SALINITY IN THE ATLANTIC OCEAN - COMPARISON OF EVAPORATION AND PRECIPITATION DATASETS

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The fresh water exchanges between the Atlantic Ocean and the atmosphere and their relation to specific climatic patterns (El Nino Southern Oscillation (ENSO), North Atlantic Oscillation (NAO), tropical Atlantic dipole...) are still a matter of large debate. They have up-to-now mostly been studied from Reanalysis model datasets from the American National Centre for Environmental Prediction (NCEP) and from the European Centre for Medium-Range Weather Forecasts (ECMWF), as well as ship-estimates from Comprehensive Ocean-Atmosphere Data Set (COADS). An alternative would be to use satellite-derived evaporation and precipitation products. A couple of these sets are now available at monthly resolution. They do not cover a very long period, and have not yet been validated. For the satellite measurements we used a latent heat flux-product developed at LODYC (HeatDSDB) and the precipitation-dataset from NASA (GPCP). To have an idea how the ship estimate measurements are done, the first part of my thesis consisted in participating twice in a scientific data-gathering cruise from Iceland to Canada. The datasets have been compared in different ways: 1) Plotting the spatial and temporal distribution of the global monthly evaporation (E) and precipitation (P) 2) Checking the regression patterns to indices characteristic of ENSO, NAO and 3) Developing a salinity model to calculate the influence of the ocean-atmosphere exchanges using the data form these datasets. We studied 4 different regions more in detail: 1) The whole Atlantic Ocean; 2) the POMME-region, a region studied by LODYC from September 2000 till September 2001; 3) the ITCZ-region around the equator, with high P-values and 4) the Gulfstream-region with high E-and P-values. All datasets represent the general trends well (for P: maxima in the ITCZ, minima in the subtropics, high P-rates around the storm tracks in the winter and also in the SPCZ and in the SACZ; for E: High E-rates just off North-America and in the subtropical trade wind regions; for E-P: water vapour source regions in the subtropics of the North-Atlantic and in cold regions in the South-Atlantic. Water vapour sink regions can be found in the regions with high precipitation, mainly in the ITCZ.). The temporal distribution is also similar in all datasets: maxima in the winter and minima in the summer. On the other hand the extent of the regions with maxima and the magnitudes of the maxima and minima vary significantly. Reanalysis products (NCEP1, NCEP2 and ECMWF) tend to overestimate the E- and P-values and this mainly in the regions with high E- or P-values, while the ship estimates (COADS) are underestimated. One significant difference was found in the Eastern Indian Ocean for the NCEP-dataset: the P-values are overestimated compared to in situ measurements. The RMS-values for the different datasets are reasonably low, except for the HeatDSDB.