



Polarimetric Doppler weather radar: towards the understanding of precipitation

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Weather radars have been used since more than 60 years to monitor precipitation events. Since that time not only the radar systems have evolved considerable, but also the understanding of precipitation systems has gained from observations, both from continuous operation and from field campaigns. Polarimetric Doppler weather radar systems are used in research for about three decades now. DLR's polarimetric weather radar POLDIRAD has participated in that development since about two decades. Originally proposed to improve the quality in rain rate estimation, it soon came evident that polarimetric radar has a much greater potential. With the help of polarimetric weather radars it became possible to gain insight into the raindrop size distribution not only at the earth surface but also in the free atmosphere. Several methods have been developed to provide a much better rainfall rate estimation than it could ever be possible with a conventional non-polarized radar. The usage of dual-polarization techniques allows to identify the various types of hydrometeors. Classification algorithms are now available to study the initiation of hail or graupel, but also less spectacular events like the temporal evolution of wintertime snowfall. They even can help to improve the microphysics parameterization in numerical forecast models. Polarimetric weather radars are now on the way to be used operational by various weather services. Continuous operation and large scale coverage through national and international networks will open a new dimension in the observation and understanding of precipitation systems Algorithms are now developed in conjunction with polarimetric weather radars to ensure the high quality of radar observations.