Norwegian
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Assimilating AMSU-A over ice

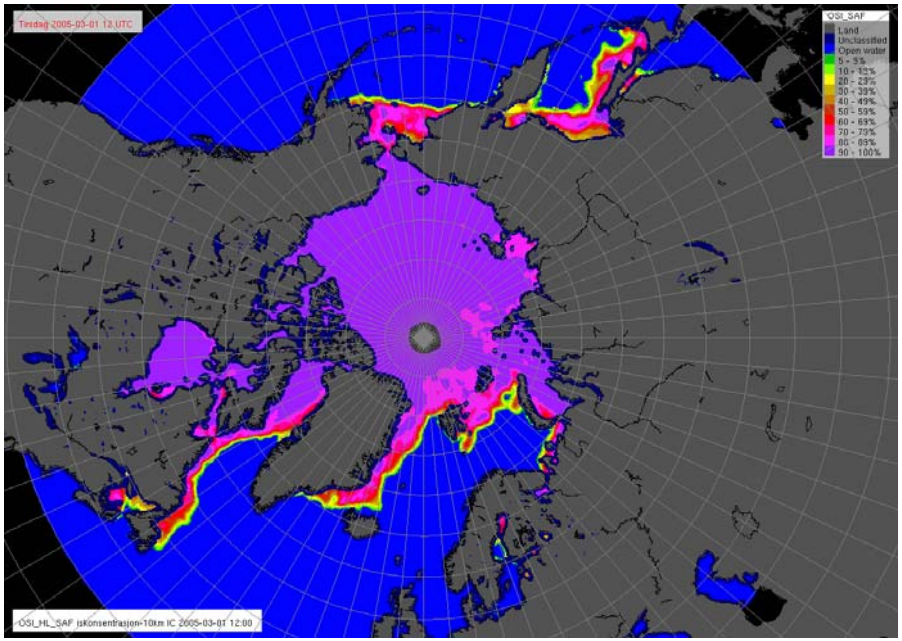
Results from initial study and plans for the future

IOMASA project meeting 3. - 4. March 2005

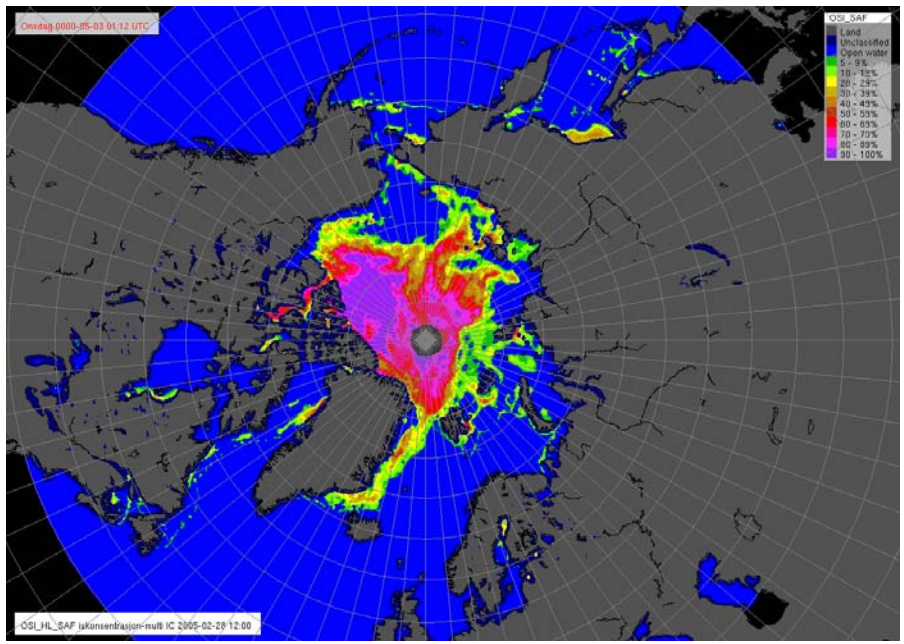
Initial setup

- Period: Dec 2004 + Jan 2005, will be extended
- Reference run (no amsu-a assimilation) – make bias corrections, check data flow and form a basis for validation.
- Experiment run (with amsu-a assimilation over ice) – Constant emissivity = 1.0, use high channels (6-10) only.
- Verify against EWGLAM stations

OSI SAF ice products

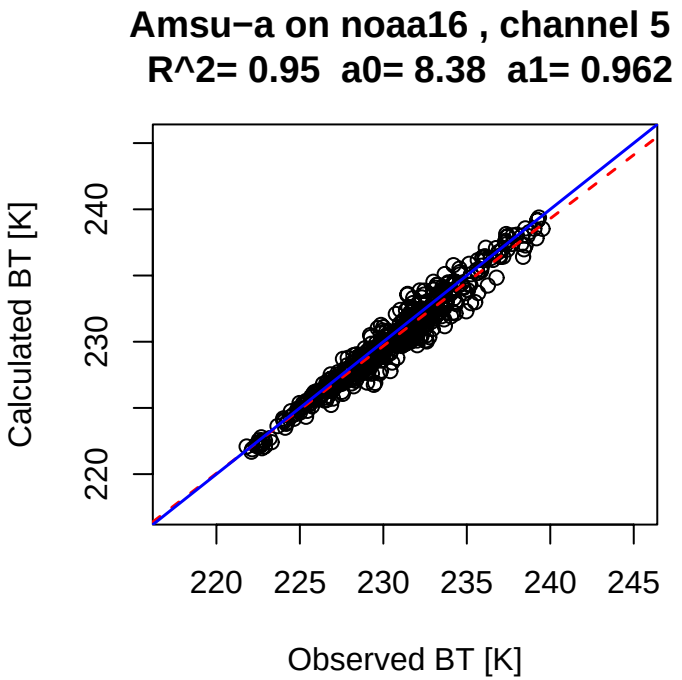


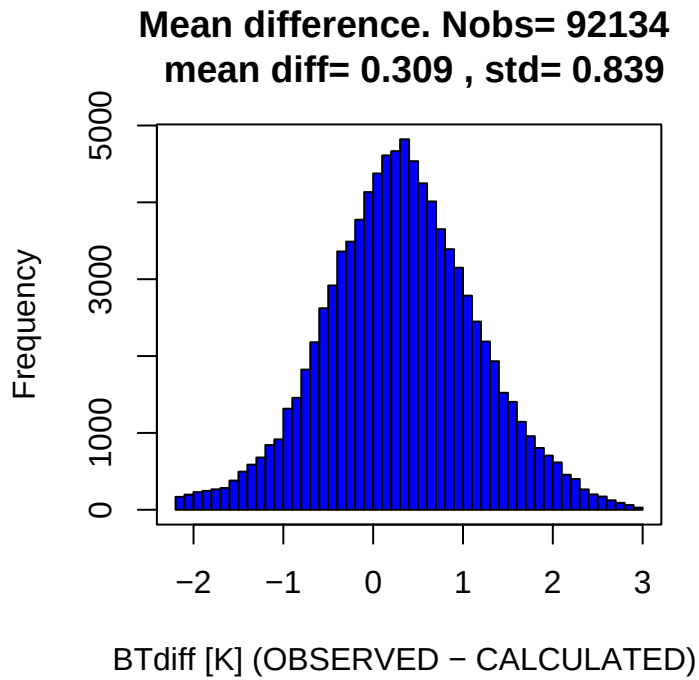
- Total ice concentration
- MY ice concentration (0-100%)



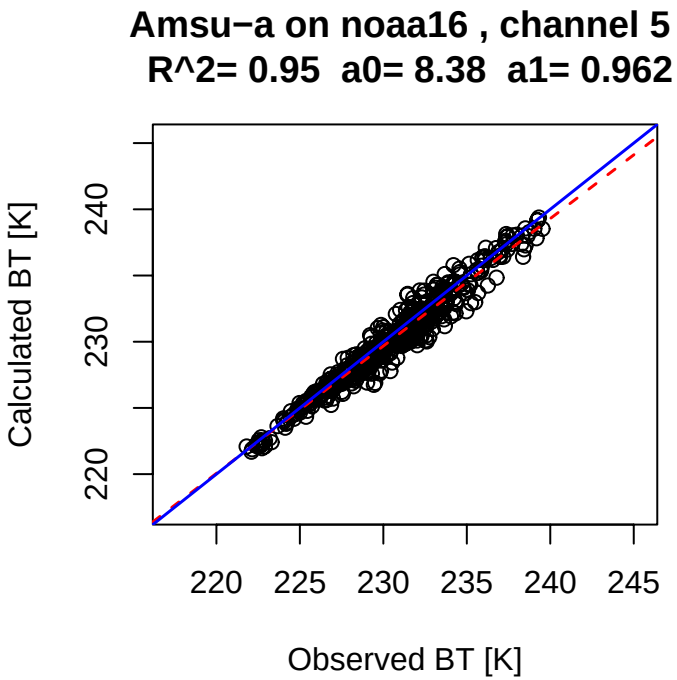
Leif's emissivity values are based on this ice information

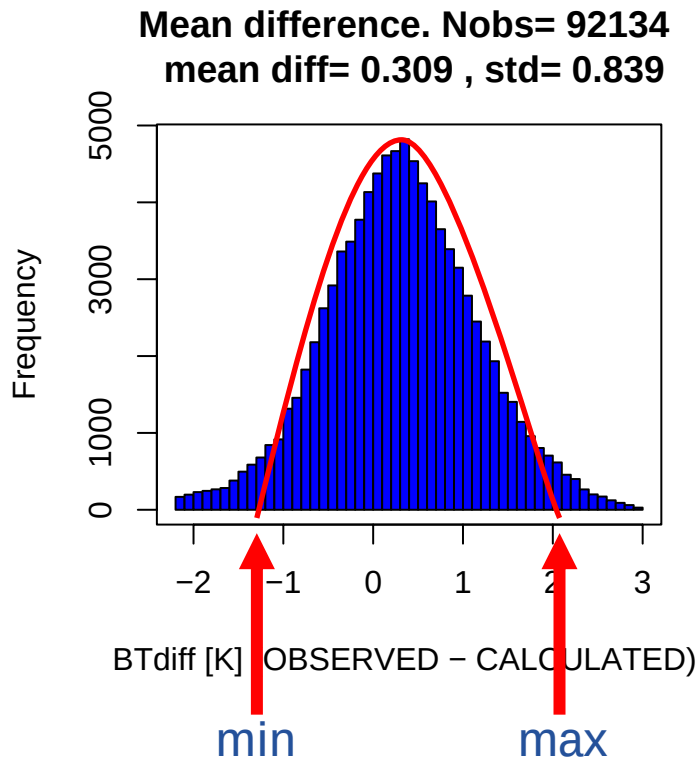
Get rid of 'wings': Cloud contamination?



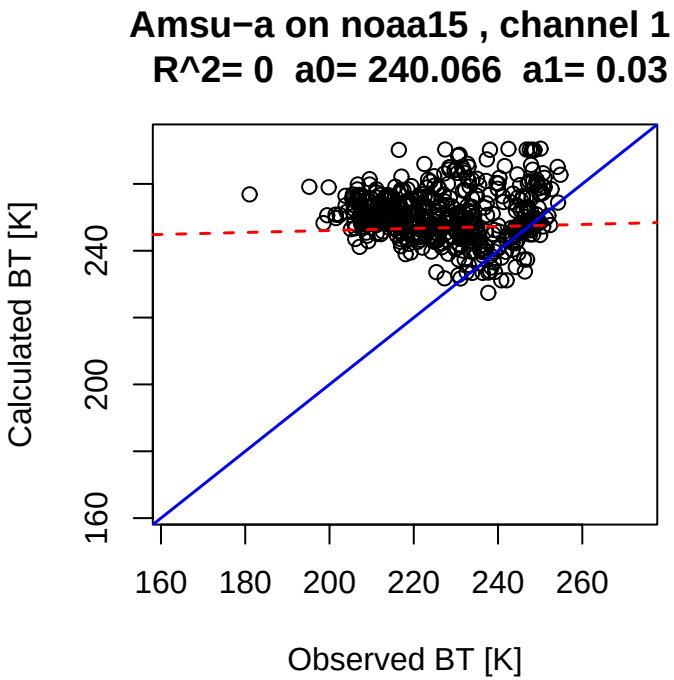


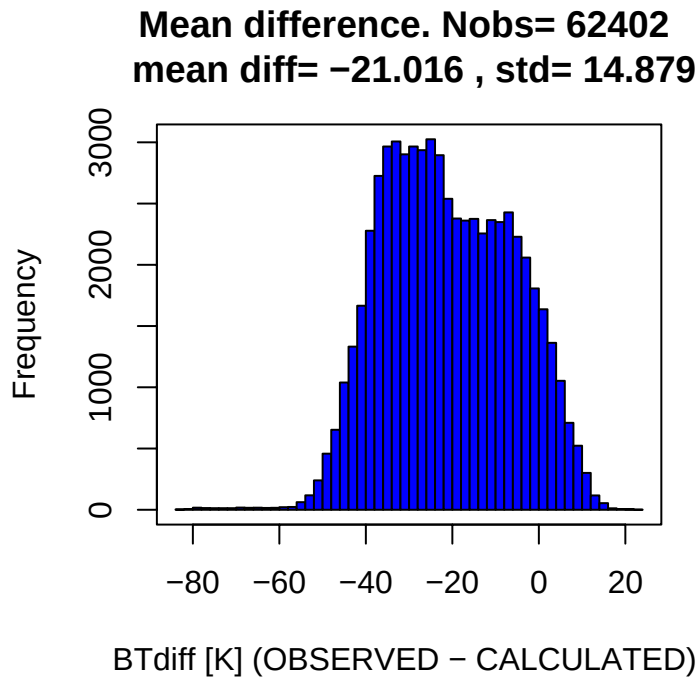
Fit a (near) gaussian curve and find threshold values



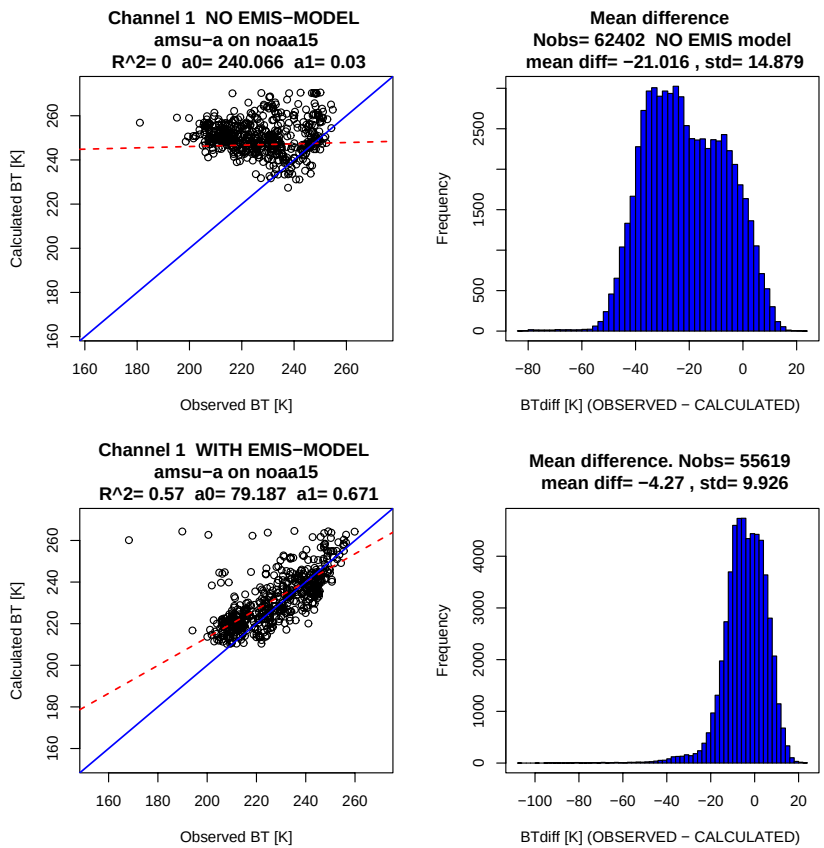


Problem: two peaks for low channels

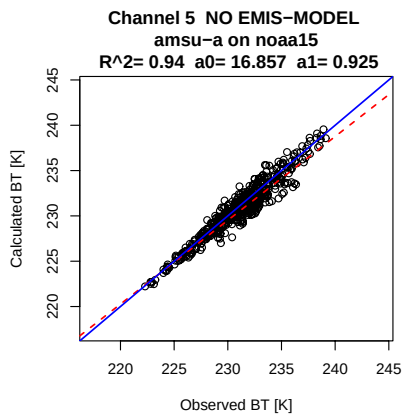


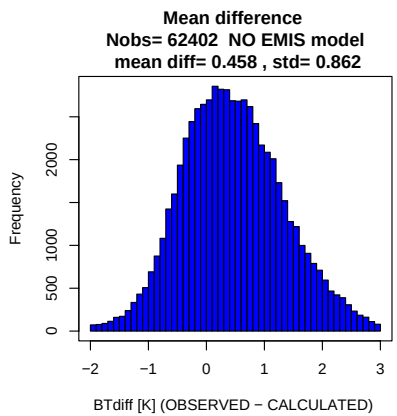


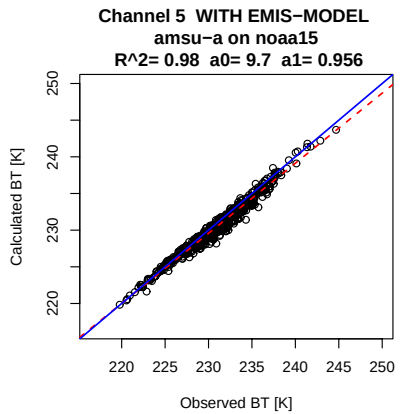
Emissivity model over ice

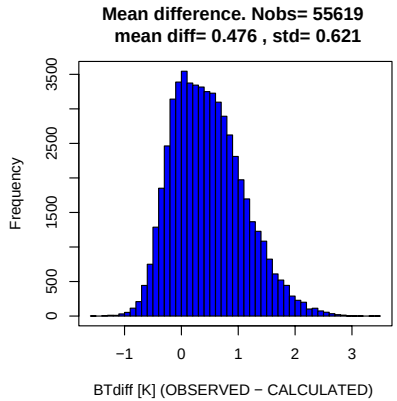


Channel 5...

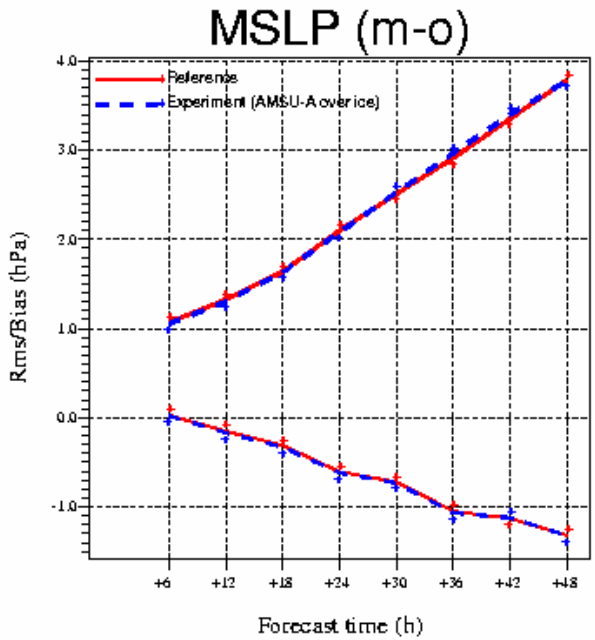

Channel 5 NO EMIS−MODEL
amsu−a on noaa15
R^2= 0.94 a0= 16.857 a1= 0.925
Calculated BT [K]
Observed BT [K]
220
225
230
235
240
245

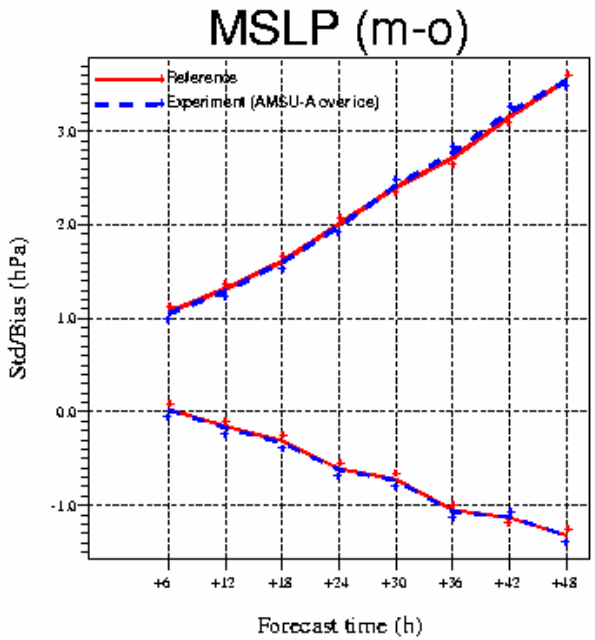

Mean difference
Nobs= 62402 NO EMIS model
mean diff= 0.458 , std= 0.862
Frequency
BTdiff [K] (OBSERVED − CALCULATED)
0
500
1000
2000
−2
−1
0
1
2
3


Channel 5 WITH EMIS−MODEL
amsu−a on noaa15
R^2= 0.98 a0= 9.7 a1= 0.956
Calculated BT [K]
Observed BT [K]
220
225
230
235
240
245
250


Mean difference. Nobs= 55619
mean diff= 0.476 , std= 0.621
Frequency
BTdiff [K] (OBSERVED − CALCULATED)
0
500
1500
2500
3500
−1
0
1
2
3

Verification of the initial study



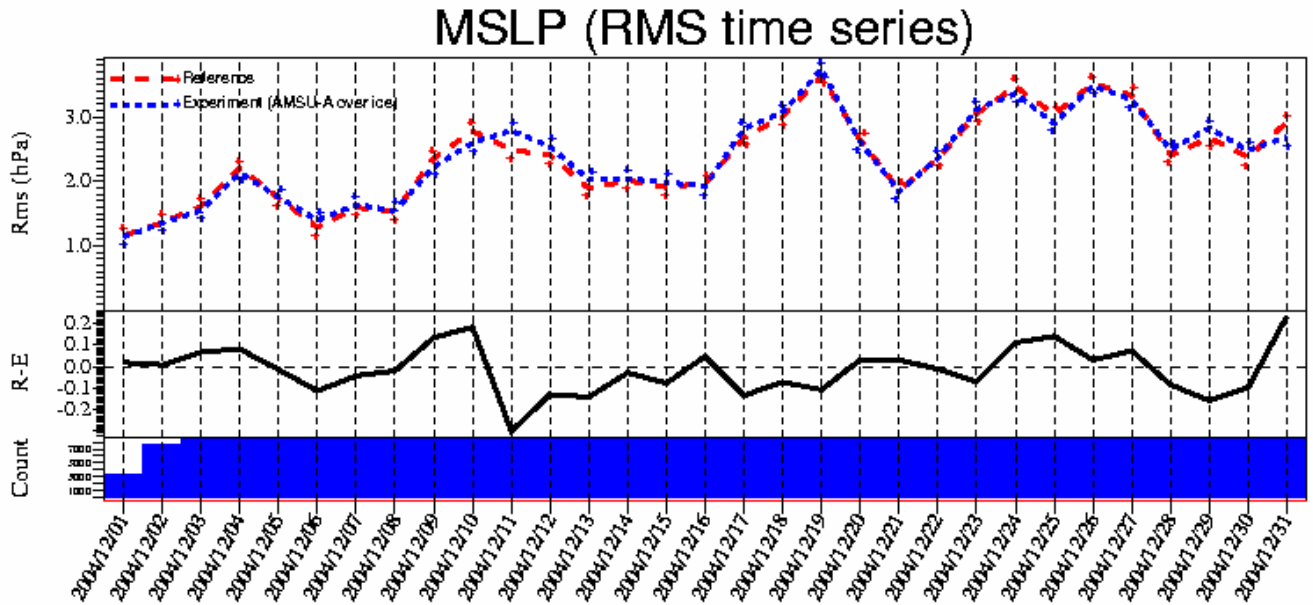


From 2004/12/01 06:00: 0.00 to 2004/12/31 18:00: 0.00

Station name	Count	Rms (m-o)	Std (m-o)	Bias (m-o)	δRms (m-o)
1288 Roros	242	4.022	3.369	-2.197	0.019
1010 Andoya	240	3.874	3.287	-2.052	0.017
1025 Tromso-Langnes	242	3.765	3.204	-1.977	0.015
1001 Jan Mayen	242	3.754	3.714	-0.549	0.015
1160 Skrova fyr	220	3.654	3.028	-2.047	0.012
103 Other stations	23590	2.436	2.354	-0.625	-0.046
7130 Rennes	242	1.649	1.587	-0.516	-0.007
16470 Pantelleria	234	1.534	1.532	0.089	-0.007
16320 Brindisi	236	1.499	1.475	0.270	-0.007
16360 S. Maria di Leuca	240	1.469	1.457	0.185	-0.008
16480 Cozzo Spadaro	242	1.414	1.354	0.408	-0.008
113 stations in total	25970	2.482	2.397	-0.644	x

Station name	Count	Rms (m-o)	Std (m-o)	Bias (m-o)	δRms (m-o)
1288 Roros	242	3.989	3.310	-2.225	0.018
1010 Andoya	240	3.899	3.305	-2.088	0.017
1025 Tromso-Langnes	242	3.821	3.287	-1.948	0.016
1001 Jan Mayen	242	3.740	3.688	-0.623	0.015
1160 Skrova fyr	220	3.767	3.124	-2.108	0.014
103 Other stations	23590	2.447	2.363	-0.634	-0.047
7130 Rennes	242	1.615	1.537	-0.498	-0.007
16470 Pantelleria	234	1.535	1.532	0.097	-0.007
16320 Brindisi	236	1.535	1.519	0.222	-0.007
16360 S. Maria di Leuca	240	1.514	1.507	0.150	-0.007
16480 Cozzo Spadaro	242	1.395	1.341	0.385	-0.008
113 stations in total	25970	2.494	2.408	-0.654	x

..verification continued…



From 2004/12/01 06:00: 0.00 to 2004/12/31 18:00: 0.00

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1025 Tromso-Langnes	242	3.765	3.204	-1.977	0.015
1001 Jan Mayen	242	3.754	3.714	-0.549	0.015
1160 Skrova fyr	220	3.654	3.026	-2.047	0.012
103 Other stations	23590	2.438	2.354	-0.625	-0.048
7130 Rennes	242	1.649	1.587	-0.516	-0.007
16470 Pantelleria	234	1.534	1.532	0.089	-0.007
16320 Brindisi	238	1.499	1.475	0.270	-0.007
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1010 Andoya	240	3.899	3.305	-2.068	0.017
1025 Tromso-Langnes	242	3.821	3.287	-1.948	0.016
1001 Jan Mayen	242	3.740	3.688	-0.623	0.015
1160 Skrova fyr	220	3.767	3.124	-2.108	0.014
103 Other stations	23590	2.447	2.383	-0.634	-0.047
7130 Rennes	242	1.615	1.537	-0.498	-0.007
16470 Pantelleria	234	1.535	1.532	0.097	-0.007
16320 Brindisi	238	1.535	1.519	0.222	-0.007
16360 S. Maria di Leuca	240	1.514	1.507	0.150	-0.007
16480 Cozzo Spadaro	242	1.395	1.341	0.385	-0.008
113 stations in total	25970	2.494	2.408	-0.654	x

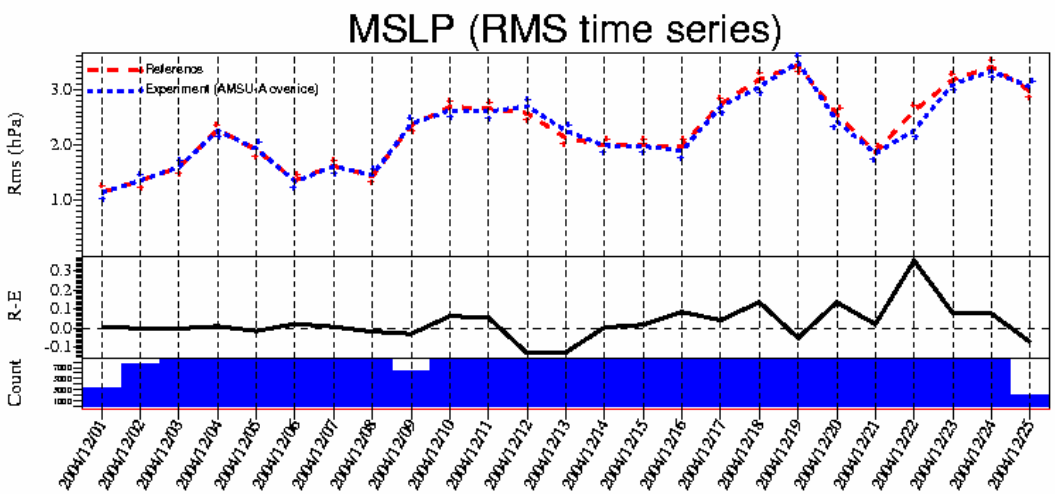
Lessons

- Bug in bias correction software - fixed
- Bug in pre-processing (ice information lost) - fixed
- Should have comparable number of iterations – to avoid false biases
- Cloud masking too simple. Is extended to all channels with individual thresholds.
- Cloud detection depends on good emissivity values

Further plans…

- Fixed number of iterations (= 150)
- Use emissivities from Leif's model.
- Include lower channels (4+5); same as for open sea.

Testing fixed number of iterations

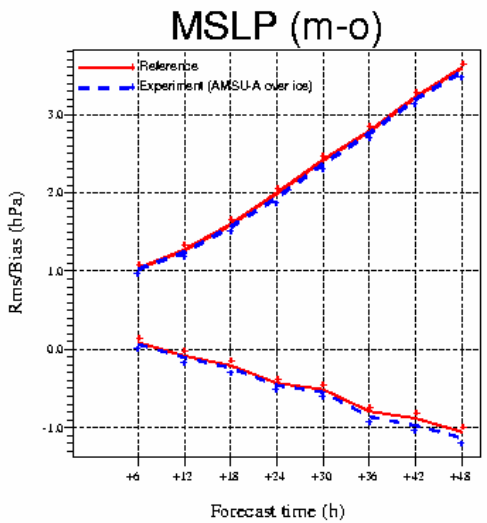


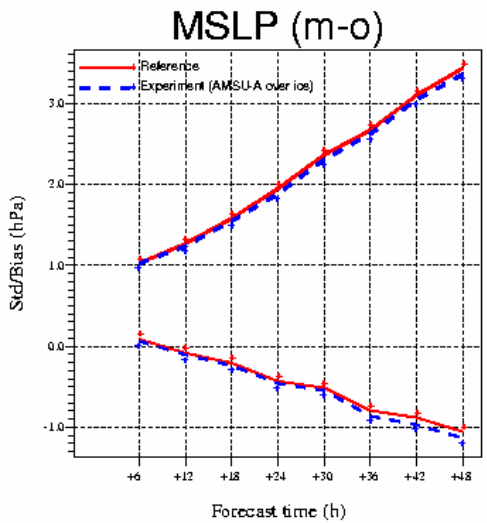
From 2004/12/01 06:00: 0.00 to 2004/12/25 00:00: 0.00

Station name	Count	Rms (m-o)	Std (m-o)	Bias (m-o)	δRms (m-o)
1010 Andoya	184	4.128	3.443	-2.273	0.022
1028 Bjornoya	186	3.987	3.987	0.049	0.020
1025 Tromso-Langnes	186	3.980	3.327	-2.186	0.020
1001 Jan Mayen	186	3.898	3.876	-0.421	0.019
1160 Skrova fyr	184	3.989	3.214	-2.383	0.018
103 Other stations	18138	2.307	2.280	-0.481	-0.072
16470 Pantelleria	178	1.504	1.500	0.108	-0.008
16360 S. Maria di Leuca	184	1.498	1.473	0.273	-0.007
16480 Cozzo Spadaro	186	1.492	1.385	0.558	-0.007
16320 Brindisi	186	1.490	1.445	0.364	-0.007
7130 Rennes	186	1.381	1.355	-0.263	-0.007
113 stations in total	19982	2.379	2.332	-0.473	X

Station name	Count	Rms (m-o)	Std (m-o)	Bias (m-o)	δRms (m-o)
1010 Andoya	184	4.148	3.487	-2.248	0.023
1001 Jan Mayen	186	3.978	3.929	-0.625	0.021
1025 Tromso-Langnes	186	3.968	3.328	-2.161	0.021
1160 Skrova fyr	184	4.058	3.321	-2.332	0.019
16153 Capo Mele	186	3.625	2.897	2.422	0.015
103 Other stations	18123	2.272	2.209	-0.532	-0.073
16360 S. Maria di Leuca	184	1.525	1.505	0.248	-0.008
7070 Reims	186	1.520	1.514	-0.129	-0.008
16320 Brindisi	186	1.514	1.475	0.344	-0.008
16480 Cozzo Spadaro	186	1.498	1.401	0.525	-0.007
7130 Rennes	186	1.389	1.334	-0.308	-0.007
113 stations in total	19982	2.345	2.287	-0.520	X

Testing fixed number of iterations





From 2004/12/01 06:00: 0.00 to 2004/12/25 00:00: 0.00

Station name	Count	Rms (m-o)	Std (m-o)	Bias (m-o)	δRms (m-o)
1010 Andoya	184	4.128	3.443	-2.273	0.022
1028 Bjornoya	188	3.987	3.987	0.049	0.020
1025 Tromso-Langnes	188	3.980	3.327	-2.186	0.020
1001 Jan Mayen	188	3.898	3.876	-0.421	0.019
1160 Skrova fyr	184	3.989	3.214	-2.363	0.018
103 Other stations	18138	2.307	2.280	-0.481	-0.072
16470 Pantelleria	178	1.504	1.500	0.108	-0.008
16360 S. Maria di Leuca	184	1.498	1.473	0.273	-0.007
16480 Cozzo Spadaro	188	1.492	1.385	0.558	-0.007
16320 Brindisi	188	1.490	1.445	0.364	-0.007
7130 Rennes	188	1.381	1.355	-0.263	-0.007
113 stations in total	19982	2.379	2.332	-0.473	x

Station name	Count	Rms (m-o)	Std (m-o)	Bias (m-o)	δRms (m-o)
1010 Andoya	184	4.148	3.487	-2.248	0.023
1001 Jan Mayen	188	3.978	3.929	-0.625	0.021
1025 Tromso-Langnes	188	3.968	3.328	-2.161	0.021
1160 Skrova fyr	184	4.058	3.321	-2.332	0.019
16153 Capo Mele	188	3.625	2.897	2.422	0.015
103 Other stations	18123	2.272	2.209	-0.532	-0.073
16360 S. Maria di Leuca	184	1.525	1.505	0.248	-0.008
7070 Reims	188	1.520	1.514	-0.129	-0.008
16320 Brindisi	188	1.514	1.475	0.344	-0.008
16480 Cozzo Spadaro	188	1.498	1.401	0.525	-0.007
7130 Rennes	188	1.389	1.334	-0.308	-0.007
113 stations in total	19982	2.345	2.287	-0.520	x

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