 Identification of hailstorms from space is always useful for various applications and this has been fairly accurate with the GPM. We study the vertical features of the GPM DPR profiles to develop algorithm to identify graupel and hail. These features include the dual-frequency ratio slope along the height, maximum value of reflectivity and storm top height etc. A precipitation type index (PTI) is built upon these features, with certain threshold, it outputs a GH flag. This flag is a Boolean product with “1” representing graupel hail exist along the vertical profile and “0” for not exists. We cross validate this algorithm with “flagHeavyIcePrecip”, a GPM flag built based on thresholds of reflectivity and dual-frequency ratio (Iguchi et. al, 2018) [1].

In this research, we generate the GH flag map on a global basis. Variations on the geophysical locations as well as the seasons are studied. In addition, percentage of convective rain that produces graupel and hail is estimated. Figure 1 illustrates a global map of this GH flag using 2018 whole year data from GPM DPR. We observe high counts in central Africa, South America, and Australia. These regions correspond well with active lightning regions where is believed to be associated with the existence of graupel at high altitudes.

RELAMPAGO (Remote sensing of Electrification, Lightning, And Mesoscale/microscale Processes with Adaptive Ground Observations, translates to lightning flash in Spanish and Portuguese) is a collaborative field campaign to observe convective storms that produce high impact weather in the lee of the Andes Mountains in Argentina. RELAMPAGO provides unique observations of atmospheric and surface conditions in a region with substantial terrain and explore a regime of convection not observed comprehensively. In this research, we cross validate the graupel and hail identification algorithm with ground radars and other instruments during the campaign. Extreme cases with very high altitudes are discussed.

REFERENCE


Keywords: GPM DPR, Graupel and hail, identification