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# Critical Liquid Water Path as a possible indicator of Fog Dissipation

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Fog has a significant impact on human transport activities due to the strong reduction of visibility at the surface. An accurate estimation of fog dissipation time could aid decision making for the transport sector, significantly reducing related costs and risks. However, the location and time of appearance and dissipation of fog are still difficult to forecast with sufficient accuracy by numerical weather prediction models.

It has been observed that a significant part of fog evolution can be explained using local parameters, especially when its dissipation happens due to lifting of the cloud base, transitioning it into a low stratus cloud. Fog-base lifting accounts for more than half of the fog dissipations recorded at the SIRTA atmospheric observatory located in Palaiseau, France, during the past 7 years.

It has also been found that fog lifting and dissipation seem to be correlated with the Critical Liquid Water Path (CLWP) parameter first introduced by Cermak and Bendix in 2011 as a method to determine the presence of fog at the surface from satellite observations. The CLWP provides a measure of the minimum amount of liquid water that is needed to fill a fog layer from the fog top height down to the surface, assuming a particular subadiabatic profile of vertical liquid water content.

Our hypothesis is that a nowcasting method based on comparing real time observations of Liquid Water Path (LWP) with the estimated CLWP at a site of interest could improve the accuracy on the estimation of fog dissipation time.

Instead of satellite measurements our approach calculates CLWP by using ground based instruments. Cloud Top Height is retrieved by a Cloud Radar BASTA and Cloud Base Height by a CL31 Ceilometer. Alongside these instruments we include standard observations of temperature, pressure and visibility at screen level. LWP is retrieved with a HATPRO Microwave Radiometer.

Uncertainties in elements such as the layer temperature and the subadiabaticity profile will have an impact on the quality of the CLWP estimation. Hence we studied a large number of cases to get a better understanding of the method and to assess the impact of other atmospheric variables on its performance.

The presentation will include an introduction to the CLWP concept and an evaluation of its performance as predictor of fog dissipation for 40 fog events observed at the SIRTA observatory, analyzing the relevance of parameters such as temperature or fog top height. Single case studies will also be shown to illustrate how CLWP evolves over time. Finally, detected limitations and proposals to improve CLWP estimation will be discussed.