

# A Posteriori Filtering Algorithms for Short-Exposure ERS Images, Spatially Invariant to Atmospheric Distortions

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**Abstract.** Optical images of Earth remote sensing (ERS) are distorted by the surface layer of the turbulent atmosphere. To compensate for the atmospheric distortions it is suggested to utilize the algorithmic technologies of postdetector spatial filtering of the distorted image. The article proposes a solution to the problem of the a posteriori determination of the optical transfer function (OTF) from the remote sensing telescope-atmosphere system by its short-exposure image. The existing algorithms of a posteriori determination of the magnitude and phase estimates of the instantaneous OTF atmosphere-telescope are discussed and new ones are provided. Therewith, to assess the OTF module, it is proposed to define and use a statistically similar object as a reference, and for the evaluation of the phase of the OTF it is proposed to use the statistical averaging and the recursive reconstruction algorithm. According to the a posteriori obtained estimates of the magnitude and phase, the atmosphere-telescope OTF is formed, which is used to form the Wiener filter and spatial filtering atmospheric distortions of the captured image. The results of experiments confirming the theory are presented.

**Keywords:** turbulent atmosphere, algorithmic technology, postdetector image processing, statistically similar reference, a posteriori evaluation of the magnitude and the phase of the OTF, Wiener image distortion filtering