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Possible contribution of passive radiometers to the analysis of the evolution of fog episodes

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The Regional Agency for the Environment of Veneto (ARPAV - North East Italy) through its Meteorological Center, has been managing some passive radiometers since 2005, one located in the Po Valley in the historic center of Padua (210,000 inh.) and the other in a wide pre-Alpine valley (Val Belluna) in the municipality of Feltre (20,000 inh.). Both instruments are located on the roof of the host building and scan the atmosphere with a thermal profile every 5 min. In the Po Valley and in Val Belluna there are frequent episodes of fog, especially in the autumn / winter season, which can sometimes persist throughout the day.

Both radiometers are MTP-5 HE produced by Attex and are able to obtain the thermal profile up to 1 km, with an interpolated value every 50 m, in almost all weather conditions, using a single channel centered on the absorption of the molecular oxygen microwave at 60 GHz. This simple type of radiometer, very useful for studying the characteristics of thermal inversion, or super-adiabatic heating of the first layers of the atmosphere, is widely used to characterize the PBL (Planetary Boundary Layer) in terms of atmospheric stability.

The proposed study seeks to explore the possibility of using thermal profile data from passive radiometers to study fog evolution only at the Padua site, where other meteorological information is also available, such as professional weather stations, webcams and visibilimeters. A statistic of the phenomenon will be presented, with the help of satellite images, from data series of over 10 years, together with some case studies, which will try to highlight the limits and effectiveness of this new approach.