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Can we infer the impact of ship emissions on clouds from the long-term satellite measurements?

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In Europe, the land-based emissions of sulfate aerosols are decreasing, while ship emissions continue to grow. The most visible impact of ship emissions on clouds is so-called ship tracks. Although these ship emissions are increasing continuously, the favorable meteorological conditions may not be present for the formation of ship tracks everywhere and all the time (e.g. presence of low-level stratus). Thus, we may underestimate overall impact of these emissions on clouds. An attempt is made here to ascertain whether the impact of ship emissions can be seen and detected in clouds using long-term satellite measurements. We use the data from the AVHRR sensors onboard NOAA-7, -9, -11 and -14 satellites for the 20-year period from 1982 to 2001. The chosen study area is part of the Northeast Atlantic Ocean (45 – 55N, 15W – 0E) that experiences intense shipping traffic. We use inventories for ship emissions and land-based emissions from the EU project QUANTIFY and the EMEP. Here, we discuss:

1. Changes in low level cloud amount, cloud reflectance (from channel 2 and especially channel 3, which is more sensitive to droplet radius) and cloud top brightness temperatures.
2. The role of inter-calibration of the AVHRR channels and the orbital drift of NOAA satellites

3. Influence of natural variability (e.g. NAO) and land-based emissions on the observed changes.