

Global ocean surface latent heat flux trends during 1958-2012

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Latent heat flux (LHF) plays a critical role in the climate since it relates to the heat and water vapor supply from the ocean to the atmosphere. Investigating the trends of LHF is helpful to explain and evaluate the climate change. In this work, the National Centers for Environmental Prediction / National Center for Atmospheric Research (NCEP/NCAR) reanalysis product and the Objectively Analyzed air-sea Fluxes (OAFlux) are used to study the LHF trends during the period of 1958-2012. Besides, the reasons for the LHF trends are investigated by linearizing the bulk flux formula and examining the trends of LHF-related parameters (i.e. surface wind speed, surface saturation humidity and surface specific humidity). Three remarkable structures of the LHF trends caused by different reasons are identified: 1) The LHF is enhanced along the path of the primary subtropical and mid-latitude western boundary currents (WBCs, i.e. Kuroshio Current, Gulf Stream, Agulhas current, Eastern Australian Current and Brazil Current) and their extensions on the magnitude of 5~9 W/m² per decade, which is induced by the enhanced warming of sea surface temperature over the WBCs. 2) The LHF is reduced over the tropical and subtropical eastern Pacific on the magnitude of 4~7W/m² per decade, which is primarily induced by the decelerating surface wind speed that might be associated with a strengthening Walker Circulation. 3) The LHF is reduced over the northern tropical Atlantic on the magnitude of 2~4 W/m² per decade, which is induced by the increasing surface specific humidity as a result of the convergence of near surface atmospheric water vapor.