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A geographic perspective on fog and low stratus formation and dissipation over central Europe

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In this contribution geographic patterns of fog and low stratus (FLS) formation and dissipation over central Europe are presented using a novel satellite-based data set.

Formation and dissipation of FLS are the results of complex interactions of meteorological and land-surface processes. Furthermore, the timing of FLS formation and dissipation has implications for traffic and the production of solar energy. Yet, little is known about the spatial and temporal patterns of both in central Europe. To improve this situation, this study analyzes these patterns, as well as the meteorological drivers and their modifications by the land surface. The basis of the analysis is a novel FLS formation and dissipation data set, derived based on satellite FLS products and logistic regression.

Very distinct and contrasting spatial and seasonal patterns of FLS formation and dissipation are found across the study area. In large-scale river valleys, FLS forms most frequently in the morning and dissipates in the afternoon. In mountainous areas and on the coast, FLS forms during the night and dissipates in the morning. FLS persists longer in winter compared to other seasons. The quantitative analysis of meteorological drivers shows that the large-scale meteorological conditions, in particular mean surface pressure and wind speed, substantially influence the timing of FLS formation and dissipation. Local variations in topography modulate these conditions, leading to local differences in the observed patterns.