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HyMeX - Evaluation of the heat and water fluxes over the Mediterranean using observed estimates and regional climate models.

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The Mediterranean Sea is a semi-enclosed marginal sea and provides an unique opportunity to investigate hydrological mechanisms, heat and freshwater budgets. The Mediterranean sea can be considered as a thermodynamic machine which exchanges water and heat with the Atlantic Ocean trough the Strait of Gibraltar and with the atmosphere through its surface. Over long period of time, the Mediterranean basin loses water and heat through its surface, those losses are compensated by a net water and heat transport through the Strait of Gibraltar. The surface heat and water budgets are strongly influence by the physical characteristics of the Mediterranean sea: complex orography, strong land-sea contrast, land-atmosphere coupling, regional winds, cloud-radiation interaction, air-sea coupling, relative importance of the river inflow, Gibraltar Strait constraint and complex ocean bathymetry and are partly driving the Mediterranean Sea water mass formation and therefore a large part of its thermohaline circulation. Estimation and modelling the mean behaviour, the interannual variability, the extremes and the trends of the heat and water budget over the Mediterranean sea is a key issue within the HyMeX project. Available observed estimates of the different components of the heat and water budget over multi-decadal timescale are used to define the best estimate over the Mediterranean sea. Those different datasets are estimated using satellite or in-situ measurements and are coming from: NOCS, ISCCP2, AJONC, HOAPS-G, OAFLUX, IFREMER, Stanev et al. 2000, Ludwig et al. 2009. Those numerous dataset give us inside information about the uncertainty and weakness associated with the different dataset but also about their interannual variability. In recent years, numerous Regional Climate Model (RCM) or Atmosphere-Ocean Regional Climate Model (AORCM) simulations were performed over the Mediterranean region within the framework of the FP6-ENSEMBLES or FP6-CIRCE projects respectively. Currently, newly Regional Climate System Models (RCSM) are developed within the framework of the HyMeX and MedCORDEX projects. All those set of simulations are driven by reanalyses (ERA40 and ERAinterim) and are reproducing the past climate over the reanalyses period. The simulated heat and water budgets are study and evaluated in regard to the observations datasets in line with the added value gained with the different model configuration, setting, coupling, nudging.