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RASTA Cloud Radar Data Processing Status

RASTA: Status as of September 2015

Radar pointing angles checked using land surface height and zero Doppler

Radar reflectivities calibrated using ocean surface (also 6 antennas inter-calibrated)

Reflectivity enhancement at short range corrected (paper in preparation)

Doppler velocity unfolding technique improved and validated for all flights
(for the "low-res" 3D wind retrieval technique that works on straight legs)

"low-res" 3D wind retrieval technique assessed at flight level using aircraft in-situ winds: good !

Ice microphysics retrieval checked against IKP IWC version 3 (awaiting V4)

Tasks remaining (as of 09/2015) :

Attenuation masking and correction (if possible)

Develop a "high-res" 3D wind retrieval that would also work during aircraft turns.

Need validated PSDs to improve our Radonvar microphysical model + process study

Deliver the data to you !

RASTA : Status as of March 2015

Attenuation has been detected and masked. The differential attenuation from the different antennas is too weak to work out an attenuation correction. It is advised not to use the data masked as "attenuated" except near flight altitude.

High-res 3D wind retrieval developed and evaluated.
Doppler unfolding issues detected in vigorous updrafts (issues are already partly identified).

Rain rate retrieval using attenuation below melting layer (~ CloudSat, Matrosov et al. 2007) – Bonus, not validated yet.

Ice microphysics retrievals refined, now available (same resolution as High-res 3D). Including W and V_T retrievals.

Intermittent overestimation of IWC for $IWC > 2.5 \text{ gm}^{-3}$ in convective profiles.
We know why (see science talk). Should be fixed soon, but needs more theoretical radar work and improvement of $M(D)$ for large IWC.

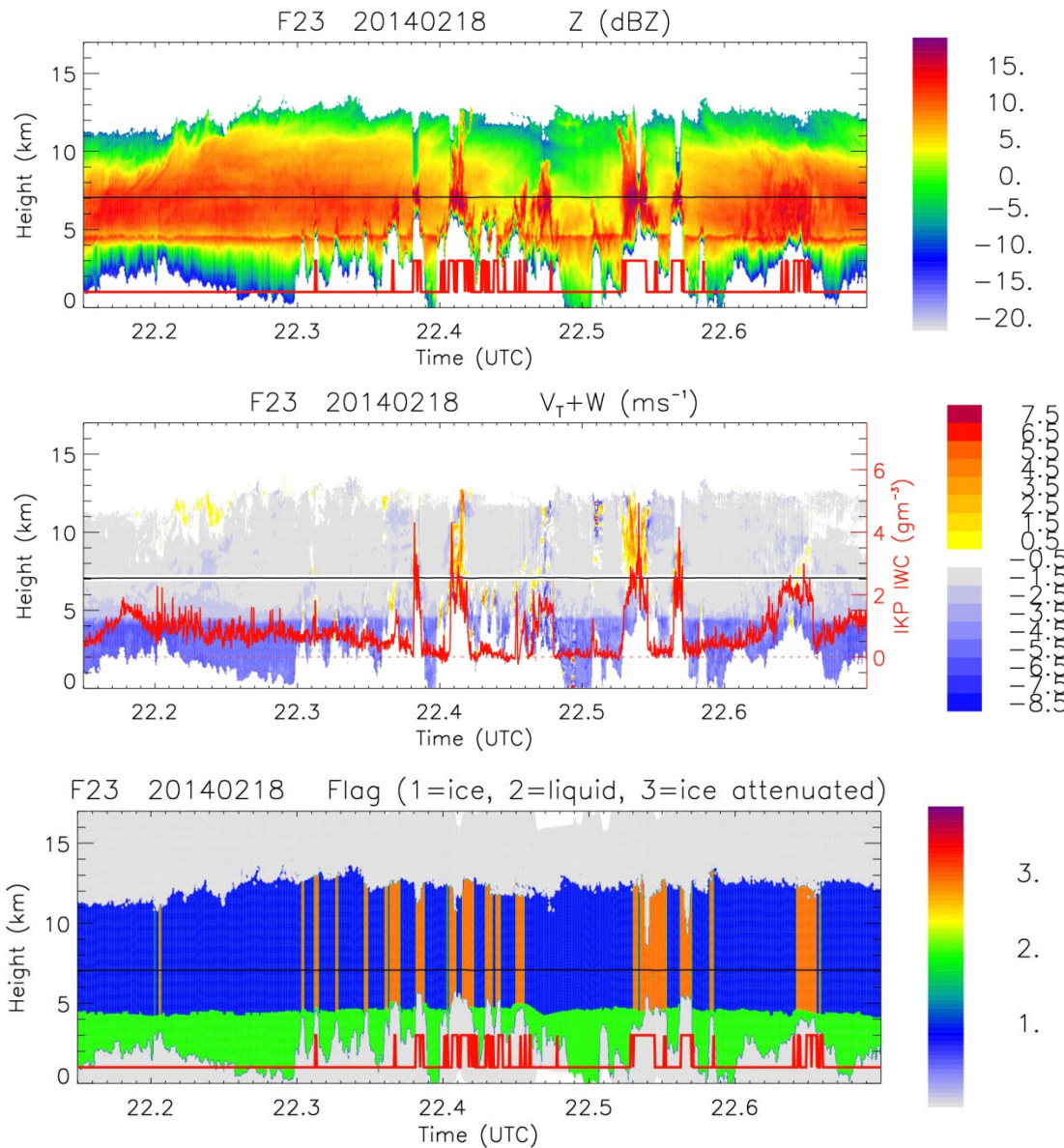
Preliminary RASTA files include all level 2 RASTA data, aircraft in-situ parameters, attenuation and phase flag, rain rate, convective index, high-res 3D winds, ice microphysics, melting layer altitude, and gaseous attenuation at 95GHz.

There is still a need for some refinements / validation for 3D winds and microphysics, but if you accept further updates later, you can have these files now :

<ftp://ftp.latmos.ipsl.fr> username : haicr (password to be provided later)

=> **Feedbacks greatly appreciated!**

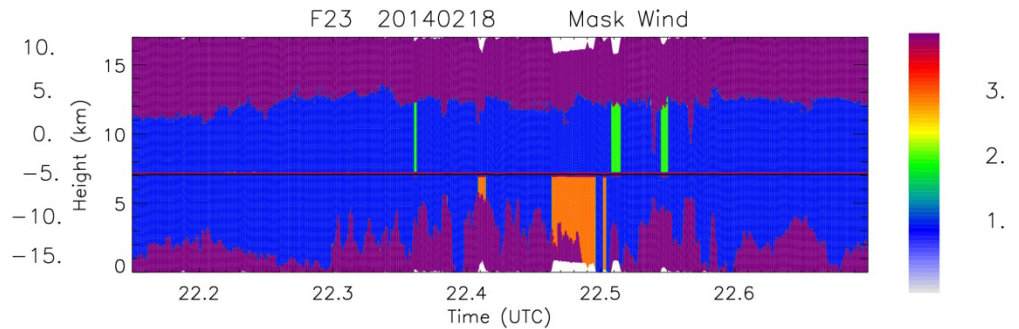
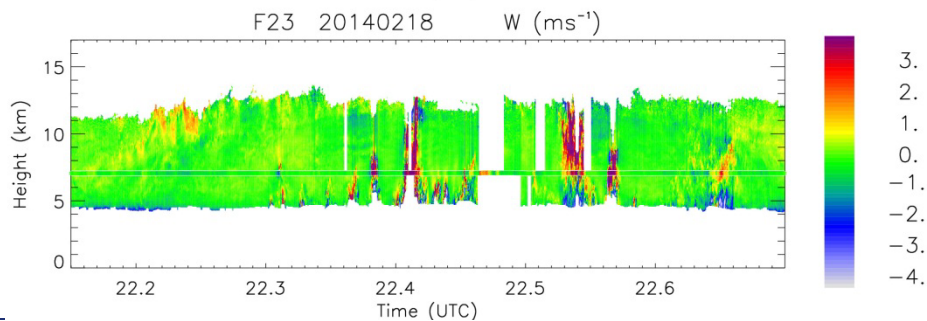
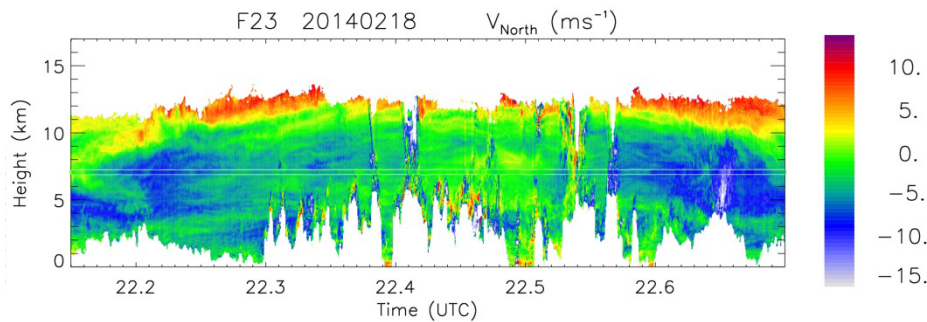
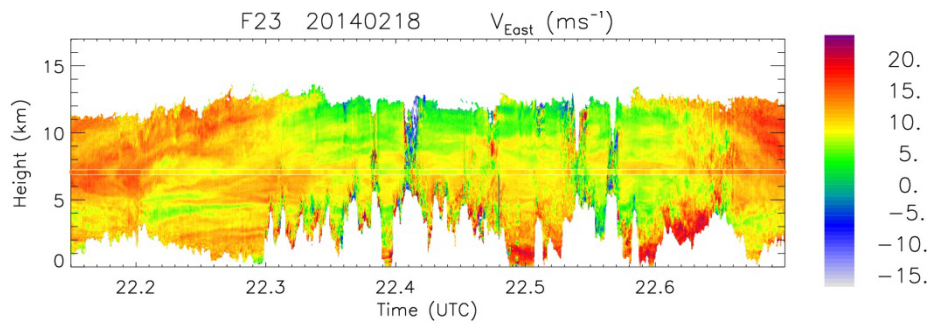
Attenuation / Phase Flag – Convective Index



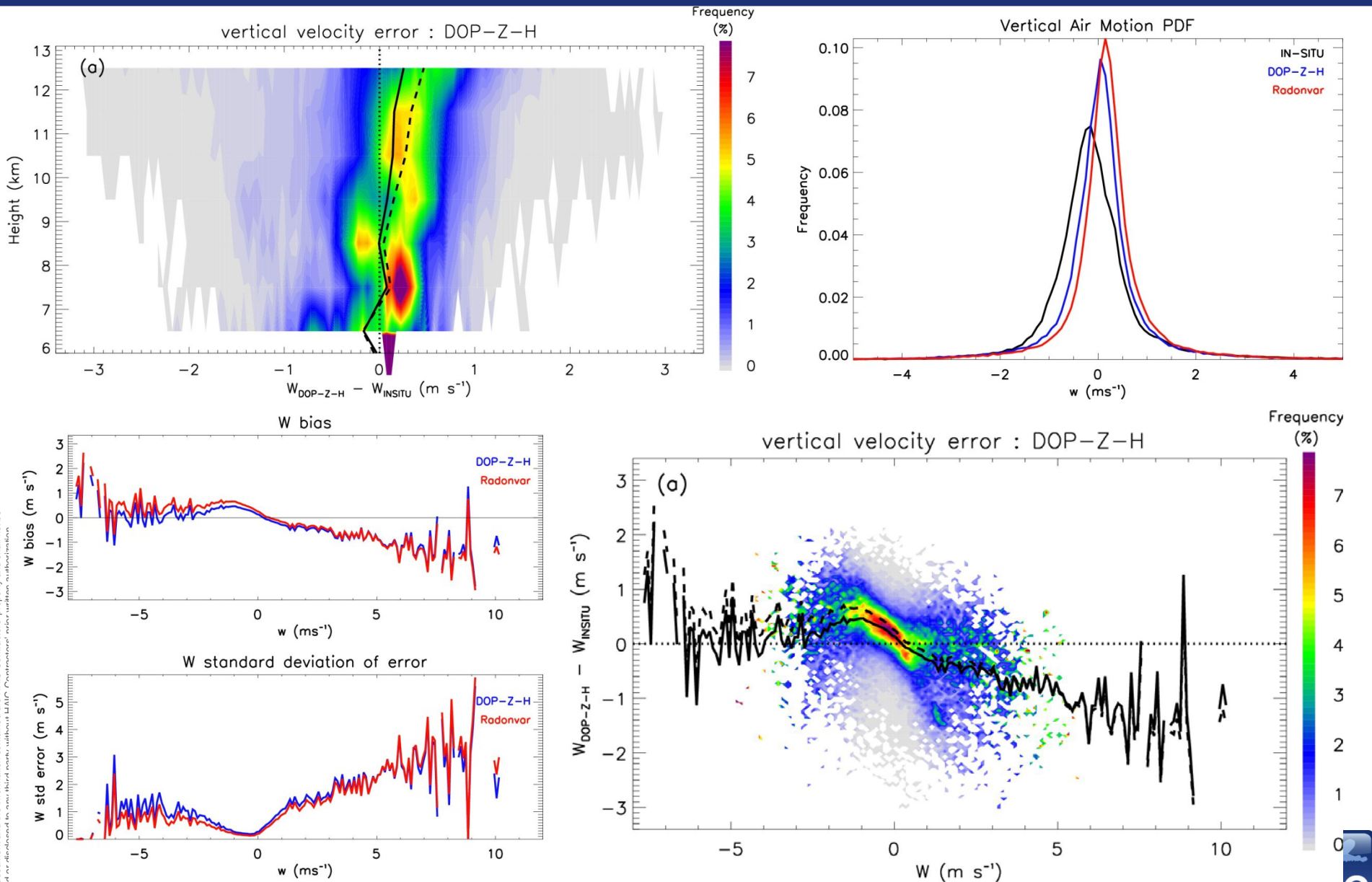
High-resolution 3D wind retrieval development

The Cartesian gridding of the low-res technique requires to use ~ straight flight patterns.
H / V grid size is 500m / 120m (not bad already).

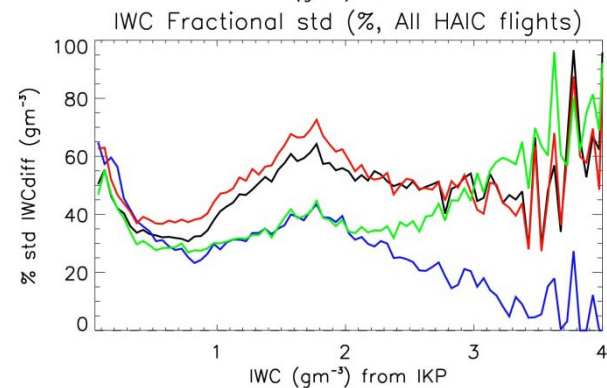
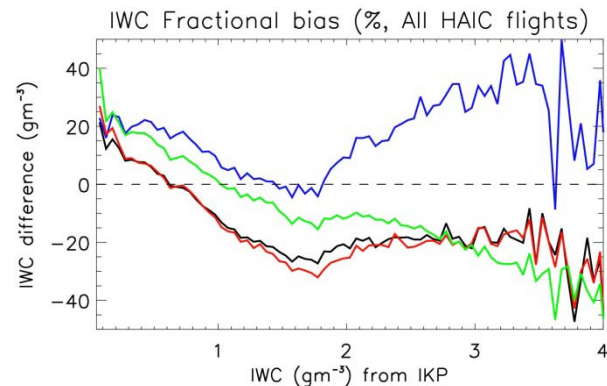
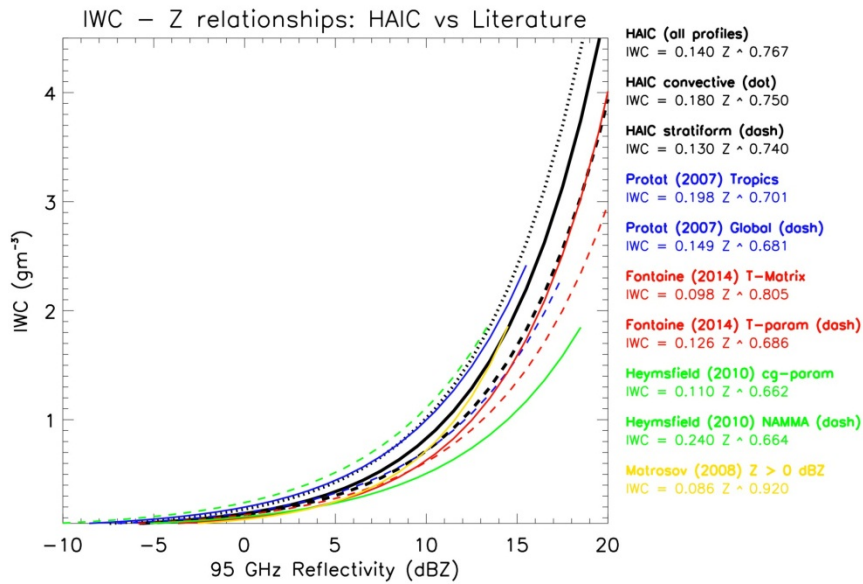
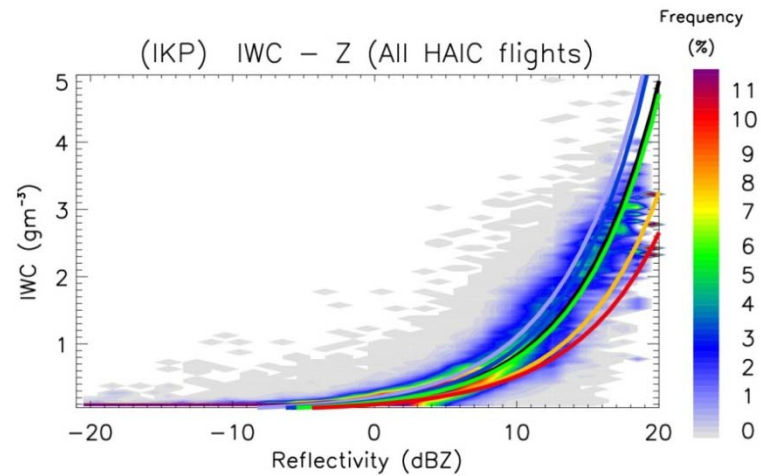
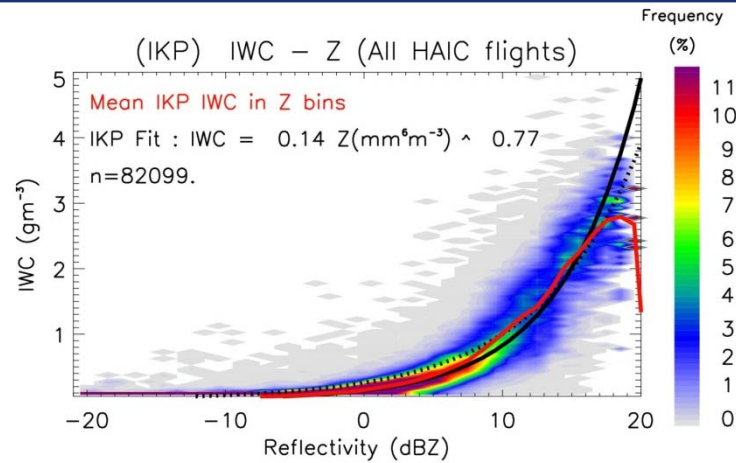
The new technique finds the common volumes sampled by the three antennas (down or up) and does the retrieval using the three non-colinear Doppler velocities for each of these volumes.
Works for any aircraft trajectory + retains the highest resolution (~ 150m horizontal, 60m vertical).



High-res 3D wind retrieval: validation



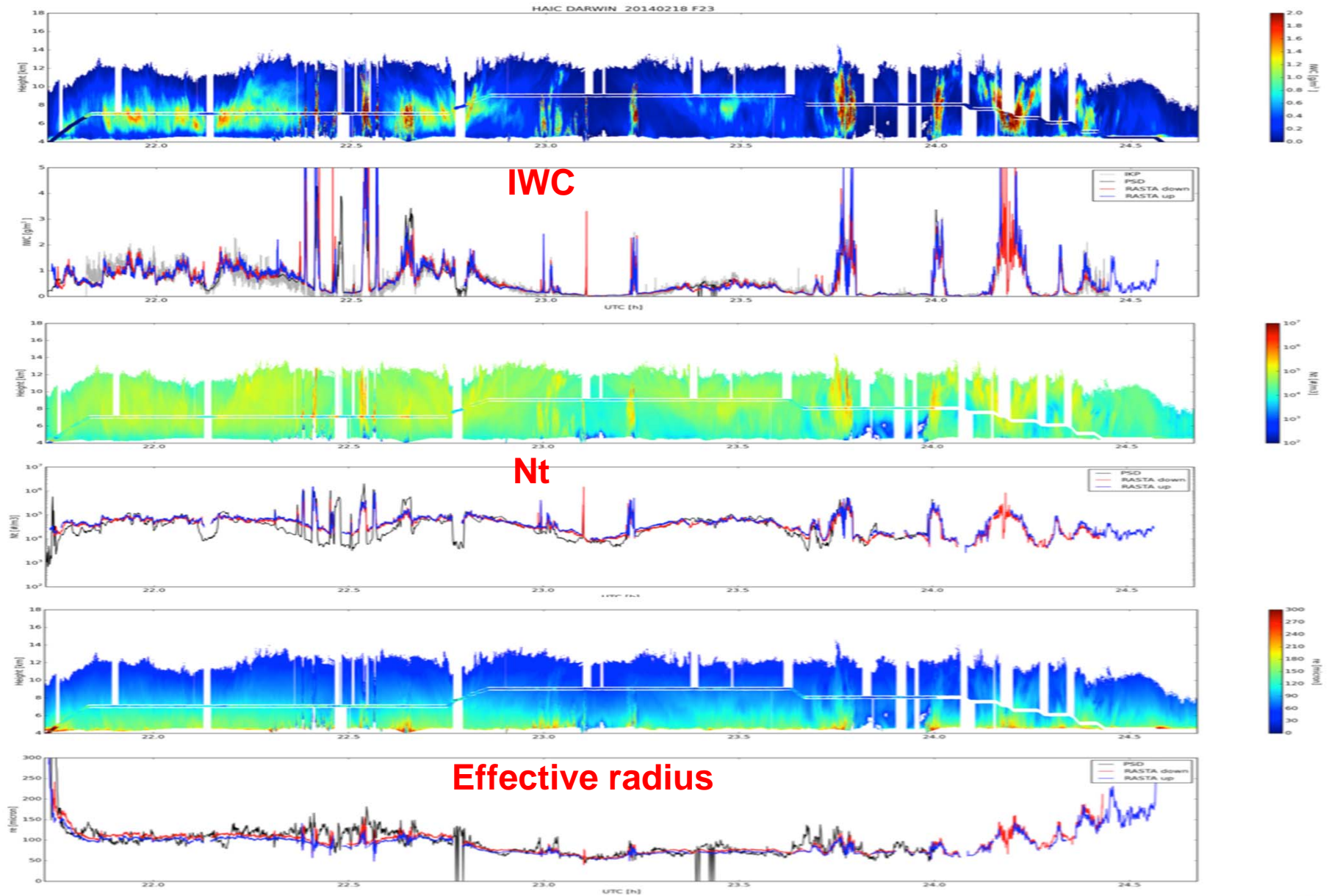
RASTA IWC retrievals



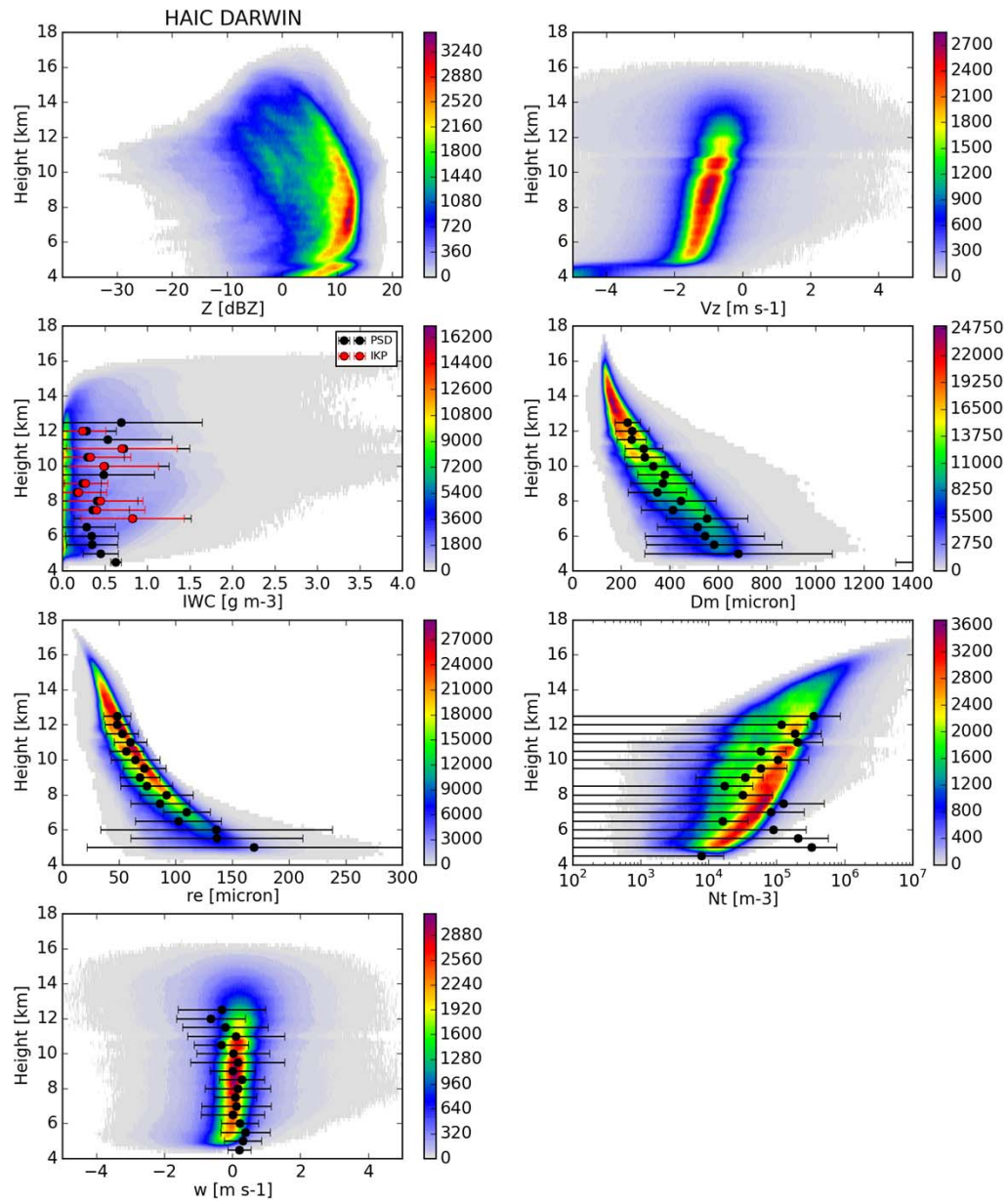
IWC - Z - T
IWC - Z
LUT (Z,T)
Radonvar

Errors
 Bias ~ $\pm 20\%$
 Std ~ 30-60%

A few more results from Radonvar



A few more results from Radonvar



Statistics per flight and for all flights