PRECIPITATION SENSITIVITY TO REGIONAL SST IN A HIGH RESOLUTION CLIMATE MODEL DURING THE WEST AFRICAN MONSOON.

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A 10-year (1983-1992) atmospheric simulation has helped to understand interactions between atmosphere, ocean, continental surfaces and hydrologic processes over West Africa (27°W-16°E, 5.5°S-27°N) where land and sea surfaces are approximately equal. Preliminary results show the sensitivity of precipitation derived from a regional climate model (RCM) to sea surface temperature (SST) during the monsoon. We compare results from three simulations of the years 1983 and 1984, considered the driest for West Africa during the 1951-1998 period. Two experiments are simulations of the years 1983 and 1984 initialized and forced with ECMWF reanalysis data. A third experiment is a hybrid simulation of 1983; it is the same as the first simulation except that the SST field is taken from the 1984 ECMWF. In this way, meteorological forcing fields at the boundaries are unchanged and only ocean surface conditions are modified.

Considering the two realistic experiments in comparison with observations, the RCM MAR (Modèle Atmosphérique Régional), running at a horizontal resolution of 40 km, can simulate the West African monsoon with its interannual variability and also the seasonal cycle with installation phase, the high rain period with abrupt northwards shift, and the southward retreat phase.

SST effects are analyzed by comparing the standard and hybrid simulations of 1983. The precipitation pattern obtained with the simulation of the year 1983 using the warmer SST of 1984 presents more similarities with the precipitation pattern of the year 1984 than with the one of 1983 in the standard experiments. SST at the regional scale then appears to be a major factor of the interannual monsoon flow variability. In particular, the increase of precipitation along the coast is associated with an increase of equivalent water content (EWC) in the low layers of the atmosphere. The warmer SST then induces larger evaporation flux and higher level of EWC. Southern advection of the monsoon flux then transports the water to the continent, and an increase of precipitation is obtained especially in the coastal zone.

OCEANIC PARTICULATE ORGANIC CARBON: AS SEEN WITH A WOCE GLOBAL SNAPSHOT

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A global set of transmissometer data has been collected during 17 WOCE expeditions (1991-1994) and several other large-scale hydrographic programs. These data include basin-wide transects in the North and South Atlantic, North and South Pacific, Indian, and Southern Oceans. Data were converted to Particulate Organic Carbon (POC) concentration using the beam attenuation:POC relationships derived earlier by our group during several studies. The POC distribution was analyzed for the entire water column as well as for the upper 500 m and basin-wide POC assessment presented. The large-scale phenomena like El Niño (1990-1995) events in the Pacific or high productive area in the Southern Ocean could be clearly seen in the POC sections. These data provide many opportunities to explore the relationship between facets of marine bio-optics, POC distribution and hydrographic conditions. A few of the topics we are pursuing include:

1. The relationship between mixed layer depth (MLD), hydrography, the distribution of POC and depth of POC maxima and minima.
2. The integrated stock of POC in the euphotic zone.
3. The standing stock of POC integrated to the depth to which ocean color sensors receive signals compared with the total integrated stock of POC in the euphotic zone (or the depth to "background" POC).
4. Prediction of POC based on various products of ocean color.