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HAIC/HIWC Research Update

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HAIC-HIWC Science Team Meeting,
Manhattan, 10-March-2015

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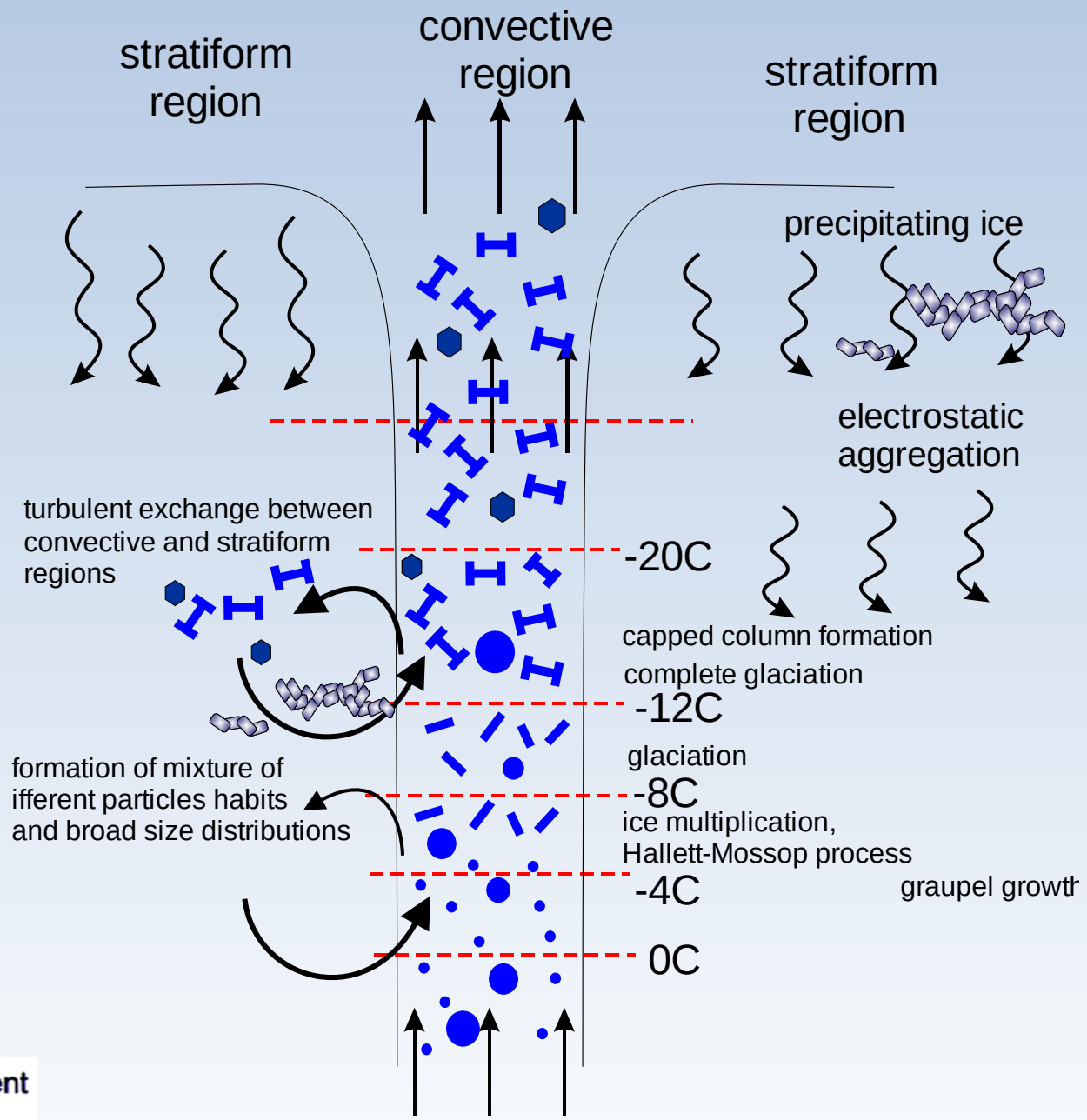
EC HAIC/HIWC research was focused on:

1. Analysis of the Flight 23: Mechanisms of the formation of high ice water content regions
2. Refinement of the algorithms and comparisons of the 2D particle probe data processing software
3. Lab calibration of 2D probes and evaluation of performances of the 2D processing algorithms.

Conceptual model of microstructure formation in MCS (flight 23)



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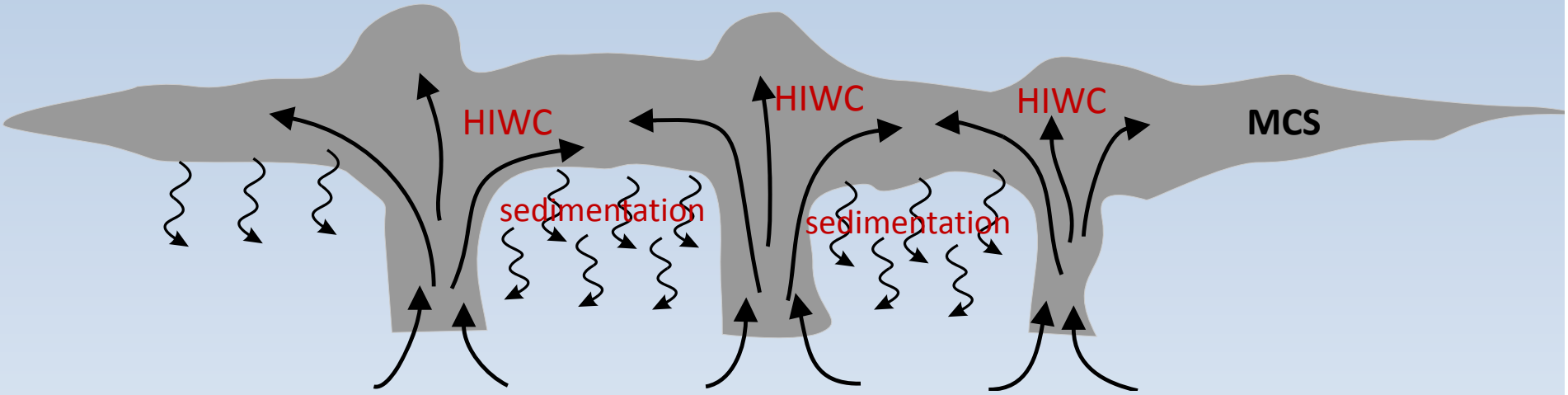
Conceptual model of HIWC formation in MCSs



- HIWC in stratiform reqions are formed as a result of periodic pumping of condensed water in the stratiform regions of MCSs by convective flows (2<Uz<15m/s).
- The convection originate in the warm sector of MSCs at H<5km and may extend to 12km or higher.
- HIWC regions are dynamic objects and they form as a result of balance between particle sedimentation and IWC brought up by convection

Preliminary conclusions based on Flight 23

1. The origin of cloud HIWC regions are primarily associated with convective updrafts.
2. Glaciation of convective updrafts seems to occur at T>-10C. Hallett-Mossop process appears to be the main mechanism of ice initiation.
3. Electrostatic aggregation appears to play an important role in precipitation formation in MCSs. Most aggregation occur in stratiform regions.

Abstract submitted to: SAE, 2015, Prague (oral presentation)
IUGG, 2015, Prague (oral presentation)

On the origin of high altitude high ice water content regions in oceanic deep convection

A. Korolev, A. Schwarzenboeck, A. Ackerman, J. Delanoë, F. Dezitter C. Dumont, A. Fridlind, A. Grandin (Airbus), L. Lilie, R. Potts, A. Protat, J. W. Strapp, A. Varble, E. Zipcer.

In preparation for submission to GRL

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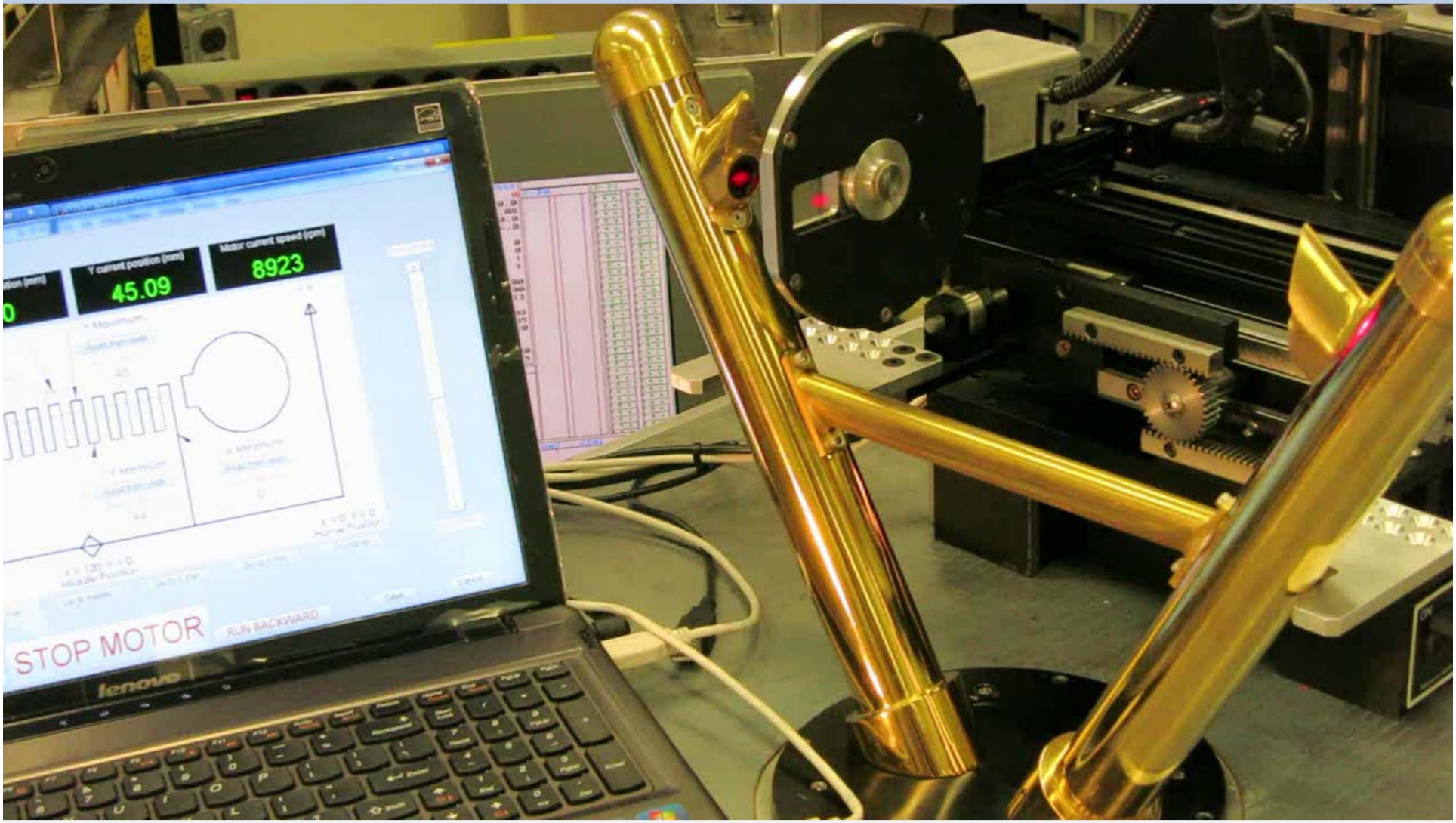
Development/refinement of the algorithms and comparisons of the 2D particle probe data processing software UBP, EC, UoI.

Two stages of comparisons:

1. Step-by-step comparisons approach
2. Before corrections
3. After corrections applied

Laboratory installation for spinning disc calibrations of 2D probes



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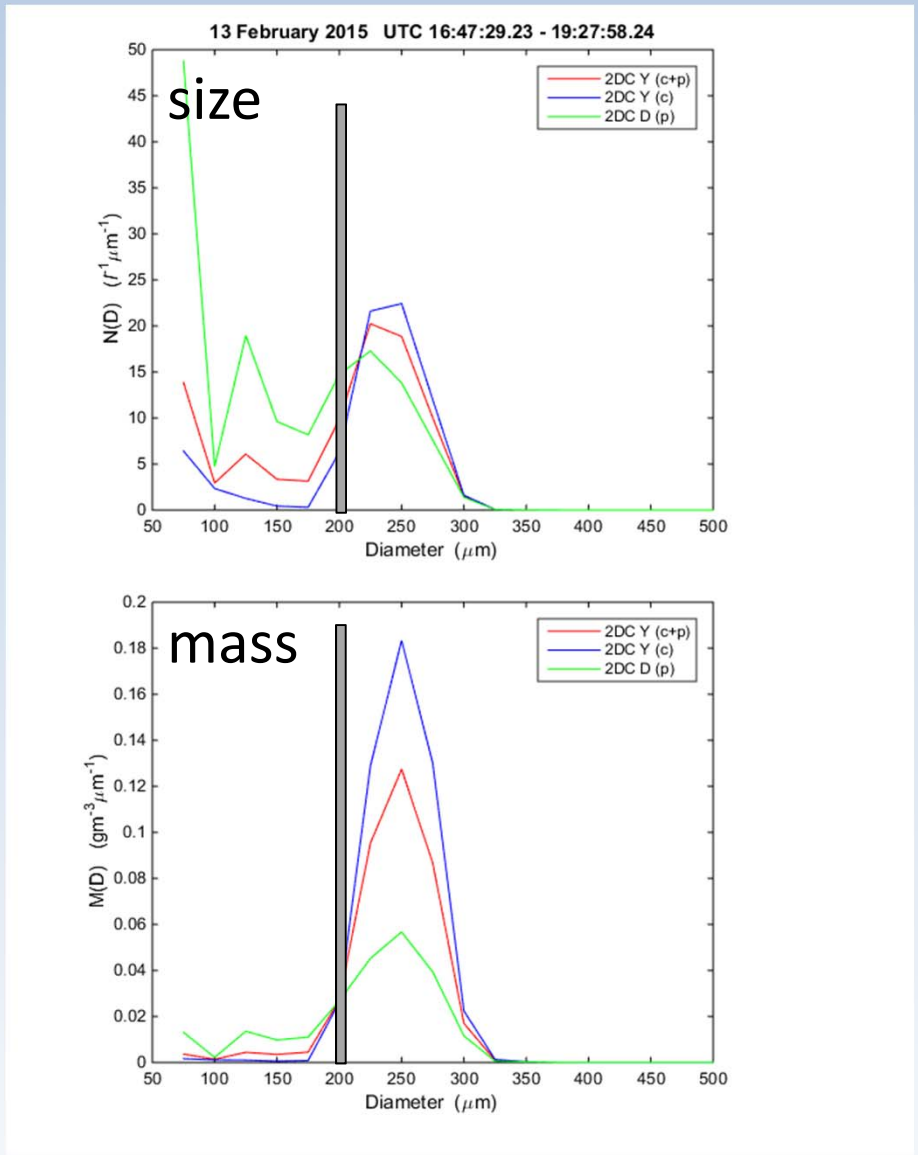
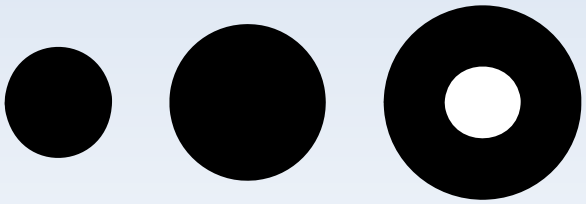
First results:

Measured size and mass distributions for monodisperse 200μm dots



Overestimation of measured mass and particle size.

Size corrections are important



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Thank you

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