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Operational daytime fog/low stratus discrimination using SEVIRI and MODIS data

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This paper presents an approach towards the automated detection of fog from satellite imagery. In order to make this assessment, information on cloud extent in space, cloud thickness, cloud top height and surface elevation is needed. The technique presented here is based on cloud type information, and cloud optical and microphysical properties retrieved from satellite data.

In a first step, the calibrated satellite imagery is classified using a combination of pixel-based spectral tests and object-oriented classification [1]. Areas covered by low stratus clouds are identified in this way. For each pixel, cloud top height is then estimated using atmospheric lapse rates derived locally around each spatially discrete cloud entity.

The assessment of cloud geometrical thickness is based on a parameterization using cloud optical depth and droplet effective radius. These parameters are retrieved using the ATSK3 scheme [2]. In combination with a digital elevation model (DEM), information on the spatial distribution of low stratus, cloud top height and cloud thickness are used to establish whether or not a stratus cloud touches the ground in a particular location or not. Where this is the case, the pixel is classified as fog-covered.

The scheme presented is implemented operationally on the basis of Meteosat 8 SEVIRI and Terra / Aqua MODIS imagery. While the former provides excellent temporal coverage at a repeat rate of 15 minutes, the latter can be used to derive spatially explicit information on fog distribution.

References

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