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Remote Sensing of Water Vapour under All Sky Conditions

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The development of a complete and accurate global water vapour climatology is important for an adequate understanding of the Earth's climate system. Such data is essential for studies concerning the energy and water cycle including poleward energy transports, radiation budget studies, general circulation model verifiation and global change research. The present work briefly summarizes advantages and drawbacks of water vapor climatologies based on radiosonde measurements, and on satellite and ground based infrared (IR) and microwave (MW) remote sensing. In the framework of the "Climate Monitoring - Satellite Application Facilities" (CM-SAF) a water vapour climatology will be derived based on various instruments. The majority of informations will be gained by the SEVIRI instrument onboard Meteosat Second Generation (MSG). This technique is restriced to cloud free atmospheres, which causes a clear-sky bias in the climatologies. In order to correct for this bias, the present work investigates the excess of water vapor in cloudy areas with respect to climatologically equivalent clear sky areas. To this end radiosonde measurements and microwave base water vapor path measurements are studied and the clear vs cloudy sky differences are determined in terms of surface pressure and surface temperature. The most significant water vapor excess in cloudy pixels is found for mid-latitude clouds in winter. Further correlations with climatological and weather conditions will be discussed.