5th International Conference on Fog, Fog Collection and Dew
Münster, Germany, 25–30 July 2010
FOGDEW2010-95

European fog/low stratus climatology from satellite and ground data

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Knowing the climatological distribution of fog and low stratus would allow for regional risk assessments and to estimate the radiative effect of these clouds. The study presented here uses geostationary satellite data (Meteosat Second Generation SEVIRI) to detect low stratus and fog, and to produce climatological maps on this basis. The maps are compared to ground-based observations. The focus of this study is on Europe.

The satellite technique used is based on a sequence of spectral and spatial analyses and validated against METAR observations. The methodology allows for the retrieval of low stratus clouds as well as ground fog situatiuons; it is found to be reliable and without a regional bias. Averaged maps covering several winter seasons of satellite data are analysed and compared to a cloud climatology based on a 26-year record of ground-based visual cloud observations. Maps are presented for the relative frequency of low stratus situations as well as for the number of hours with ground fog, making use of the very high temporal resolution available from a geostationary platform. The spatial patterns found in both products are found to be in good agreement and plausible.