Monitoring Seasonal to Interannual Air-Sea Exchanges W. TIMOTHY LIU
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Air-sea exchanges drive the transport and change the storage of heat, water,
nutrient, and greenhouse gases and thus moderate the world’s climate. The
ocean feedback to climate changes must be manifested through these
exchanges, without which the Earth would be a more hostile habitat. The
ocean is an under-sampled turbulent fluid with non-linear interactions;
processes at one scale affect processes at other scales. Adequate
observations at significant temporal and spatial scales can only be achieved
from the vantage point of space. Spaceborne sensors have been used to
monitor atmospheric forcing (momentum, solar warming, evaporative
cooling, and precipitation) and the surface signatures of oceanic response
(sea surface temperature and sea level). While little influence of sea surface
temperature (SST) on the seasonal variation of either solar or latent heat flux
is found, both solar flux and latent heat have strong influence on the
seasonal change of SST, except in the equatorial wave guide where ocean
dynamics is more important. El Niño flux anomalies are found to be
governed by the dislocation of large-scale circulation and organized
convection more than SST, and SST anomalies are changed more by ocean
dynamics than by local surface fluxes. The role of wind forcing in
generating equatorial long waves and lifting the thermocline are examined
through SST and sea level anomalies observed by spaceborne sensors and
through the simulations of art ocean general circulation model.

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