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Particle Size Distribution dataset

High Altitude Ice Crystals
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Data files

Quick description of the files ➔ readme.pdf

Missing information :

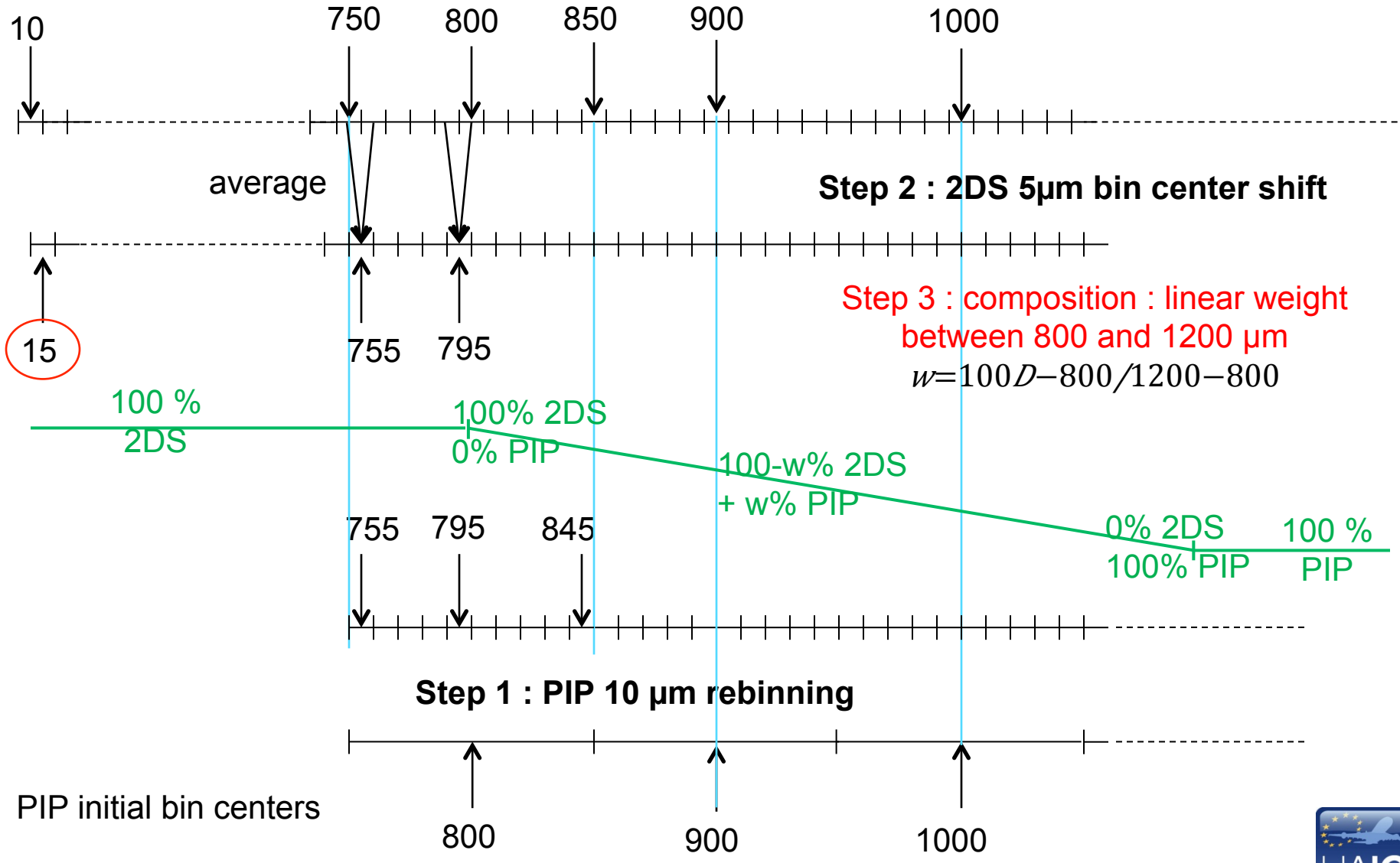
Times corresponds to the **starting time** of the 5s interval

Correction:

Size bin of the composite PSD	1284 bins with a 10 µm resolution between 15 and 12845 µm.
Composite PSD compilation method	~~Cross over size where PIP takes over from 2DS = 1000 µm~~
Time resolution	5 s

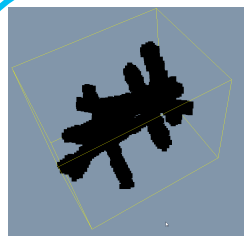
2DS and PIP PSD are merged over the 800-1200 µm interval

Composition



Mass-size distributions

Same principle as for the MMD compution (i.e. already presented in Melbourne)



THEORY

3D particles simulations

β

2D particles projections

Surface-size relationship

$S=\gamma D\downarrow\uparrow\sigma$

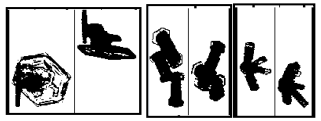
Perimeter-size relationship

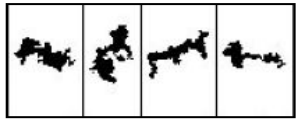
$P=\delta D\downarrow\uparrow\tau$

$\beta=f\downarrow D(\sigma,\tau)$

IN-SITU DATA

2D-S & PIP images





D $S=\gamma D\downarrow\uparrow\sigma$ $N(D)$

$P=\delta D\downarrow\uparrow\tau$

$\beta=f\downarrow D(\sigma,\tau)$

1) Size retrieval

D=deq, dmax, ly, $lx+ly/2$

2) Particle Size Distribution

$m=\alpha(t)D\uparrow\beta(t)$

3) Mass Size Distributions

α(t) deduced from IKP: $TWC(t)=\alpha(t)\sum i\uparrow N(i)D(i)\uparrow\beta(t)$

➔ Summing the Mass Size Distribution will give back the TWC measured by the IKP-2

CDP-2 Particle Size Distributions

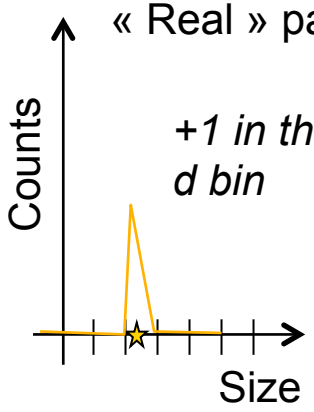
Monte-carlo inversion method (copy from Melbourne meeting)

1) Choose one size ☆ randomly in the 2-50 µm range

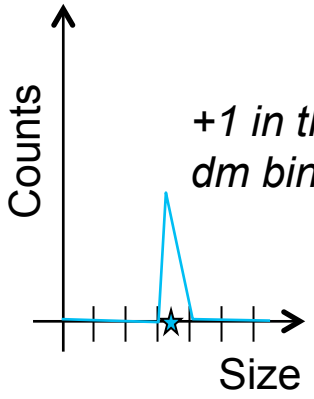
2) Compute the corresponding scattering cross section σ (mie theory)

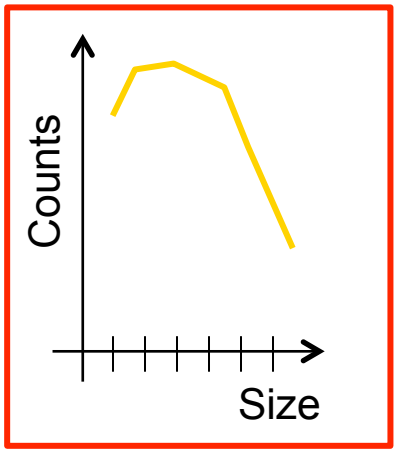
3) According to the bin limits in σ, compute the corresponding « measured » size ☆

« Real » particle spectra



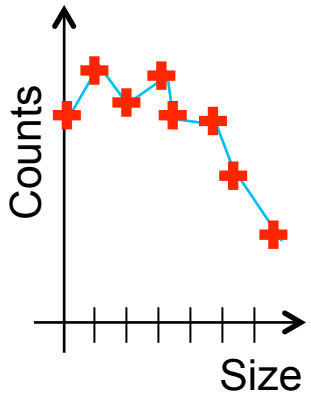
recontructed« measured » particle spectra





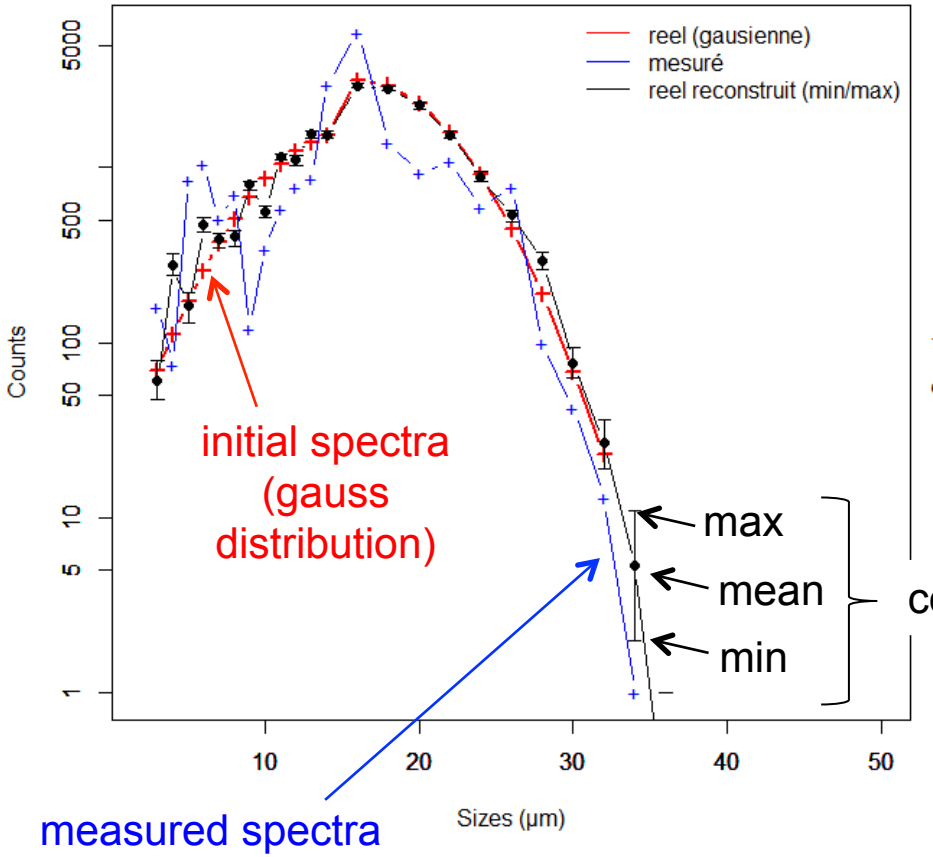
✚ « true » measurement

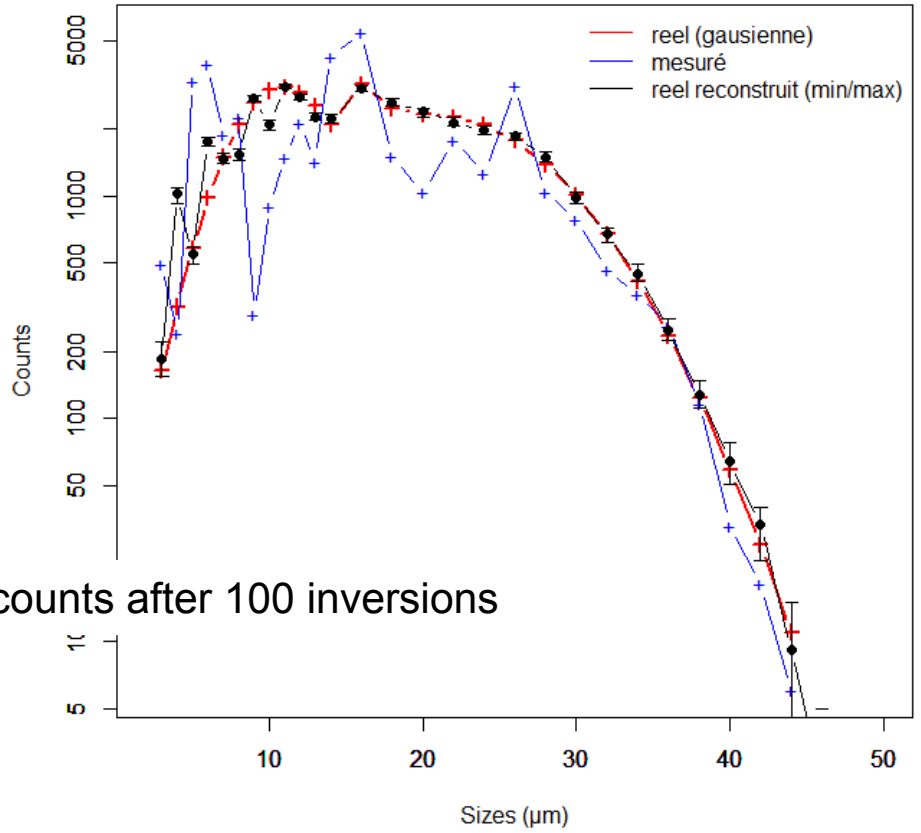
until



CDP-2 Particle Size Distributions

First tests





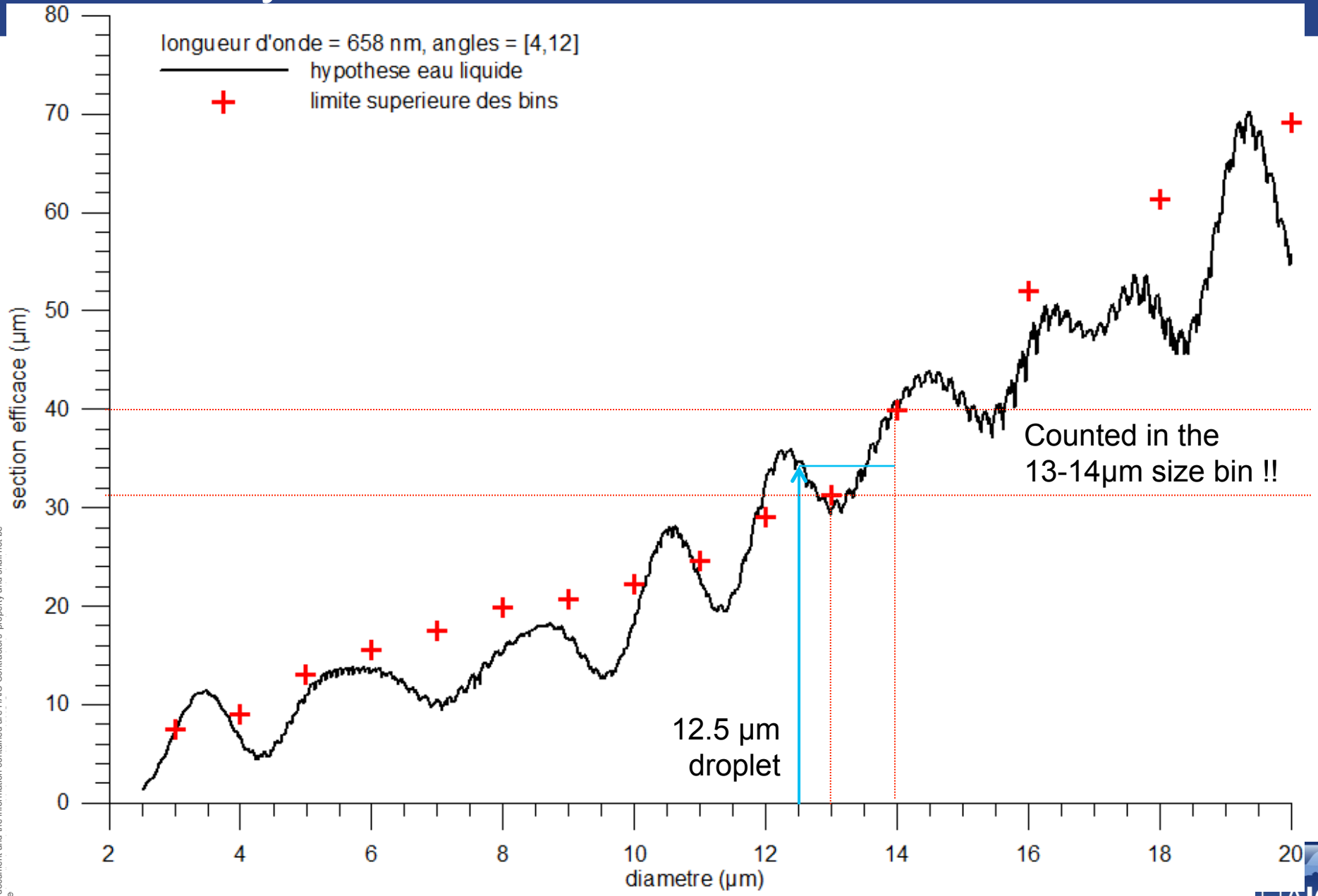
counts after 100 inversions

➔ Still some oscillations but much less than in the raw measured spectra
➔ Apply to measured data

High Altitude Ice Crystals (HAIC, 314314)

Project co-funded by the European Commission within the Seventh Framework Programme (2012-2016)

Mie theory



Mie theory