

A new high spatial resolution low stratus/fog retrieval for the Atacama Desert

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The Atacama Desert is considered one of the driest places in the world. Along the coastline, however, small-scale fog oases are home to a special vegetation and fauna that is supplied with water by fog. The fog water is also used by humans for industrial projects. So far, knowledge about fog and low stratus (FLS) clouds and their physical properties is limited because only local observations or spatial products from satellite data with coarse resolution are available. The existing satellite products usually do not capture the local patterns resulting from the complex topography. Consequently, we developed the first fog and low stratus climatology with 30 m spatial resolution based on over 400 Landsat scenes recorded since 1986. The new product provides valuable estimates of the optical and microphysical properties of FLS. Fog and low stratus over the Pacific Ocean showed optical thicknesses around 13.5, which decreased to 4.2 over land. The effective radii were 5.3 μm . The liquid water path ranged from 71.0 g m^{-2} over the ocean to 14.9 g m^{-2} on land. The climatologies of the new Landsat product were successfully validated against those of the MODIS Cloud property product over homogeneous surfaces. In areas with heterogeneous topographies, the new product outperforms existing products with coarse spatial resolutions if compared to in situ measurements. This shows the general need for cloud products with high spatial resolution in areas where the development of small-scale clouds is favoured e.g., by a complex topography.

Related References:

Lehnert, L., Jung, P., Obermeier, W., Büdel, B. & Bendix, J. (2018): Estimating Net Photosynthesis of Biological Soil Crusts in the Atacama Using Hyperspectral Remote Sensing. *Remote Sensing* 10, 891. DOI10.3390/rs10060891

Lehnert, L., Thies, B., Trachte, K., Achilles, S., Osses, P., Baumann, K., Schmidt, J., Samolov, E., Jung, P., Leinweber, P., Büdel, B. & Bendix, J. (2018a): A Case Study on Fog/Low Stratus Occurrence at Las Lomitas, Atacama Desert (Chile) as a Water Source for Biological Soil Crusts. *Aerosol and Air Quality Research* 18, 254-269.