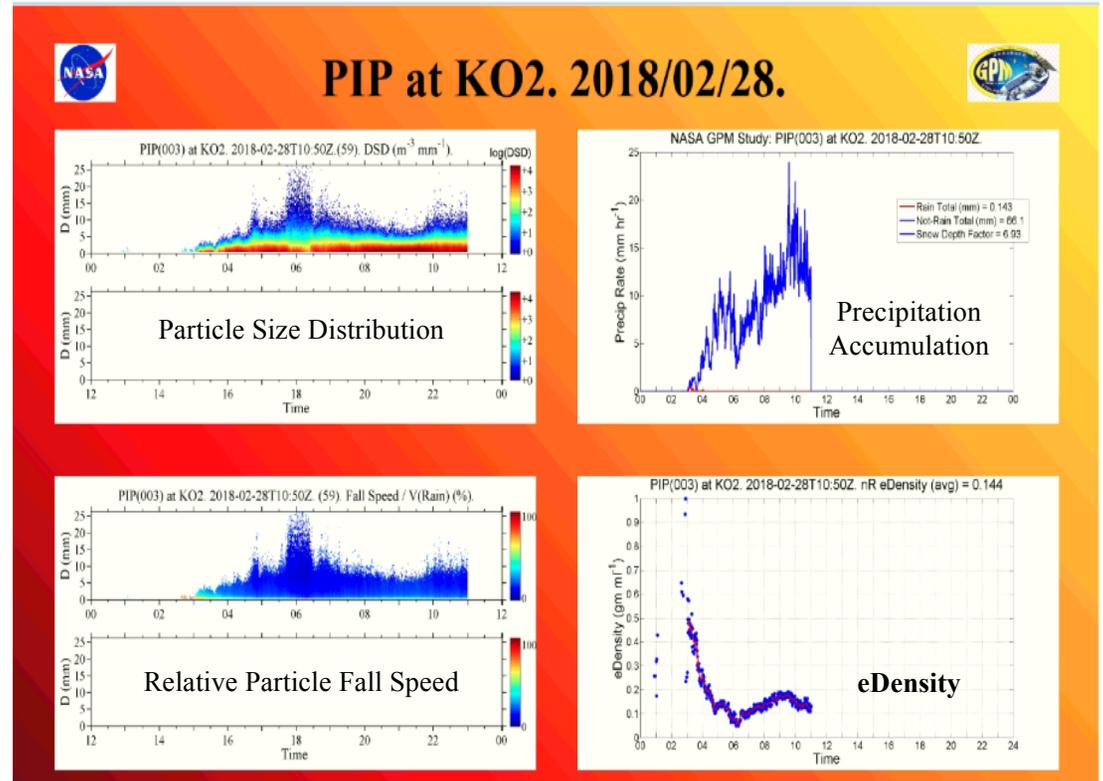


Using NASA's Precipitation Imaging Package (PIP) to Determine Snow Water Content

Science Question: Can observed fall speeds of snowflakes be used to retrieve particle densities and more importantly, snow water content?

Finding: The Precipitation Imaging Processor (PIP) designed at NASA Wallops Flight Facility was deployed in support of the International Collaborative Experiment - Pyeongchang Olympics and Paralympics (ICE-POP) during the 2018 Winter Olympics. The PIP uses a high-speed video camera to measure the particle size distribution of precipitating particles. Liquid particles have densities of 1 g cm^{-3} and fall predictably along theoretical relations with drop size (mass). Snowflakes and mixed-phase particles, however, have widely varying densities. The relative fall-speed (i.e., the ratio of the snowflake fall-speed to the terminal velocity of a similar sized raindrop) is used to estimate the effective density (eDensity), which is then used to compute the total precipitation by the *rain/mixed/snow* components of the precipitation event.

Impact: NASA is interested in developing better measurements of mountain snowfall from space, which involves obtaining a better understanding of the physics of snow that produce the signals we see with satellite remote sensors. In a sense we are trying to ensure a triangle of consistency between ground observations, satellite measurements, and model-predicted snowfall amount.



Why it Matters: Snowfall is an important contributor to the hydrological cycle and in many areas is the most abundant source of potable water available. Knowledge of the snow water equivalent in snowfall is key to improved hydrological modelling and societal impact planning.