



OHD Seminar: Range Adjustment for Ground-based Radar, Derived With The Space-borne TRMM Precipitation Radar

Dr. Marco Gabella
Asst. Prof. of Remote Sensing
Politecnico Di Torino
Turin, Italy

Wednesday, August 9, 2006
10:30AM
SSMC2 Room 12246

ABSTRACT

We show how the TRMM Precipitation Radar (TPR) can be used to monitor and adjust Ground-based Radar (GR) data, as a function of the distance from the radar site. Problems caused by the variability of precipitation and differences in sampling volume of the two instruments are reduced to a level that is achievable with, and acceptable for, the present analysis. Throughout the region under surveillance, TPR has poorer spatial resolution than GR. The sampling volume of the GR changes quite remarkably according to the range from the GR site: it increases with the square of the range. TPR, on the other hand, has similar sampling regions in all the locations.

The analysis is based on the average, linear radar reflectivity, in circular rings around the GR site, $\langle Z(D) \rangle$, as a function of the range, D , from the GR site. The GR/TPR ratio varies, for the Cyprus radar, on average from 2 dB, at 10 km, to -11 dB at 100 km. In Israel (Shacham radar), the variation is from -2 dB, at 10 km, to -7 dB at 100 km.

The average departure at the average range is considered to be mainly caused by the calibration of the GR. The range dependence of the GR/TPR ratio is significant and similar, in all the investigated cases. This is interpreted to be caused by the increasing sampling volume of the GR with range, combined with non-homogeneous beam filling, e. g., at longer ranges of GR, the lower part of the volume could be in rain, whereas, the upper part of the same pulse could be filled with snow, or even be without an echo.

After correcting the GR data by using the derived averaged relationship, a significantly better agreement between the GR and TPR is found in all the overpasses analyzed. The agreement between the results of the two instruments is better for both the percentage of echo-areas and the rain amount within each area. It is also better for the agreement of the GR with the gauges. In the absence of TPR-data, it will be useful to investigate to what extent long-term, climatological data can be used to substitute TPR-data.