13.36 IMPACT OF THE VERTICAL GRADIENTS OF PRECIPITATION ON THE RADAR QPE BIAS IN THE FRENCH ALPS

D. FAURE[1] , N. GAUSSIAT[1], G. DELRIEU[2]

[1] Centre de Météorologie Radar, Météo-France, Toulouse, France

[2] Insitute of Geosciences and Environment, University Grenoble Alpes, Grenoble, France

dominique.faure@meteo.fr

In the French Alps region, the quality of the radar Quantitative Precipitation Estimation (QPE) provided by the French weather radar network, can be locally limited due to radar beam blockages, the distance to the radars, and the altitude of measurement: distant C band radars, or local X band radars installed in the mountain chain between 1740 m and 2580 m of altitude, scan the atmosphere above the mountain ranges and cannot sample precipitation into the valleys. A study realised in 2017 on data of the entire year 2016 in all the French Alps (Faure et al, 2017), has shown a general bias between values of the national radar QPE mosaic and the raingauges measurement: a radar QPE over-estimation for raingauges at low altitude, and an increasing underestimation for raingauges at high altitudes (up to 2100 m). This trend has been linked to altitudinal gradients of precipitation observed at ground level in the Alps, and not taken into account by the current radar data processing.

An analysis of these gradients is presented for a subset of 23 daily raingauges around Grenoble, the greatest French Alps conurbation situated at the confluence of three valleys. The raingauges are located at the bottom of the valleys (around 220 m a.s.l.) and on the slopes and top of the three massifs surrounding the conurbation (from 220 to 1730 m a.s.l.). A radar of the national network (Moucherotte X band radar, 1910 m a.s.l) is located inside the studied area at the top of the Vercors massif, which guarantees a good radar coverage. Since November 2016, it is also possible to use the volume scans of the XPORT research radar of IGE, installed in the Grenoble Alpes University campus, at the bottom of the valley (227 m a.s.l.). The XPORT high elevation angles of measurement (15°, 25°, 45°) allow to complete the bottom (below 2000 m of altitude) of the vertical profiles of precipitation estimated by the operational Moucherotte radar.

The analysis focuses on the vertical gradients of precipitation observed at ground level for different temporal accumulations (yearly, three months periods, daily) and for different spatial integrations (the all area, by slope). The corresponding values of the radar QPE mosaic are also presented, in order to explain the impact of the vertical gradients of precipitation on the bias between radar QPEs and raingauges measurements. The results for the subset are as well compared to the widespread results obtained for 430 raingauges at the scale of the entire French Alps and the all year 2016.

References

Faure D., Gaussiat N., Dupuy P., Delrieu G., Yu N., Sarter F., 2017, Quality analysis of the 2016 quantitative precipitation estimates in the French Alps, 38th Conference on radar meteorology, AMS, Chicago, IL, USA (https://ams.confex.com/ams/38RAD

AR/meetingapp.cgi/Paper/320389 or https://www.researchgate.net/publication/319457229)