Geophysical Research Abstracts
Vol. 19, EGU2017-14978, 2017
EGU General Assembly 2017

North Atlantic air-sea fluxes from long-term experiments with atmospheric mesoscale model

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Mesoscale air-sea interactions are critically important for understanding the mechanisms of air-sea exchanges associated with the ocean and atmospheric mesoscale phenomena. However, global reanalyses provide surface flux and flux-related variables at spatial and temporal resolutions much coarser than the mesoscales. In order to assess the role of mesoscale features in forming characteristics of air-sea exchanges we perfumed long-term experiment with non-hydrostatic atmospheric model WRF-ARW v3.7 with 15 km spatial resolution over the North Atlantic from 20N to70 N. The experiment covered the period from 1979 and was forced at the lateral boundaries by ERA-Interim reanalysis. Then atmospheric state variables from the WRF run were used to compute the fluxes using COARE-3.0 algorithm. For comparability, surface fluxes for ERA-Interim were also re-computed using COARE-3.0 scheme and ERA-Interim state variables at 0.75 degree resolution. Comparative assessment was performed for surface meteorological variables (wind speed and surface temperature and humidity gradients) and for the fluxes with a focus on the long-term mean characteristics and the magnitudes of synoptic and mesoscale variability, including extreme surface fluxes. We discuss seasonal and regional differences between the two runs and representation of surface fluxes associated with atmospheric cyclones.