Analysis of the environment of a severe hailstorm in Mendoza, Argentina during the RELAMPAGO-CACTI field campaign

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Storms in the Mendoza province, Argentina are known for frequently producing large and severe hail. The environmental conditions and strong interaction with topography there provide unique conditions for the initiation and intensification of severe storms. The RELAMPAGO (Remote sensing of Electrification, Lightning, And Mesoscale/microscale Processes with Adaptive Ground Observations) and CACTI (Clouds, Aerosols, and Complex Terrain Interactions) field campaigns were deployed between October 2018 to April 2019 over west-central Argentina, and have collected unprecedented Intensive Observation Periods (IOPs) in the region. During the IOP number 10 on November 26, 2018, a severe hailstorm developed and moved across the observational network in the Mendoza domain. 4-cm diameter hail was reported over multiple hailpad sites and with in-situ measurements. Several soundings, mobile and fixed radar observations, and surface observations are available for this case, along with 1-min GOES-16 ABI Mesoscale Domain Sector (MDS) data coverage.

High-temporal frequency soundings and surface observations collected prior to the convection initiation are analyzed, allowing a detailed description of the storm environment. Processes leading to convective initiation over the higher terrain include the development of the upslope flow associated with a mountain-plains circulation, the weakening and ascent of the nocturnal inversion owing to diurnal heating and mixed-layer growth, and upper-level cooling related to the advance of a shortwave trough. Once the storm initiates, it moves eastward towards the lower terrain, where the higher CAPE and deep-layer shear environment support the transition into a supercell. It is after this transition that the most severe hail at the surface is observed.