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Atmospheric Forcing of the Eastern Mediterranean Transient by Midlatitude Cyclones

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Hydrographic observations indicated a shift of the main deep water formation in the Mediterranean Sea from its usual location in the Adriatic Sea to the Aegean Sea during the late 1980s and early 1990s, during winters 1991/1992 and 1992/1993. This event is known as the Eastern Mediterranean Transient (EMT). We report here a connection between EMT and specific atmospheric conditions which created anomalously large buoyancy fluxes from the Aegean Sea during winters 1991/1992 and 1992/1993 (the "enhanced EMT winters"). We use newly available, state of the art datasets with high space and time resolution and show that atypical cyclonic activity in the central Mediterranean versus the eastern basin produced the enhanced atmospheric forcing which intensified the EMT. An abatement of the frequency of cyclones in the central Mediterranean during 1992/1993 drastically reduced the northward advection of warm air over the Aegean Sea compared to more typical years, while an increase in the frequency of cyclones in the eastern Mediterranean enhanced the southward advection of cold air over the Aegean Sea, especially during 1991/1992. These changes significantly increased buoyancy flux losses from the Aegean Sea during the enhanced EMT winters, intensifying deep water production.