Air-Sea Fluxes in NCEP=s Seasonal Forecast Model

Glenn White
Global Climate and Weather Modeling Branch
Environmental Prediction Center
National Centers for Environmental Prediction
National Weather Service/NOAA/Dept. Of Commerce
Camp Springs, MD
Glenn.White@noaa.gov
ph (301) 763-8000 x7238
fax (301) 763-8545

This study examines the ability of NCEP=s seasonal forecast model to produce realistic estimates of transfers of water, energy and momentum across the air-sea boundary. Air-sea fluxes can serve as a good diagnostic of the global model=s parameterization of the boundary layer, radiation and cloudiness and are essential for coupling atmosphere and ocean models, a key element of dynamical seasonal forecasting.

Problems in verifying air-sea fluxes will also be addressed. Air-sea fluxes from the NCEP-I and NCEP-II reanalyses have been widely used and critically examined; surface stress and sensible and latent heat fluxes from reanalyses may be as realistic as other independent global estimates. Independent estimates of precipitation and surface radiation, however, appear superior to the reanalyses= estimates. NCEP-I is known to have too weak an equatorial wind stress in the Pacific; NCEP-II lacks low-level stratus clouds in the eastern subtropical oceans. Cloudiness appears to be one of the major problems in improving air-sea fluxes in numerical weather prediction.

This paper investigates differences in air-sea fluxes between the NCEP reanalyses and the currently operational NCEP global system. Since the NCEP/NCAR reanalysis, surface short wave fluxes, equatorial surface stress and the precipitation pattern have improved in the NCEP global forecast system; however, sensible heat flux appears to be too low and the NCEP system still has problems with low-level oceanic stratus clouds. Air-sea fluxes in extended integrations of the NCEP global model will be examined, together with NCEP=s experience with air-sea fluxes in coupled atmosphere-ocean integrations.