.
The study focuses on the tropospheric ozone and the total water vapour accumulation cycles found on the Mediterranean Basin throughout the year. The data used in this study come from the most recent EOS satellite missions (specifically, time series of water vapour data measured by the MODIS instrument on board the TERRA, EOS AM-1, satellite) and the regional air quality surveillance network.
Annual evolution and seasonality of the total precipitable water column and tropospheric ozone are analysed. After carrying out the parametric reconstruction of the time series, we have obtained their statistically significant principal harmonics, related them to different atmospheric recharging periods (identified as water vapour accumulations) and calculated the seasonality of the different accumulation cycles.
Results are in good agreement with previous short-term field campaigns and mesoscale modelling studies which used atmospheric tracers of opportunity to estimate the vertical recirculation times in the Western Mediterranean Basin.

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