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Neuro-variational retrieval of the aerosol properties from simulated spectropolarimetric measurements over ocean and land

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Multiangular spectropolarimetric measurements are a powerful tool for the remote characterization of the properties of atmospheric aerosols. Methods for the retrieving the aerosol properties from this kind of measurements have been recently proposed by a limited number of research groups and have been successfully applied to data acquired by the POLDER instrument onboard the PARASOL satellite (Dubovik et al., 2011; Hasekamp et al., 2011). The methods proposed so far are based on maximum likelihood or regularization techniques. At the core of these methods is the minimization of a nonlinear cost function through an iterative technique. A recently published study (Di Noia et al., 2015) has shown that the accuracy and the speed of aerosol retrievals may both be influenced by the selection of the initial guess to be used in the iterative scheme, and that neural networks may be used to produce an accurate initial guess in an even more efficient way than the look-up tables that have been traditionally used for this purpose so far. This approach, initially demonstrated on ground-based measurements, is currently being extended to down-looking measurements such as those that can be performed from an aircraft or from a satellite platform. In this work we will show preliminary results obtained by applying the neuro-variational retrieval approach to simulated measurements mimicking the observation of a non-imaging spectropolarimeter – such as the airborne Research Scanning Polarimeter (RSP) – over ocean and land. The impact of using a neural-network-based initial guess in a Phillips-Tikhonov iterative scheme will be discussed, and the open issues related to a further extension of this method to imaging spectropolarimeters – such as POLDER or the forthcoming 3MI – will be examined.

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