



Interannual variability of the air-sea heat exchange in the western Mediterranean in relation to the deep-water formation processes

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A 60-year long time series of heat fluxes (long and short wave radiation, sensible and latent contributions) from NCEP reanalysis dataset and a 22-year long time series of Sea Surface Temperature (SST) from JPL AVHRR Oceans Pathfinder dataset have been combined to study the seasonal and interannual variability of air-sea heat exchanges over the Mediterranean Sea and correlate them with the characteristics of the Mediterranean outflow through the Strait of Gibraltar collected in the frame of the INGRES projects in the last years. Special attention has been devoted to the historically reported deep-water formation basin of the Western Mediterranean (Gulf of Lions) during the pre-conditioning (November and December) and winter seasons. Until around 1970, no clear trend is found in the net heat flux winter series since positive and negative anomalies are observed alternatively. From then onwards, negative anomalies are frequently observed until the 2003-2006 positive events. A net heat loss of about 150 W/m² is observed in 2005, the highest value since 1956, especially due to evaporation losses towards the atmosphere. The anomalously cold air and sea surface temperature in the area help to increase this contribution that reflects in a higher fraction of Western Mediterranean Deep Water (WMDW) in the outflow through the Strait.