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Five years of ship-based remote sensing observations of clouds, water vapor and radiation over the Atlantic Ocean

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Within the framework of the OCEANET project, ship-based observations have been performed since 2007 on board of the research vessel Polarstern on the Atlantic Ocean at ten cruises between Bremerhaven (Germany) and Cape Town (South Africa) or Punta Arenas (Chile), respectively. These observations were designated to measure the full energy budget and exchange processes at the sea surface as well as the state of the upper ocean and the troposphere in different climate zones.
This presentation specifically analyzes the atmospheric water (clouds as well as vapour) and its influence on the energy balance. The main instrumentation on all cruises to infer the atmospheric composition consisted of a passive microwave radiometer, a full sky imager, sun photometer and additional lidar ceilometer and broadband solar and infrared radiation measurements. With five years of measurements, always at the same time of the year, it is possible now to assess the variability of the atmosphere, especially in subtropical and tropical regions.
One focus is laid on marine stratocumulus clouds which are widespread over oceans and are therefore an important factor for the Earth's energy budget. To better quantify the effect of these clouds on the radiation balance, detailed studies on their structure and distribution are vital.
In addition, statistics of the water vapor distribution, the liquid water content of clouds and their frequency will be presented, with a focus on the variability and annual differences.