



The characteristics of cyclones in the Mediterranean region and their link to precipitation and sea level anomalies

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This presentation describes the cyclones in the Mediterranean region considering a set of 14 different cyclone tracking methods, which contributed to the IMILAST project. Results confirm that the Mediterranean region is characterized by very intense cyclonic activity at global scale when counting the number of individual cyclones, which, however, in general have higher central pressure minima and shorter duration than cyclones in the Northern Hemisphere. Mediterranean spatial features consists in two main branches (one crosses the region along the southeastward direction, another enters the central part of the basin from south-west) and areas of strong activity in the Levantine basin, in the North Aegean Sea, the Black Sea and the Fertile Crescent. The annual cycle of the frequency of cyclones in the Mediterranean region has a main maximum in April and a flat minimum from June to October, which results from the superposition of secondary maxima with slightly different timing in different areas inside the region. Most of cyclones crossing the Mediterranean region are generated inside it, in several relatively well defined areas where cyclogenesis frequently occurs. The Atlantic, and to considerably lower level, the Western North Africa, represent the main external sources of cyclones. Recent trends of cyclone numbers in the 1979-2008 period are negative in spring and positive in summer, with those two tendencies compensating each other so that there is no significant long-term trend at annual scale.

Mediterranean cyclone have important roles on the environment, particularly on intense precipitation. When precipitation occurs in the north-western Mediterranean, cyclones are generally either of Atlantic origin or secondary cyclones associated with the passage of major cyclones north of the Mediterranean basin, while they are mostly generated inside the region itself for events at the eastern Mediterranean coast. An important fraction of intense precipitation events in the southern areas are produced by cyclones that are generated over northern Africa. Cyclone depth, circulation strength, surrounding synoptic condition, and speed of the cyclone center are important characteristics for producing intense precipitation events. Further, positive and negative large sea level anomalies along the coast of the Mediterranean Sea are linked to intensity and position of cyclones moving across the region. Atlantic cyclones are associated with positive sea level anomalies in the western Mediterranean when they enter in the basin and negative anomalies at several coastal locations as they continue moving along the Mediterranean storm track. Western Mediterranean cyclogenesis are associated with positive sea level anomalies along most of the coastline, and are strongly linked to negative anomalies along the north-western coast.