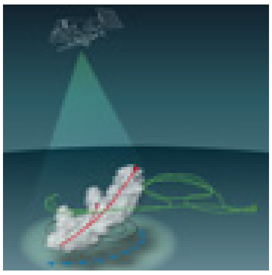

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Microphysics and dynamics of snowfall associated to a warm conveyor belt over Korea

Wednesday, 11 March 2020 14:35 (25 minutes)

On 28 February 2018, 57 mm of precipitation associated to a warm conveyor belt (WCB) fell within 21 h over South Korea. To investigate how the large-scale circulation influenced the microphysics of this intense precipitation event, we used radar measurements, snowflake photographs and radiosounding data from the International Collaborative Experiments for Pyeongchang 2018 Olympic and Paralympic winter games.
The WCB was identified with trajectories computed with analysis wind fields from IFS. Supercooled liquid water (SLW) with concentrations exceeding 0.2 $\mathrm{g\,kg^{-1}}$ was produced during the rapid ascent within the WCB. The SLW droplets eventually freeze to form ice crystals, which grow by vapour deposition in the outflow of the WCB, where the ice supersaturation is above 10%. This depositional growth above 5000 m a.s.l. is confirmed by polarimetric radar measurements. The WCB was collocated with a zone of enhanced wind speed of up to 45 $\mathrm{m\,s^{-1}}$ at 6500 m a.s.l., as measured by a radiosonde and a Doppler radar. Below this maximum of wind speed, a strong vertical wind shear creates turbulence. The precipitating crystals aggregate in this turbulent layer and experience riming by accretion of SLW droplets, which was confirmed by snowflake photographs at ground level. Furthermore, vertical Doppler velocity measurements suggest the presence of embedded convection with updraughts of 3 $\mathrm{m\,s^{-1}}$, which lift particles and produce more SLW, enhancing both aggregation and riming. This case study shows how a WCB provides ideal conditions for rapid precipitation growth involving SLW production, riming and aggregation. For accurate precipitation forecasts, atmospheric models need to correctly simulate the flow conditions in WCBs and properly parametrise the involved microphysical processes.

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