Ambient Environments for Ice Mass Growth and Shrinkage in the Context of Winter Storm Structure

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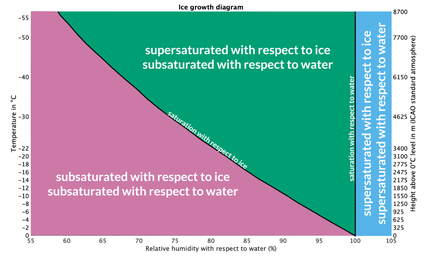
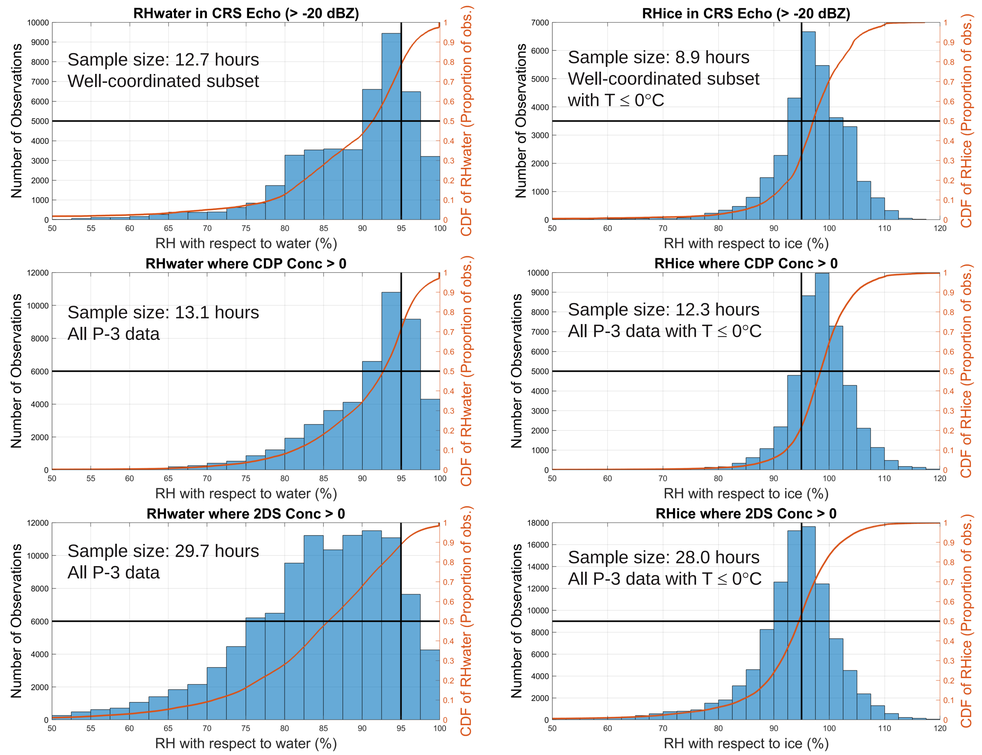


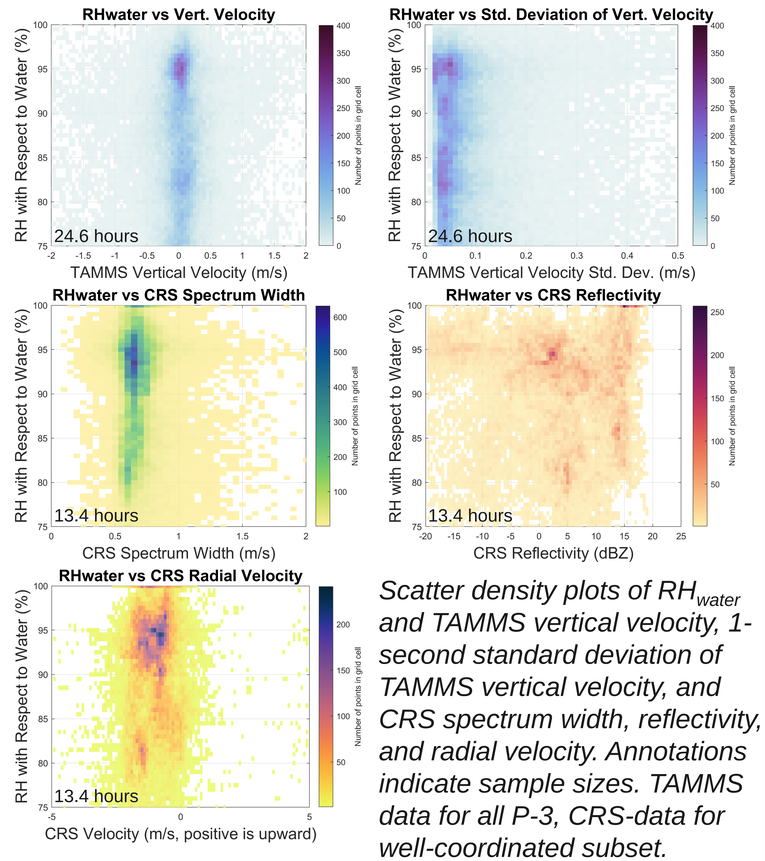
Methods and Findings

We focus on winter 2020 IMPACTS data when the NASA ER-2 was well coordinated with the NASA P-3. We define these conditions as when P-3 was located within ± 3 km horizontal distance and within ± 5 minutes of a given point on the ER-2 track.

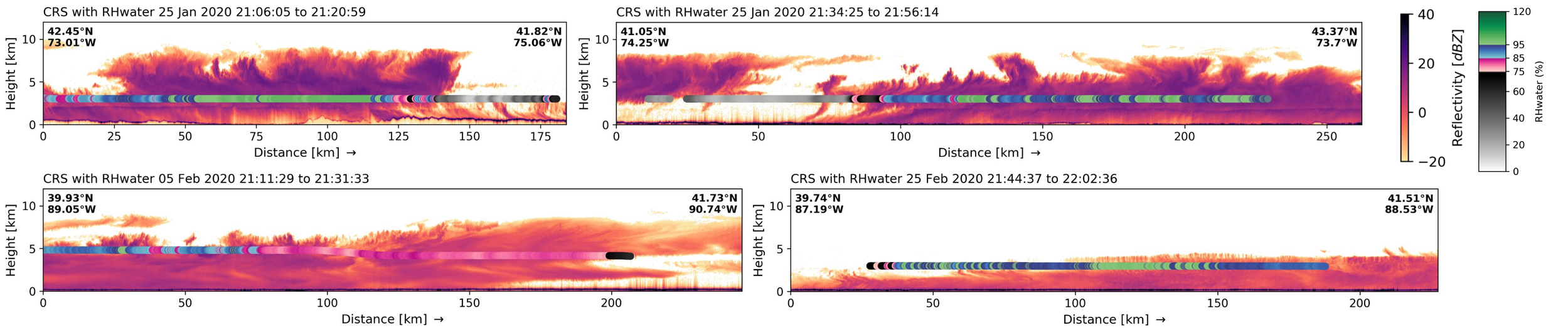
- Within CRS echo (> -20 dBZ), around 33% of P-3 samples were subsaturated with respect to ice, and around 80% were subsaturated with respect to water.
- No obvious correlation between RH_{water} and TAMMS vertical velocity, vertical velocity variance, CRS spectrum width, reflectivity, or radial velocity was found.
- Regions of saturation with respect to water do not appear to systematically coincide with repeatable CRS-detected features.



Histograms of RH_{water} (left column) and RH_{ice} (right column) for points in CRS echo (top row), where the CDP detected any particles (middle row), and where the 2D-S detected any particles (bottom row). CDFs of RH_{water} overlaid in orange. Solid black lines indicate 95% RH_{water} and 50th percentile. Annotations indicate sample sizes.



Scatter density plots of RH_{water} and TAMMS vertical velocity, 1-second standard deviation of TAMMS vertical velocity, and CRS spectrum width, reflectivity, and radial velocity. Annotations indicate sample sizes. TAMMS data for all P-3, CRS-data for well-coordinated subset.



Subset of well-coordinated flight legs between ER-2 and P-3. CRS reflectivity is overlaid with P-3 RH_{water} measurements along P-3 flight track altitude.

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