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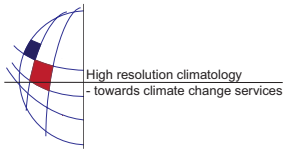

A linkage between freshwater discharge into the Gulf of Guinea and summer climate variability in the Mediterranean: a preliminary study

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The effect of Gulf of Guinea (GG) SST on the intensity of West African Monsoon (WAM) has been widely examined in the last decades, and the key role played by its variability has been assessed. Besides, according to some recent studies, WAM and the Mediterranean summer climate are strongly linked by mutual connection, with the former influencing the latter and the other way around.
Among the multitude of factors contributing to the inter-annual variability of SST in the GG, the continental freshwater inflow is probably the least investigated. The Gulf collects a huge quantity of freshwater due to discharge from several rivers. Every year, the Congo River alone releases 1270 km3 of freshwater into Tropical Atlantic (the second-largest flow in the world second only to the Amazon River), and the Angola Current transports this water to the GG. The secondary peak discharge affects the summer SST, that is the time of the year with the highest variability. An anomalously large flow inhibits the coastal upwelling, resulting in a heating of the GG, while low peak discharge amplifies vertical mixing and consequently SST drops.
Using the CCSM4.0 fully coupled model, with SST along the southwestern African coast prescribed to observed values, we performed a few experiments to demonstrate the effect of freshwater inflow into the ocean. The restoring allows a better representation of the processes involved and the feedbacks generating by the tuning of river discharge. The continental freshwater inflow acts on the SST, whose variation influences the strength of WAM and eventually the summer climate variability in the Mediterranean region.
These implications should be taken into account in the assessment of impact management and adaptation strategies, since the area is strongly susceptible to heat waves and prolonged droughts.