13.55 MELTING LAYER CLIMATOLOGY IN THE GENOBLE VALLEY USING MULTI-FREQUENCY, MULTI-PARAMETER, MULTI-ANGLE RADAR MEASUREMENTS

A. KHANAL[1], G. DELRIEU[1], S.KREMER[1], F. CAZENAVE[1]

[1] Institut des Géosciences de l'Environnement, Grenoble, France
anil-kumar.khanal@grenoble-inp.org

The Grenoble experiment aims at developing advanced methods for rain and snow estimation using weather radar remote sensing techniques in high mountain regions for improved water resource assessment and hydrological risk mitigation. A unique observation system has been deployed since 2016 in the Grenoble (France) region. It is composed of a Météo France operated X-band radar (volumetric, Doppler and polarimetric) on top of the Mt Moucherotte (1970 m asl), a X-band XPORT radar (volumetric, Doppler, polarimetric), a K-band micro rain radar (MRR, Doppler, vertically pointing) and in situ sensors (rain gauges, disdrometers), latter three operated by Institut des Gosciences de l'Environnement (IGE) on the Grenoble campus (210 m asl).

An algorithm for the automatic detection of the melting layer (ML) characteristics has been developed based on the use of the higher elevation angles (15°, 25° and 45°) XPORT measurements and the vertically pointing MRR data. It allows the detection of the ML, along with vertical profiles of hydrometeors reflectivity parameters (Zh, Zv, Zdr and ρ_{hv}) from XPORT measurements and vertical profile of hydrometeors apparent falling velocities from MRR measurements. In these vertical profiles the ML is characterized by the peaks and inflection points. The algorithm is applied to a series of 40 events with significant rainfall in the Grenoble valley (typically above 10 mm/day), corresponding to a large variety of weather types and vertical structures of the atmosphere. Typical signatures of the various profiles are evidenced supporting some speculations about the micro-physical processes at work in various cases.

At the moment of this abstract submission, the project is at the stage of identification of periods of homogeneous precipitation at the scale of the volume sampled by the radars. The next steps concern the establishment of statistics between various radar observables and ground-based observations (e.g. rainfall intensity and temperature) as well as with the variables predicted by the Modèle Atmosphérique Régional (MAR) of IGE (e.g. 0°C isotherm altitude, water and ice contents, rain and snowfall rates) for the Grenoble 10 x 10 km^2 mesh.