



## **Improvement metrics for water vapour and temperature profiles retrieved from GPS RO profiles through 1D-Var.**

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Wave optical retrieval of GPS RO profiles are known to give a better estimate of bending angle and refractivity profiles in the lower troposphere than geometric optics can provide. Here we analyse the GRAS raw sampling dataset from METOP from October 2007, with good representation of the lower troposphere. We process all profiles with both the wave optics and geometric optics methods. The resulting refractivity profiles are inverted to temperature, humidity and surface pressure state vectors by using the 1D-Var method, with background states interpolated from the ECMWF forecast. We use the same error covariance matrices for the two retrieval methods. In order to describe the difference in performance of wave optics versus geometric optics we investigate standard information measures to quantify the partitioning of information from observation and background data in the solution profiles.