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The Eastern Mediterranean Transient in relation to atmospheric circulation dynamics

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A major shift in deep water formation in the Eastern Mediterranean from the southern Adriatic Sea to the Aegean Sea at the beginning of the 1990s is known as the Eastern Mediterranean Transient (EMT). Several mechanisms for this event have been proposed: reduced input of freshwater by rivers into the Mediterranean, strong anomalies in regional weather patterns, and changes in the large-scale atmospheric circulation. Concerning this latter aspect, different mechanisms might be operating: long-term trends in major atmospheric circulation regimes on the one hand, or rapid changes in the preferred mode of particular circulation patterns on the other hand. A prominent example for the former case is the recent trend of the last decades towards positive values of the North Atlantic Oscillation (NAO) index which, however, is not able to account for the discontinuity of the EMT event. But there are other circulation patterns derived as coupled modes with Mediterranean precipitation anomalies showing time-consistent changes in relation to the EMT event: i) a large-scale pattern significantly linked to the East-Atlantic (EA) pattern during winter time, revealing a shift around the early 1990s towards that mode which implies preferred northerly components in the air flow above the eastern Mediterranean; ii) still more pronounced is a similar shift around 1990 in the so-called Mediterranean Meridional Circulation (MMC) pattern further contributing to the wind stress anomalies linked with the EMT. Thus, large-scale atmospheric circulation dynamics in terms of rapid shifts in preferred modes of particular circulation patterns might be decisive for prominent ocean-events like the EMT.