



ADM-Aeolus VAMP
WP 4a: Mie Core QC

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Content:

- additions since last meeting
 - update TN₃ to extended dataset
 - look at inner loop iterations of Mie Core
 - altitude dependency
- conclusions

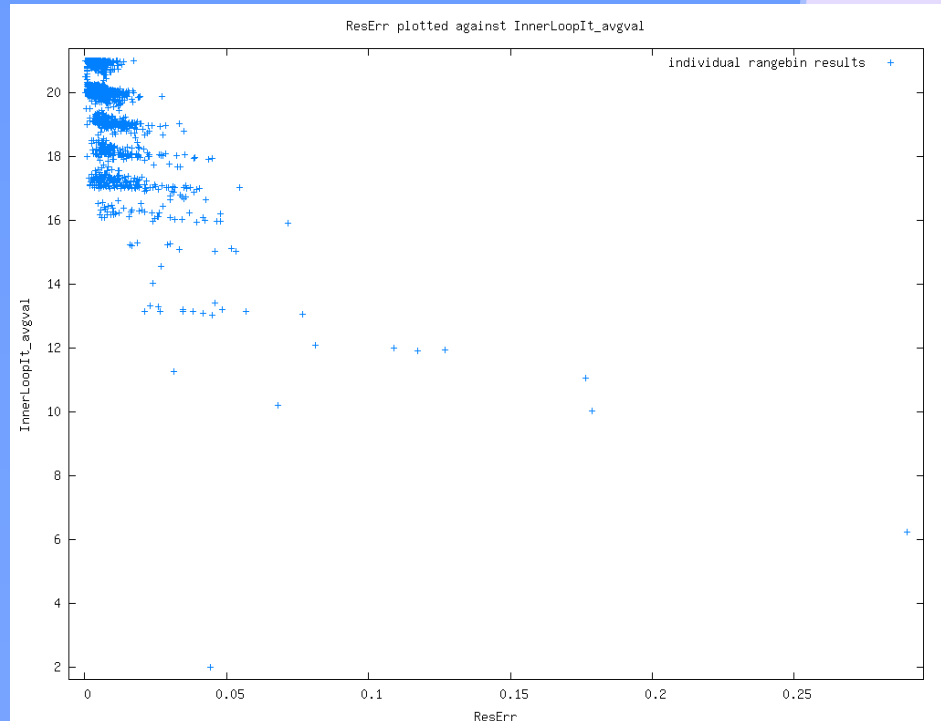
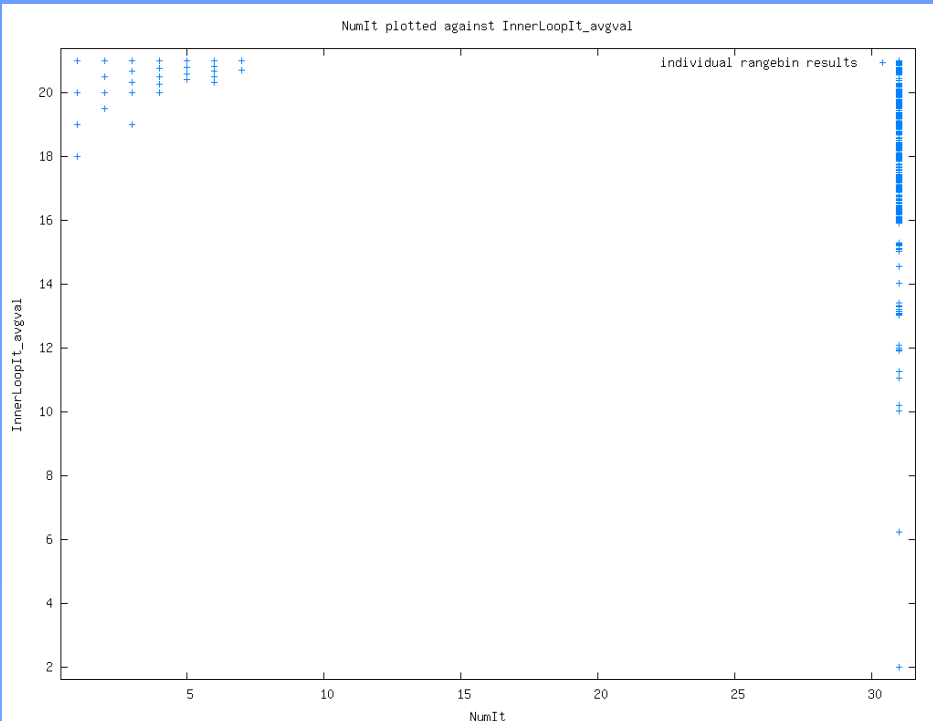
Update TN₃ to extended dataset

- Statistics are now based on 10 half (night time) orbits of CALIPSO backscatter data, collocated with ECMWF NWP wind and temperature profiles
- Error multiplier with fixed value of 3 at all altitudes was used to increase the wind shear
- All CALIPSO figures have been updated accordingly
- All tables and numbers have been recalculated
- Main results remain unchanged

Inner loop iterations of Mie Core

- Mie Core algorithm in the L2bP software has been modified to allow extracting information on the inner loop behaviour.
- Mie Core routine now exports optionally an array giving the number of inner loop iterations for each out loop iteration.
- For plotting purposes the tool stores:
 - min/max/avg value
 - number occurrences of min value
- Change was implemented after running all CALIPSO orbits. Therefore results based on shorter LITE case.

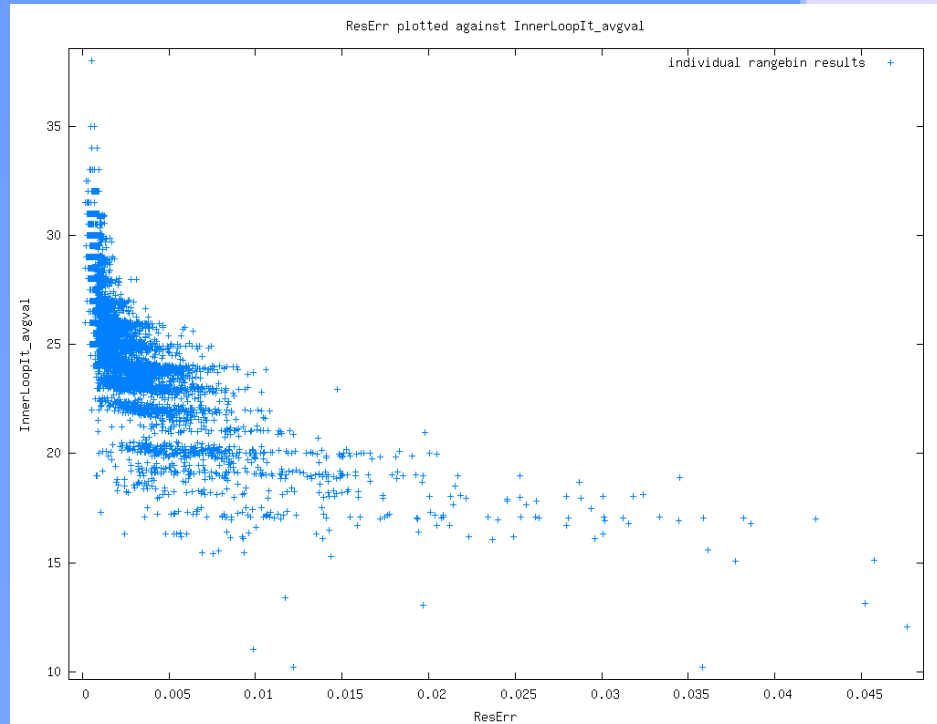
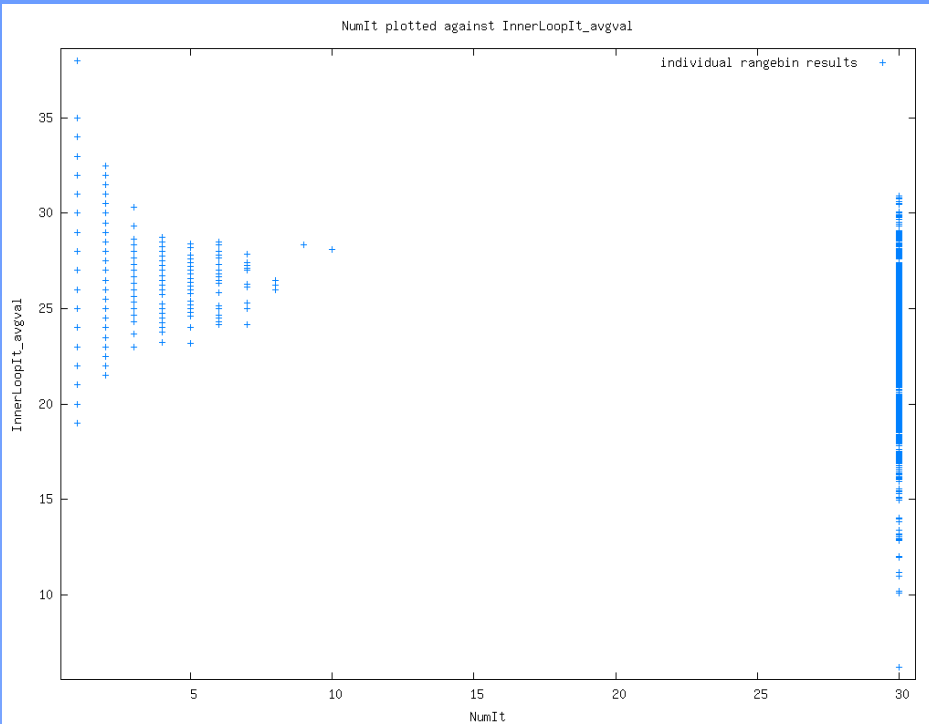
Inner loop results



- inner loop iterations vs. outer loop iterations

- inner loop iterations vs. residual error

Inner loop results: 200 iterations allowed



- inner loop iterations vs. outer loop iterations

- inner loop iterations vs. residual error

Inner loop iterations: results (1)

MaxNumIt	Windspeed Error		Windspeed Error for ResErr < 0.005	
10	0.7169	m/s	0.6728	m/s
15	0.6396	m/s	0.5889	m/s
20	0.6274	m/s	0.5764	m/s
25	0.6267	m/s	0.5761	m/s
200	0.6268	m/s	0.5763	m/s

NonLinOptThresh	Windspeed Error		Windspeed Error for ResErr < 0.005	
0.01	0.6268	m/s	0.5763	m/s
0.001	0.6213	m/s	0.5740	m/s
0.0001	0.6206	m/s	0.5739	m/s

Inner loop iterations: results (2)

- number of inner loops seems larger for
 - lower residual error values (better fits)
 - lower number of outer loop iterations (better fits)
- inner loop is truncated a little too soon
 - allowing upto 35 iterations may improves results slightly, but will also increase runtime (not an issue at L2B stage)
 - with a threshold of 20 inner loop iterations the NonLinOptThresh is almost never reached
 - with a threshold of 200 inner loop iterations, the actual number of iterations is typically 35-45 for a threshold of 0.0001 (max value was 51 iterations).

Altitude dependency

- results should be compared to LOS requirements (not HLOS)

Altitudes	HLOS wind accuracy		LOS wind accuracy	
below 2.2 km	1	m/s	0.6	m/s
2.2 – 16.2 km	2	m/s	1.2	m/s
above 16.2 km	3	m/s	1.8	m/s

Bin nr	Rangebin Bottom Altitude (km)	Rangebin Top Altitude (km)	bin size (km)	Wind velocity error std (m/s)	Requirement (m/s)
all	-	-	-	1.193	
1	22.18	24.18	2	1.551	1.8
2	20.18	22.18	2	1.499	1.8
3	18.18	20.18	2	1.604	1.8
4	16.18	18.18	2	1.630	1.8
5	15.18	16.18	1	1.313	1.2
6	14.18	15.18	1	1.288	1.2
7	13.18	14.18	1	1.245	1.2
8	12.18	13.18	1	1.246	1.2
9	11.18	12.18	1	1.252	1.2
10	10.18	11.18	1	1.267	1.2
11	9.18	10.18	1	1.221	1.2
12	8.18	9.18	1	1.174	1.2
13	7.18	8.18	1	1.022	1.2
14	6.18	7.18	1	0.994	1.2
15	5.18	6.18	1	0.999	1.2
16	4.18	5.18	1	1.004	1.2
17	3.18	4.18	1	0.971	1.2
18	2.18	3.18	1	0.950	1.2
19	1.68	2.18	0.5	0.849	0.6
20	1.18	1.68	0.5	0.707	0.6
21	0.68	1.18	0.5	0.706	0.6
22	0.18	0.68	0.5	0.811	0.6
23	-0.32	0.18	0.5	0.679	0.6
24	-0.82	-0.32	0.5	1.130	0.6

Conclusions:

- Inner Loop threshold settings seem appropriate, and improvements seen in small test sample are not significant
- Additional filtering on Residual Error and/or FWHM is probably only needed in the PBL (500 m range bins) and for the higher most 1 km range bins
- All other altitude results are already within the wind threshold without additional filtering (except for $\text{SNR} > 10$ and validityFlag)



The end

- questions ?

