Tropical-Atlantic biases of the HiGEM CGCM and their dependence on horizontal resolution

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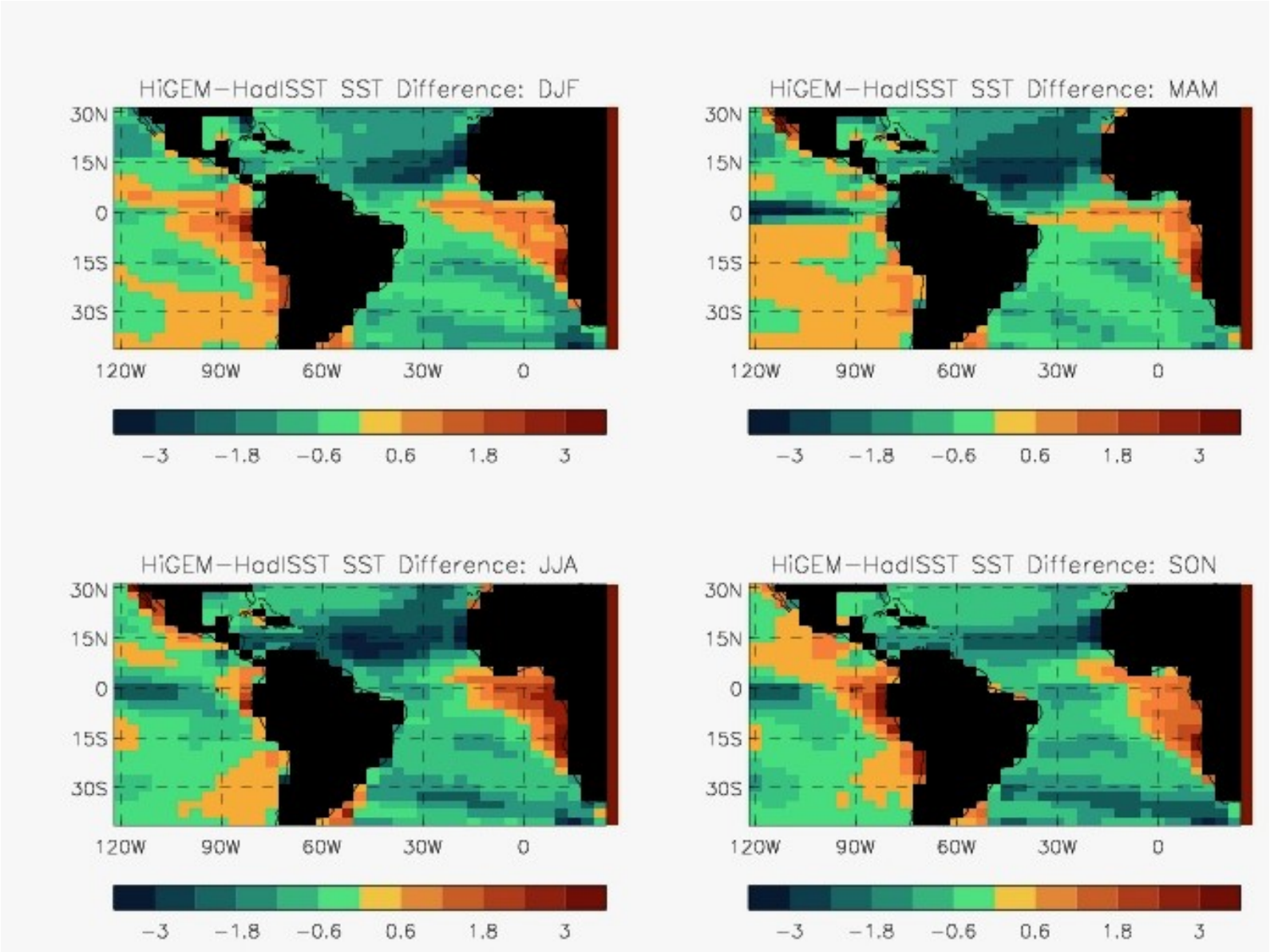
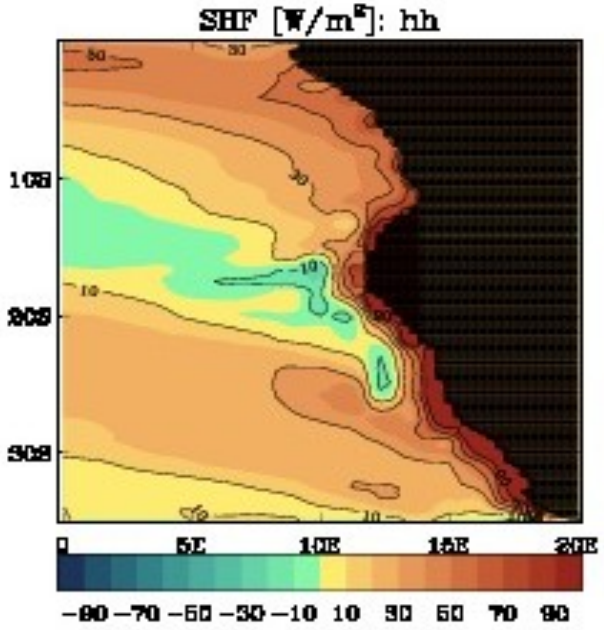
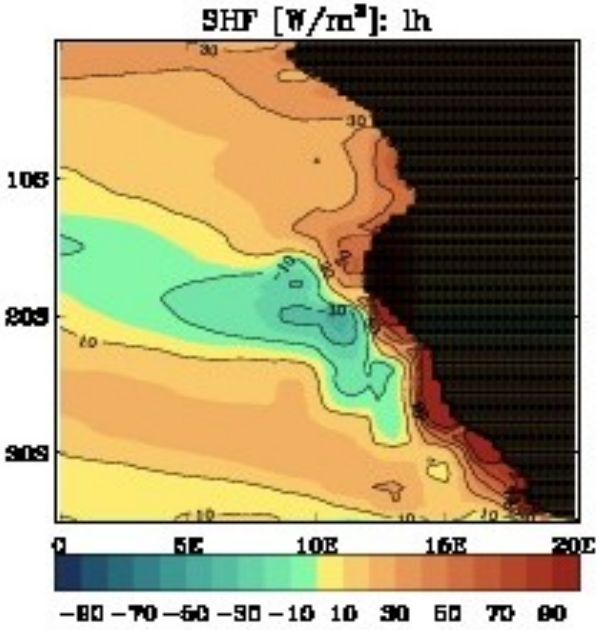
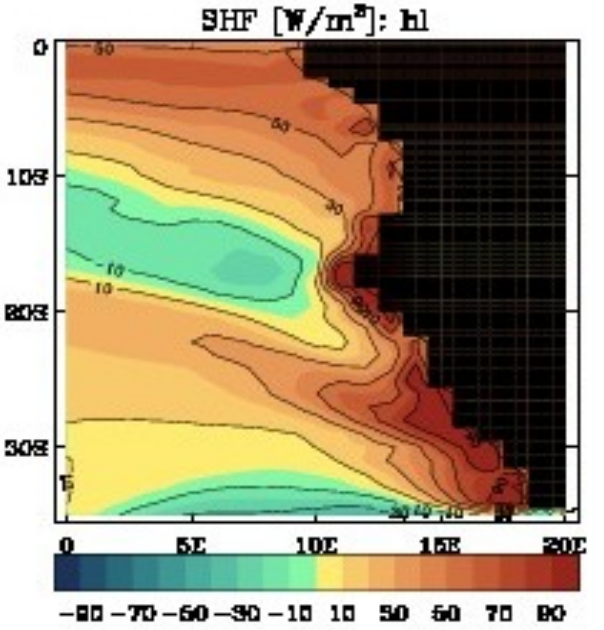
HiGEM SST errors – the usual...

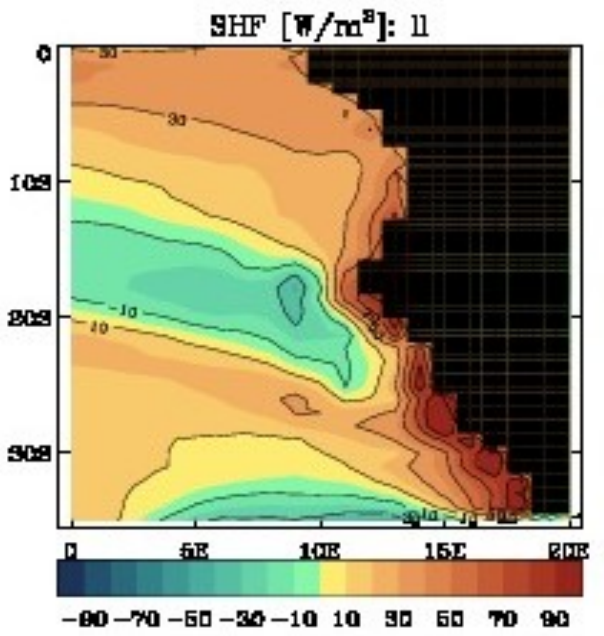


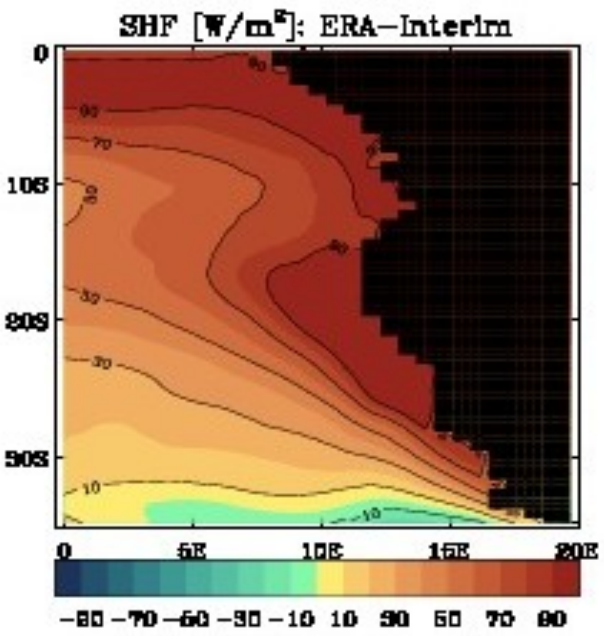
Worries with the SIGN of surface forcing...

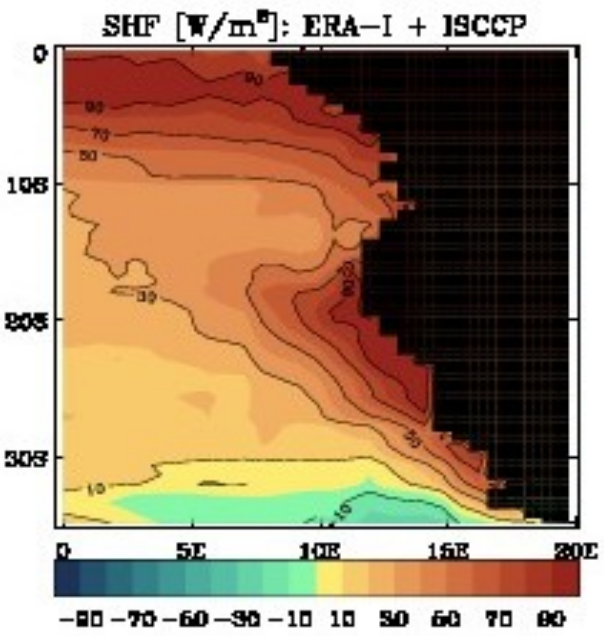




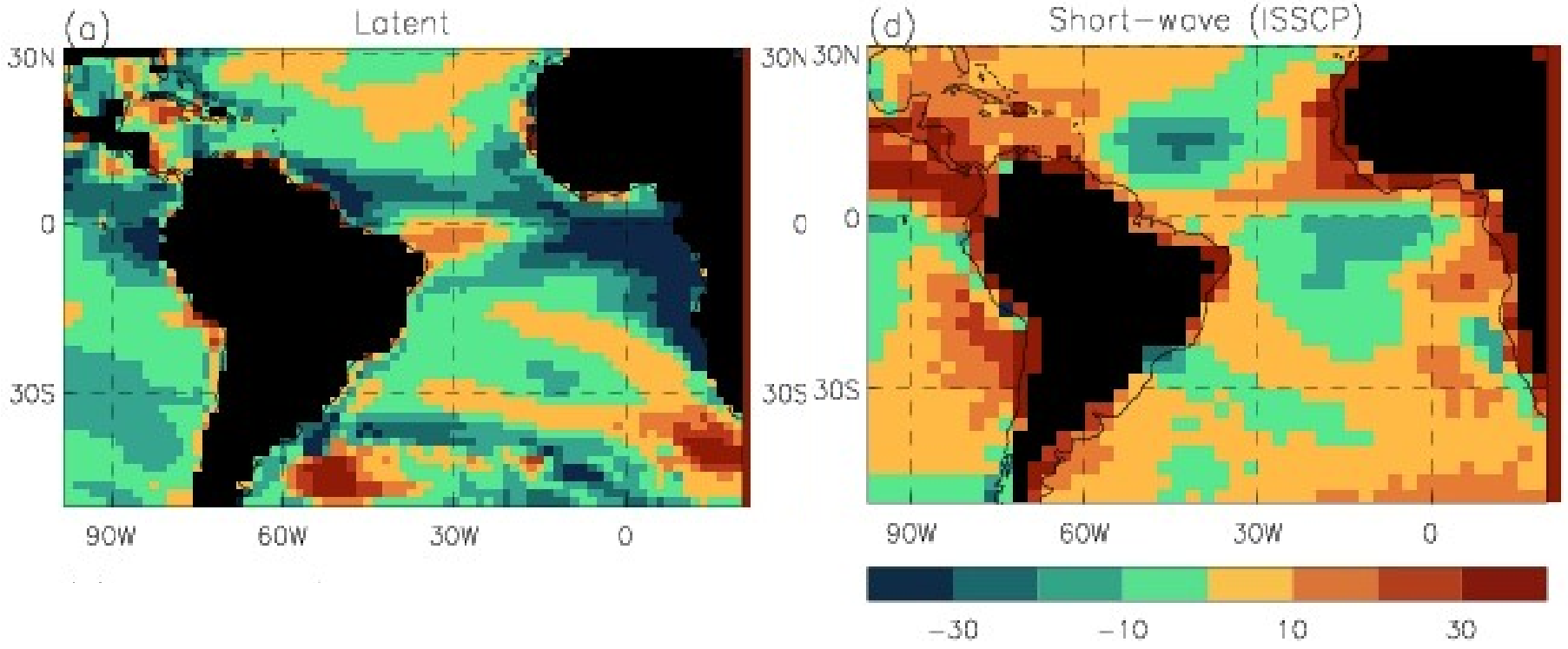




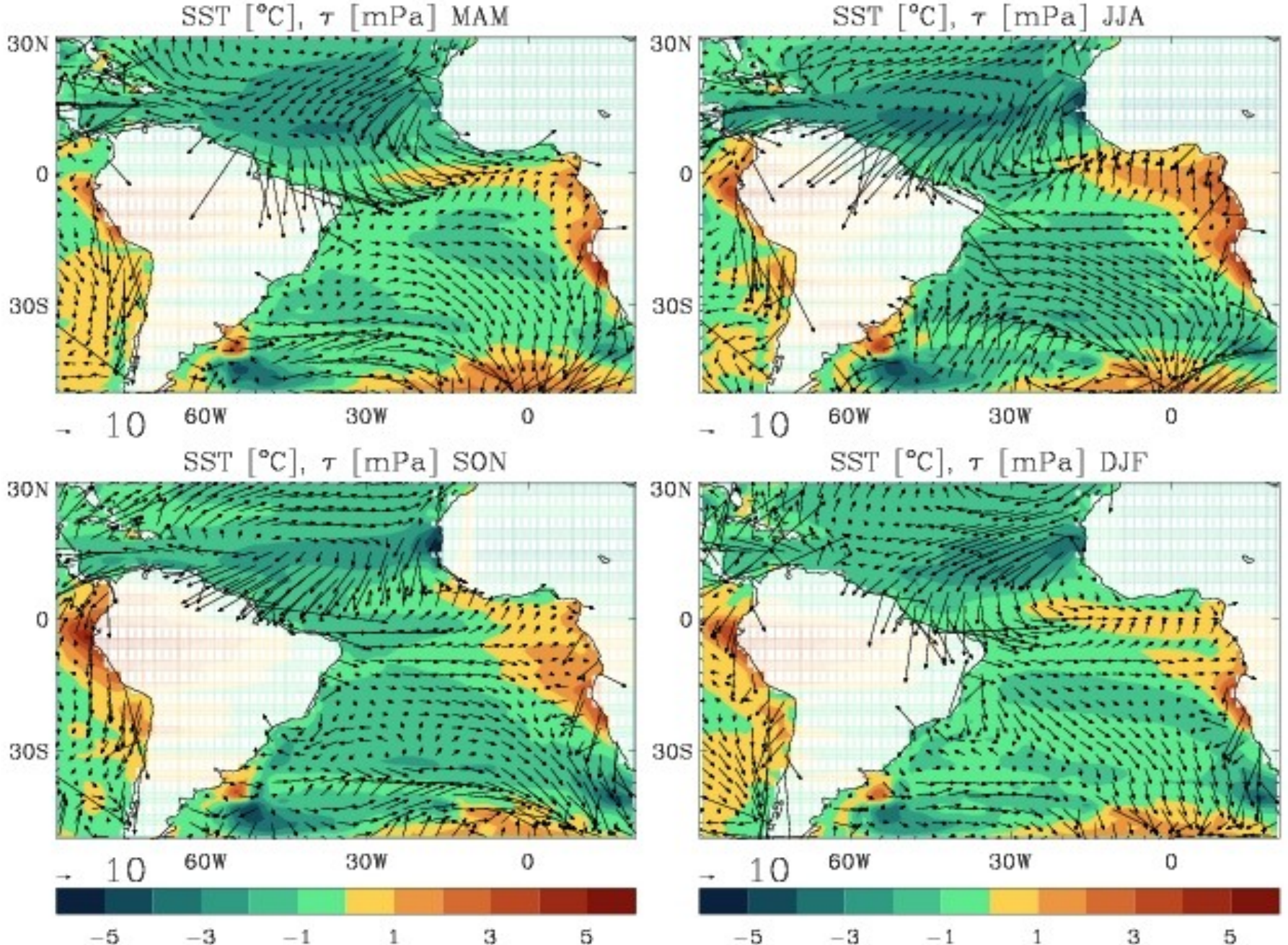




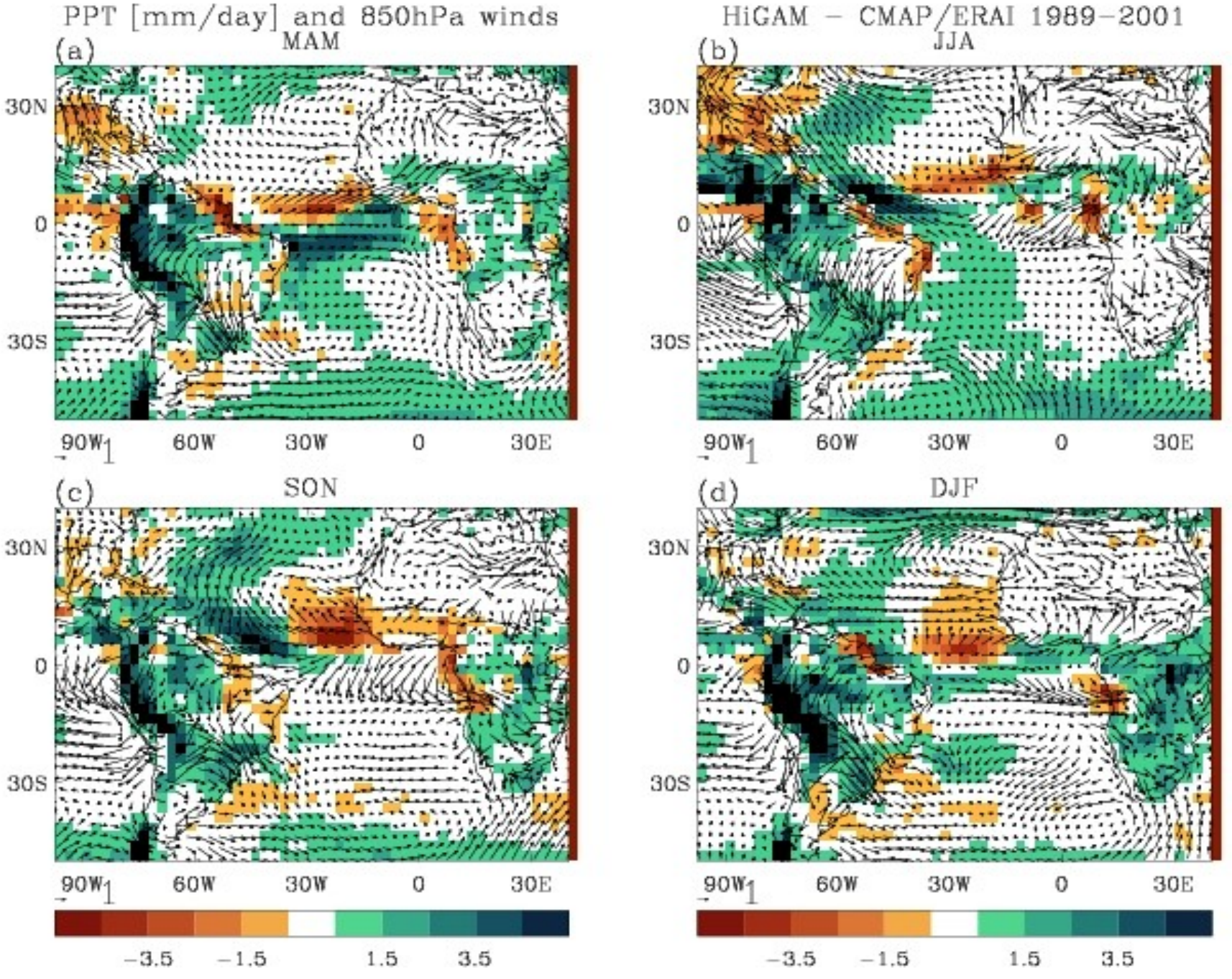
Biases in surface heat fluxes are dominated by evaporation



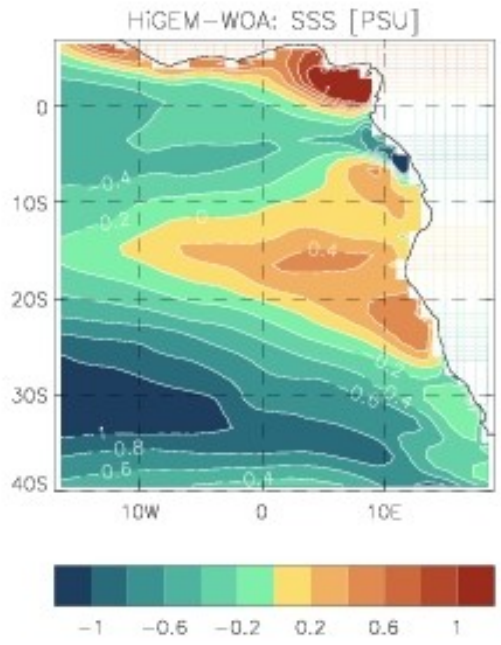
Wind-stress biases suggestive of Richter & Xie (2006) mechanism

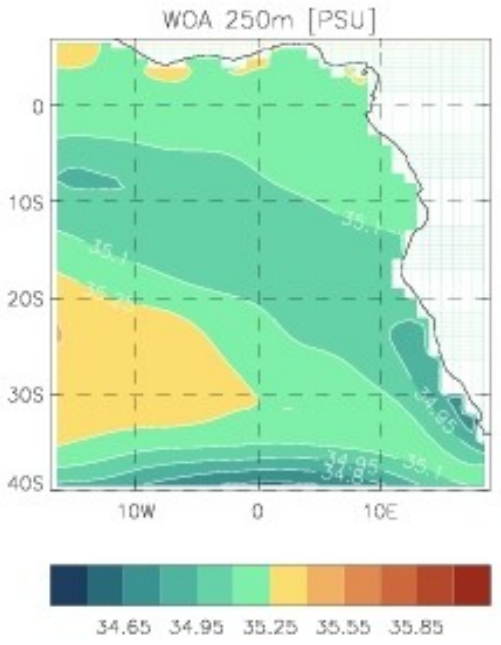


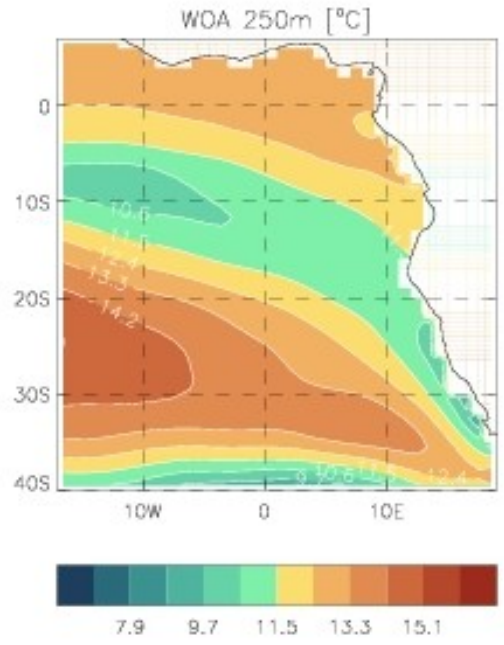
Also: typical PPT biases, but relation between winds and wind-stress is not immediate

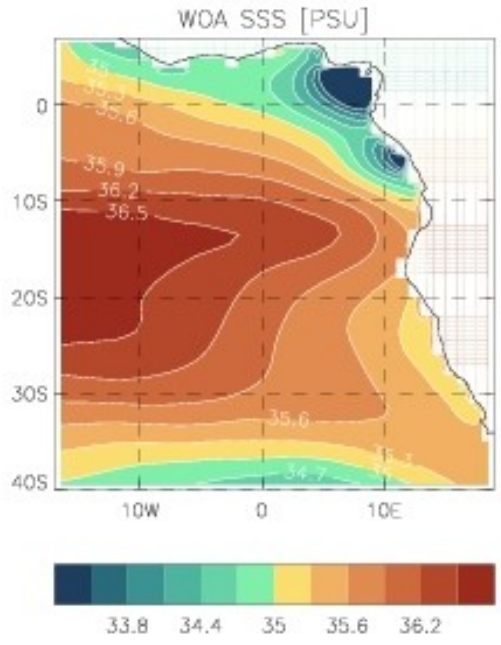


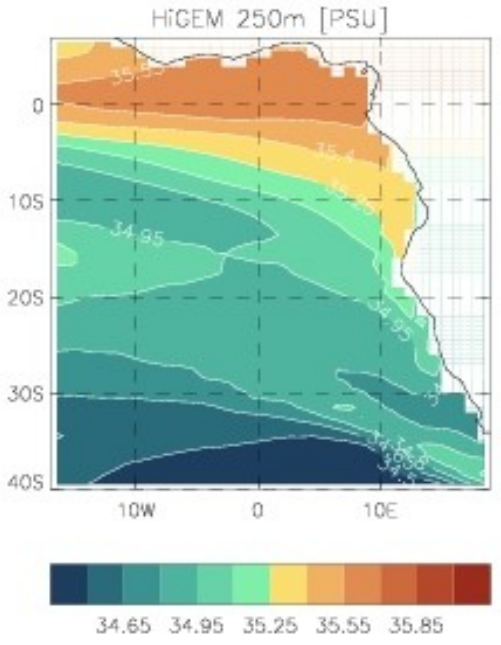
Surface and sub-surface salinity and temperature biases

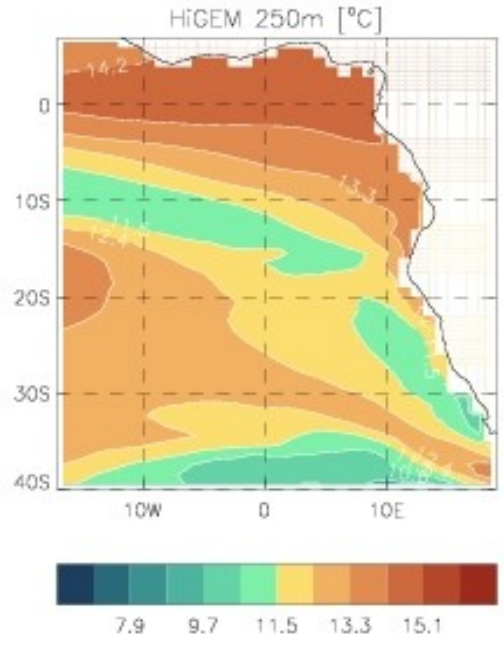




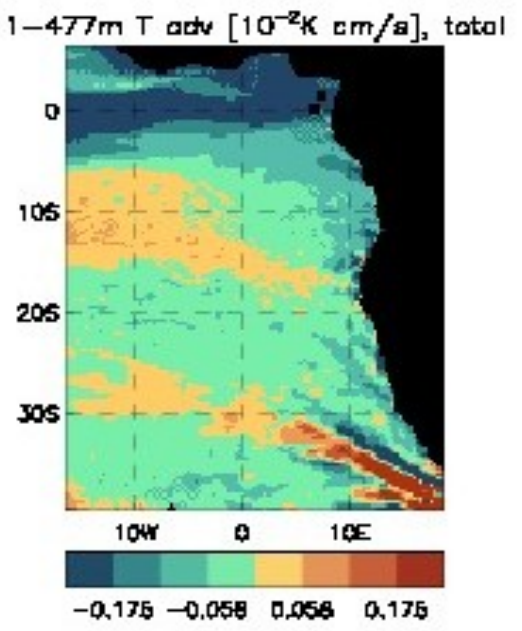


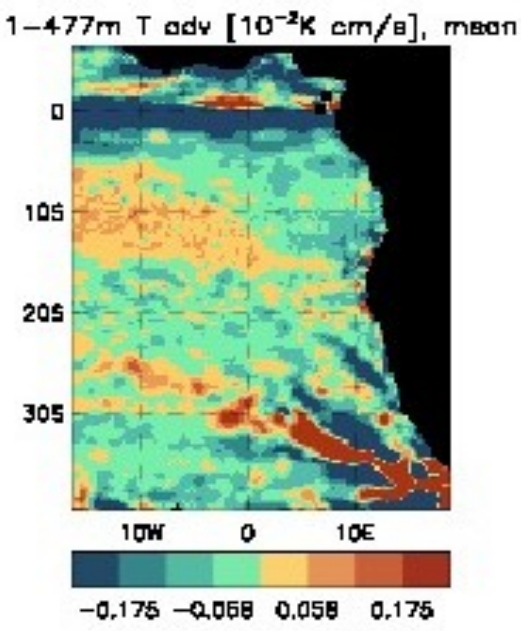


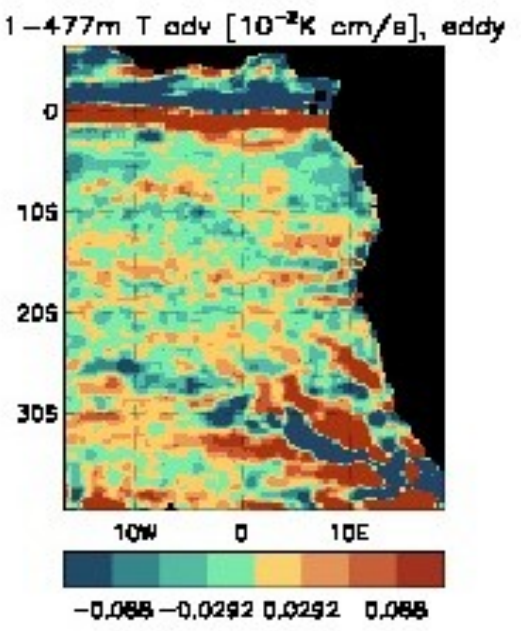


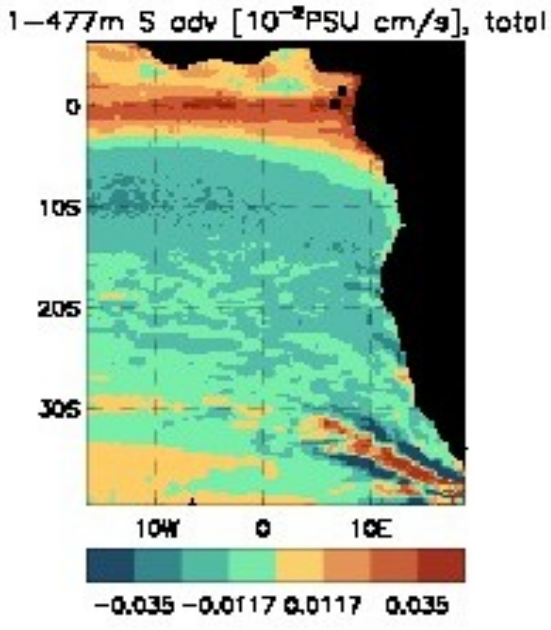


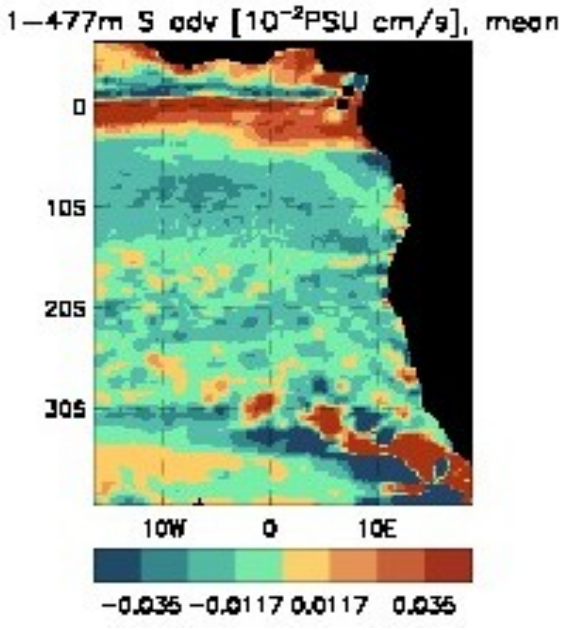
Characteristics of oceanic advection in HiGEM

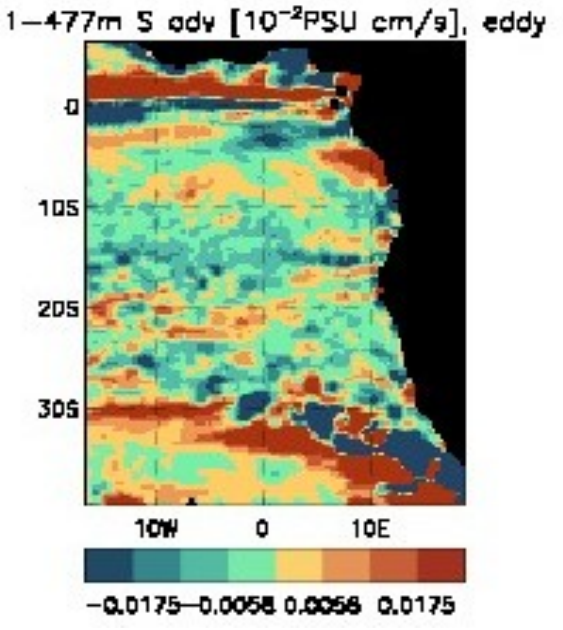




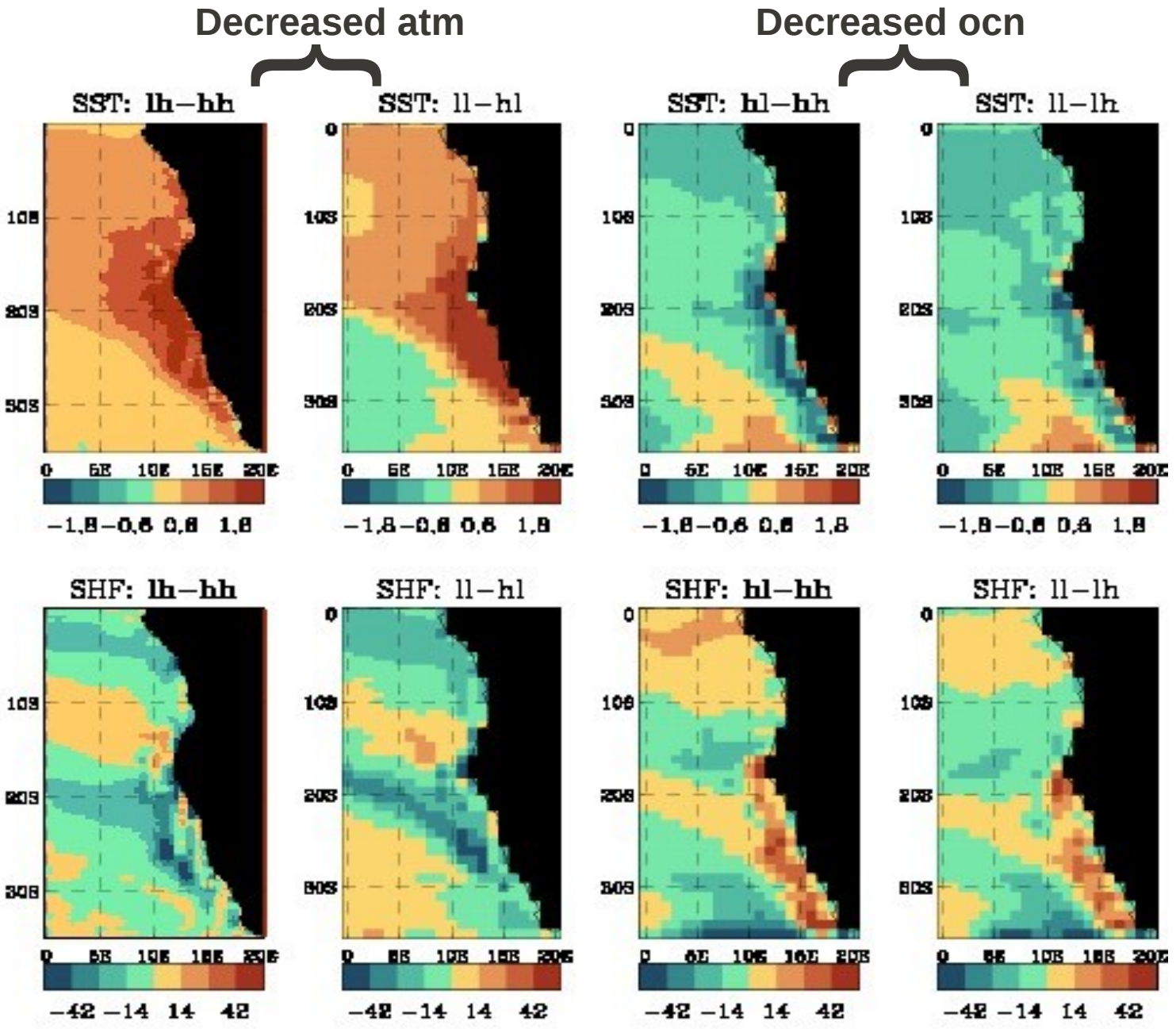




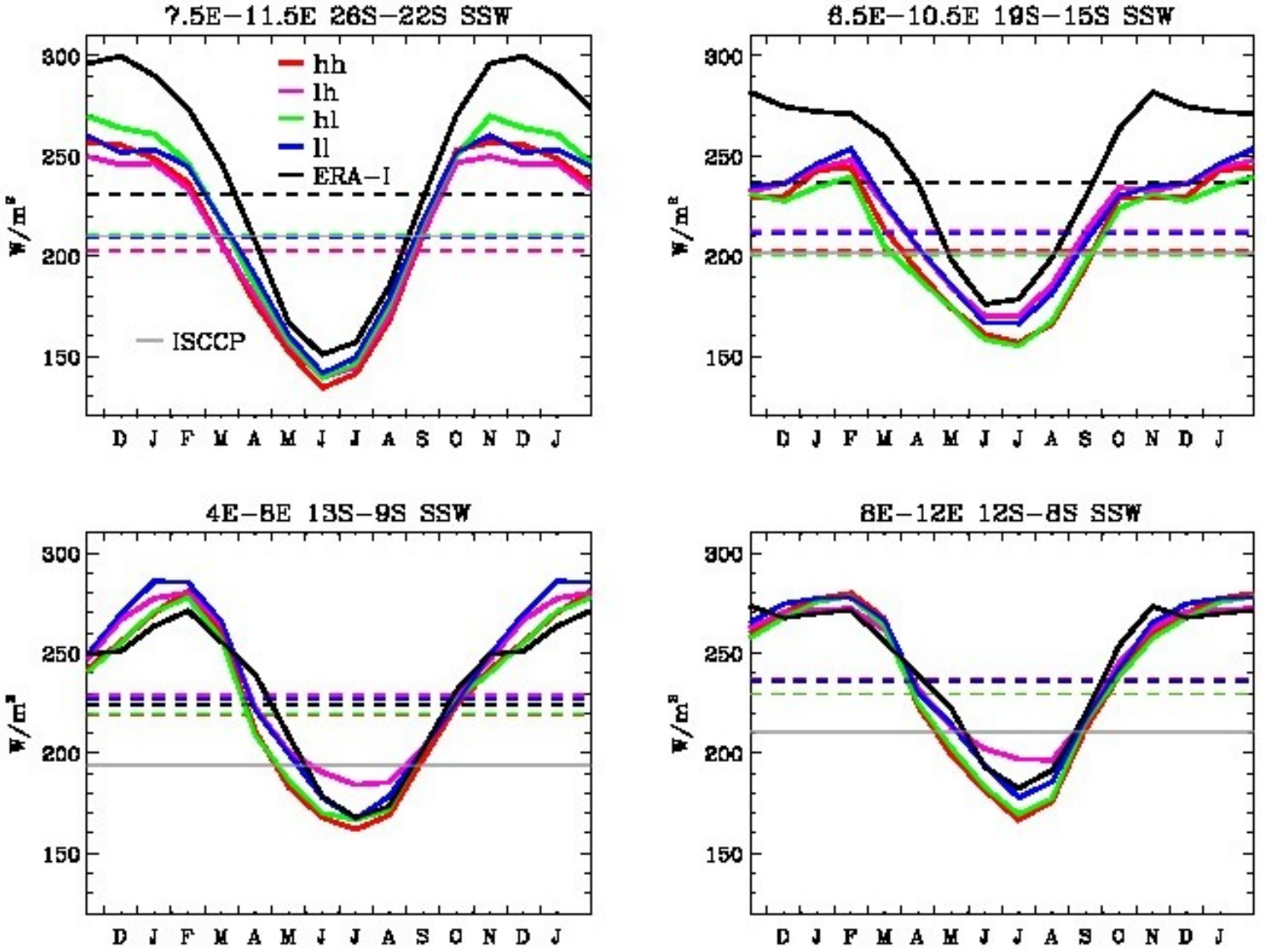




The effect of decreasing resolution in the atmosphere and in the ocean

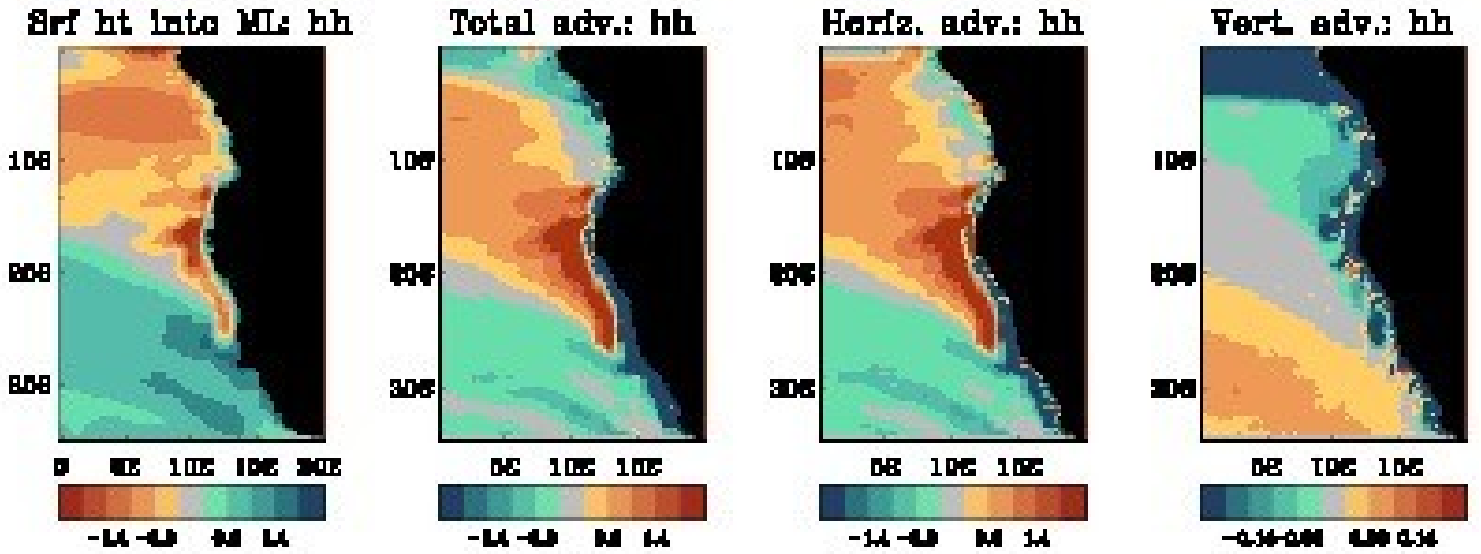


Seasonally and spatially varying SSW biases

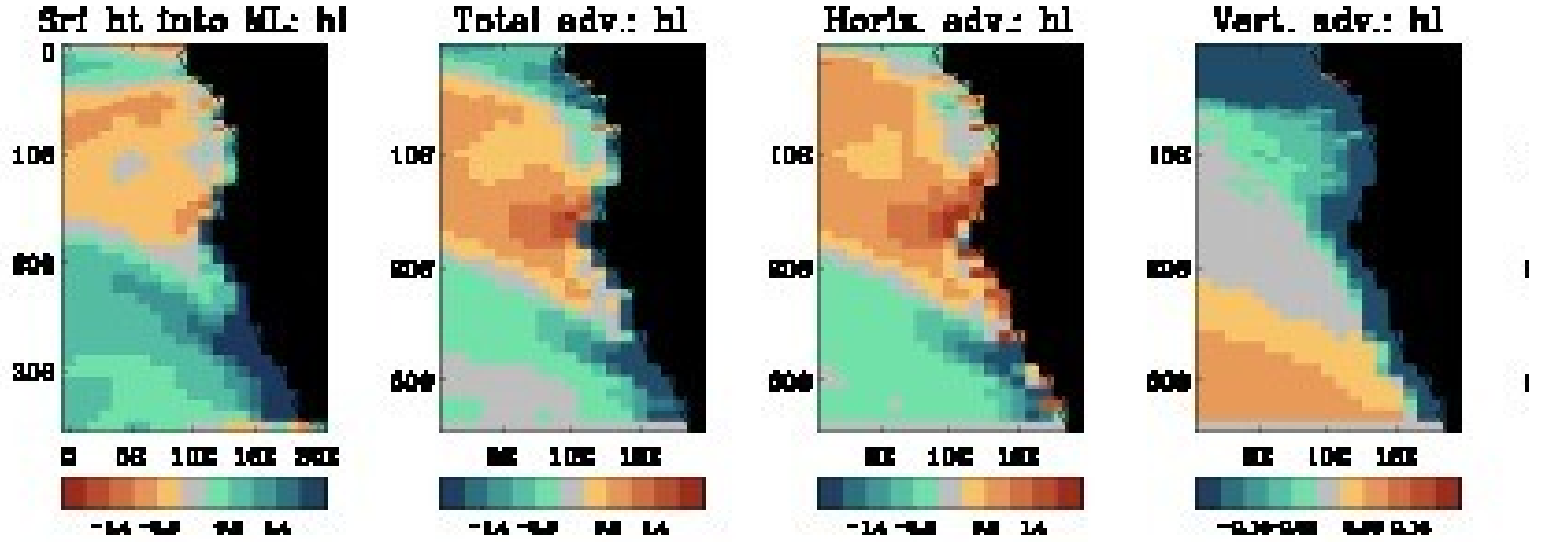


ML heat budgets, vertical and horizontal advection

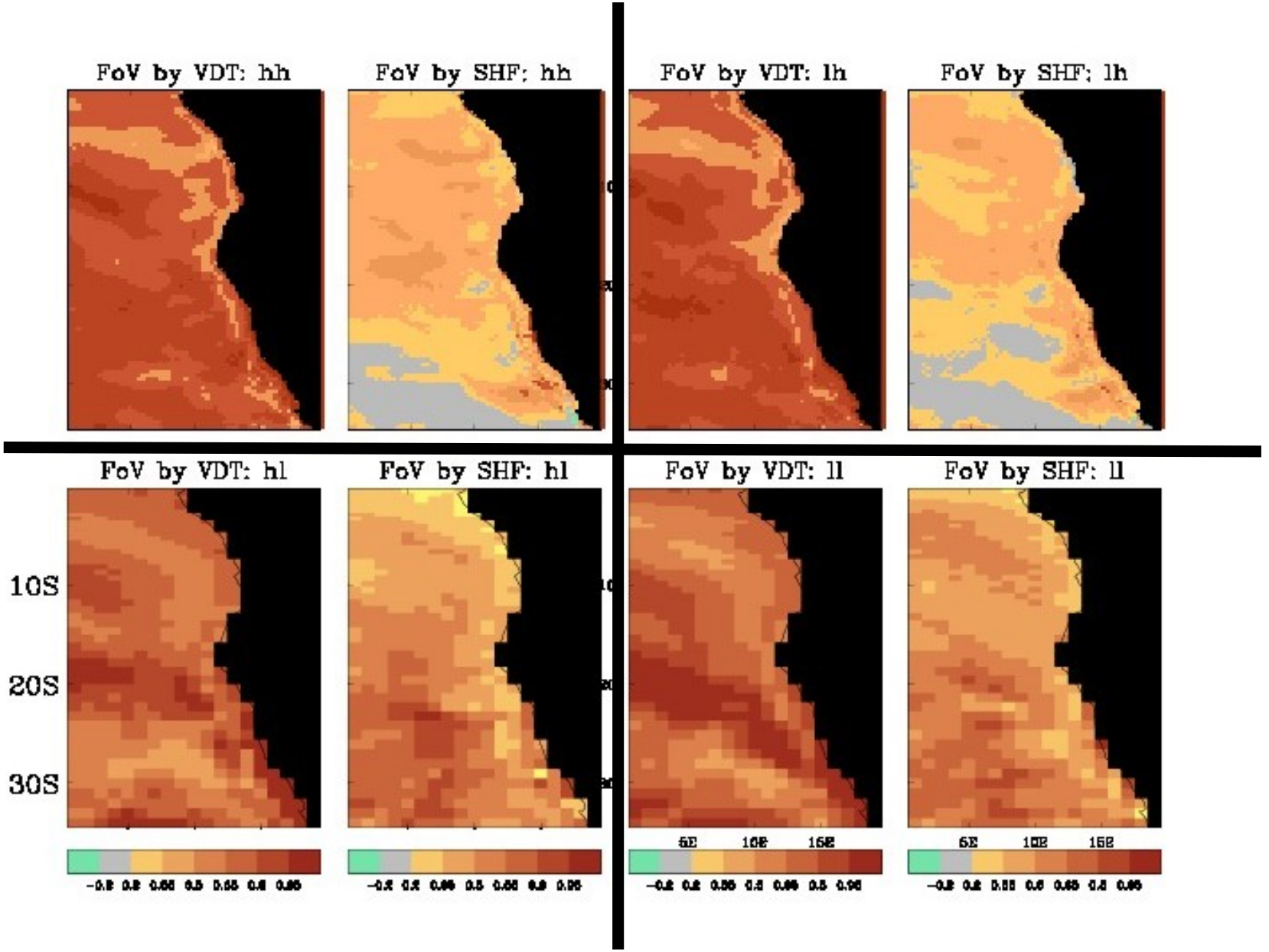
1/3 degree ocean



1 degree ocean



Bi-variate regressions of dT/dt on SHF and advection: a greater role for advection at higher ocean resolution



Conclusions

•HiGEM shows Richter&Xie (2006) type SST/wind-stress/Precipitation biases in the tropical Atlantic

•The coupled errors do not depend just on precipitation biases – role of PBL and of ocean dynamics are important

•Surface-flux errors are dominated by evaporation and induce a surface forcing with spurious cooling pattern

•SST errors are resolution-dependent, with increased severity with lower atmospheric resolution

•effect of oceanic resolution is more subtle, with a greater role for surface fluxes and coastal upwelling at low resolution