

PIP Reveals Winter Storm Characteristics At GPM/PMM Ground-Validation Sites

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- PIPs are installed in cold regions at GPM/PMM Ground-Validation Sites.
- They continuously record high frame rate videos of falling precipitation.
- Video analysis identifies and tracks particles in successive images.
- The Particle Size Distribution (PSD(D)) is calculated for each minute.
- The Fall Speed Distribution (V(D)) is calculated for each minute, where D is Equivalent Diameter.
- Winter Storm Characteristics are revealed by analysis of various distributions.
- Rain and not-Rain precipitation is identified.
- Snow-water equivalent rates (SWER) can be derived, e.g. Böhm's particle method or other methods.
- *Operation of PIPs in cold regions shows that PSDs, Vs and visualizations can be produced routinely.*

Storm(A) has low density snow. Storms(B,C,D) have average density snow. Storm(A) PSD has a dearth of small particles compared to Storms(B,C,D). The 10 minute V(D) figures illustrate low noise data during stable weather. An empirical all weather eDensity model is formulated. eDensity is the Equivalent Density, which is computed using V(D), i.e. the velocity distribution. Volume average eDensity is calculated for each minute using PSD(D) and V(D). Herein SWER is computed for each minute using the all weather eDensity model, PSD(D) and V(D). Validation/refinement of the all weather eDensity model are ongoing, so it is premature to quantify reliability. As measurements span different conditions, a robust all weather eDensity model is likely to be established. Comparison of model and data will show strengths and weaknesses.



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8 PIPs at GPM-PMM Sites



Hurricane Ridge, WA



Hyttiälä, Finland

