Abstract Details

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Title: Filter bank radiometers for atmospheric profiling

Abstract:

We present microwave radiometers for the remote sensing of troposp profiles of temperature and relative humidity. In contrast to previous generation instruments, improvements in technology allow for small a precise low-cost instruments. The hardware design is optimized for du and offers many additional sensors which make the instruments ideal measurement campaigns. The software design provides full access to sensors and allows also for unattended measurement periods of seve weeks. High accuracy and long term stability together with high samp rate are essential features of the filter bank receiver design. Profiling radiometers need to observe several frequencies along the wings of s lines (oxygen and water vapour). Although a simultaneous observatio such frequencies should be preferred in order to obtain consistent measurements, many profiling radiometers use synthesizer controllec receivers: The detection frequency of only one receiver is sequentiall to the specified observation frequencies. Such designs have scientific drawbacks: If short term fluctuations (such as clouds) occur during th measurement cycle, the samples along the wing of the observed line inconsistent and thus the retrieved profiles will be less accurate. Furthermore, it is often desirable to use the profiler with its set of mu channels also for the retrieval of IWV and LWP. The sampling rate for variables will be significantly reduced when they are observed with a synthesizer controlled profiling radiometer instead of a standard two radiometer. As a consequence, RPG-profilers perform simultaneous de of all profiling channels by using a filter bank design. This way all frec are recorded at the same time, and the repetition rate of measureme only limited by the integration time of a single detector (typically one second). Improving the duty cycle by the filter bank design would allc observation of rapid changes in the atmosphere, for example humidit bubbles and turbulent transport phenomenon. In addition, the radiom designed to meet the demands (low maintenance, low cost) of operat weather observation networks. Automatic protection from rain, hail, a snow is provided as well as reduction of dew and wetness on the radc Automatic internal calibrations with ambient temperature load, noise standards, and sky tipping procedures provide very long time periods unattended operation (usually several weeks). A GPS clock is used fo temporal synchronization.