Spatiotemporal characterization of very long dry spells in the Mediterranean region

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Mediterranean winter precipitations (September to April) are important for annual water resources, summer ground moisture, vegetation and agriculture. Decrease of precipitation during this season may cause many important economic and social impacts.

The study focuses on the identification and variability analyze of very long dry spells (VLDS) in the Mediterranean region, relying on observations. E-obs Data grid from ECA&D are used to 0.25° spatial resolution to the 1957-2013 period. ERA-40 (1957-1979) and ERA-Interim (1979-2013) reanalysis data from ECMWF are then used to associate different and oceanic forcings to the very long dry spells events.

76 events are detected throughout the Mediterranean Basin for a total duration of 4423 days (33% of the 13364 studied days). Clustering analysis was applied to the 76 events and have detected 5 cluster. Cluster 1 (called North-West Mediterranean) regroups 13 VLDS events who's mainly located in the Iberian Peninsula and France. Cluster 2 (Generalized) regroups 23 events who's dispersed throughout the entire Mediterranean Basin. Cluster 3 (West-Mediterranean) regroups 5 events VLDS events who's mainly located in the Iberian Peninsula and Maghreb countries (Morocco and Algeria). Cluster 4 (North-East Mediterranean) regroups 11 events who's mainly located in the Balkan region. The last cluster (South-East Mediterranean) regroups 24 events mainly located on the Middle East. All the events are associated with anticyclonic conditions, except events of the cluster 5 (South-East Mediterranean), who's associated with heat low conditions.

This study also assesses the ability of regional climate simulations performed within the context of the HyMeX (Drobinski et al. 2014) and MED-CORDEX programs (Ruti et al. 2015) to represent the spatio-temporal characteristics of very long dry spells, to the 1979-2009 period.

CCLM4, LMDZ4 and LMDZ4NEMOMED8 strongly overestimate the duration of VLDS in Middle East and Anatolia. Globally, the 5 studied models overestimate the special extension of the VLDS events compare to the E-OBS data.