

Calibration and Standardization of Large Surveys and Missions in Astronomy and Astrophysics



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Monitoring atmospheric water vapour at ESO's Paranal observatory

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Monitoring the actual atmospheric conditions under which observations are being conducted is a key task of any ground-based observatory. At ESO's La Silla Paranal observatory parameters like seeing, extinction and coherence time are regularly measured and the observed values are routinely used to make real-time scheduling decisions for service mode based on user-provided constraints. This effort ensures that the astronomical observations - combined with proper instrumental calibration - meet their science objective and hence optimizes the output of the observatory. For survey work which usually consists of service mode observations and for which homogeneity of the output data is crucial such monitoring of atmospheric conditions is all the more important. Precipitable Water Vapour (PWV) is one of the main, and variable, sources of opacity in the Earth's atmosphere at infrared wavelengths. In late 2011 a Low Humidity and Temperature Profiling microwave radiometer (LHATPRO) by Radiometer Physics GmbH (RPG) has been permanently deployed at ESO's Paranal site providing accurate measurements of the column of PWV in real-time. The unit measures several channels across the strong H₂O emission line at 183 GHz, optimized for the low levels of PWV on Paranal (median ~2.5 mm). The radiometer has been commissioned and validated across the range 0.5 - 9 mm demonstrating an accuracy of better than 0.1 mm by comparison with 22 balloon-borne radiosondes and other instruments. We'll present an overview of the instrument, its performance and operations as well as its integration in the Paranal database for environmental parameters.

Summary

A water vapour radiometer operating at 183 GHz has been deployed at ESO's Paranal observatory site for high precision real-time monitoring of the atmospheric water vapour content. We'll present an overview of the instrument, its performance and operations as well as its integration in the Paranal database for environmental parameters. We'll also highlight the value of such an instrument for large surveys in terms of homogeneity of data products.

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