TESTING OF DUAL-POLARIZATION PROCESSING ALGORITHMS FOR RADAR RAINFALL ESTIMATION AND VALIDATION OF H-SAF PRECIPITATION PRODUCTS USING CHUVA CAMPAIGN DATASET

Lia Amaral, Daniel Vila and Thiago Biscaro

The availability of the data collected by mobile X-band polarimetric radar during the CHUVA Project provided the opportunity to test and apply a quality control on the retrieved X-band radar rainfall fields. The methodology is applied to with intent to identifying the most common radar error sources and eliminate or minimize its contaminations. Among them, the following error sources were considered: contamination from non-precipitation echoes (clutter), partial beam blocking (PBB), beam broadening at increasing distances, vertical variability of rain distribution and rain induced attenuation. A quality index for each source of error it was introduced through appropriate tests, allowing, when possible, its use to compensate for the polarimetric variables. These quality matrices constitute partial indexes that are part of a final overall data quality index. Additionally, the combination of different rainfall estimators (using polarimetric variables) were also employed in order to identifity the most appropriate estimator for each region (Vale do Paraíba and Manaus).

After the quality control treatment it was possible to verify the performance of the H-SAF precipitation products H01, H02 and H18 in comparison with CHUVA X-Band radar data collected during Vale do Paraíba and Manaus campaigns. As the satellite products are differentiated in terms of retrieval technique, spatial and temporal resolutions, the validation procedure it was composed by: ground data error analysis, upscaling of radar data to satellite native grid, temporal matching and statistical evaluation using continuous and multi-categorical scores. From the validation analysis it was noticed that in general all algorithms showed high FAR values and larger pattern of precipitation which are deeply related to the precipitation screening procedure which apparently is substantially affected by high water vapor content on the amazon region. Meanwhile, for the Vale do Paraíba, the algorithms H01 and H02, produce mean error values quite close to zero (or negative) and lower FAR values than Manaus. Differently of Manaus, the precipitation patterns are well detected and the estimations are pretty close of the reference as indicated by low mean error values.

The methodology adopted in this work for the CHUVA campaign can be an alternative approach with an embedded data quality control for the SOS CHUVA data, which can be used as constraint for future validation activities.