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METEOROLOGISKA INSTITUTET
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GEMS AEROSOL Task 2.4
Quantification of wind-blown sea salt emission.
Contribution of FMI, year 1

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Task 2.4 sea-salt emission

- An approach of Monahan (1986) has been implemented to ECMWF model, 3 modes. Some tests performed (JJM)
- Alternative consideration of a more sophisticated hybrid scheme Monahan + Martensson has been considered in FMI. Model is partly implemented and some tests performed

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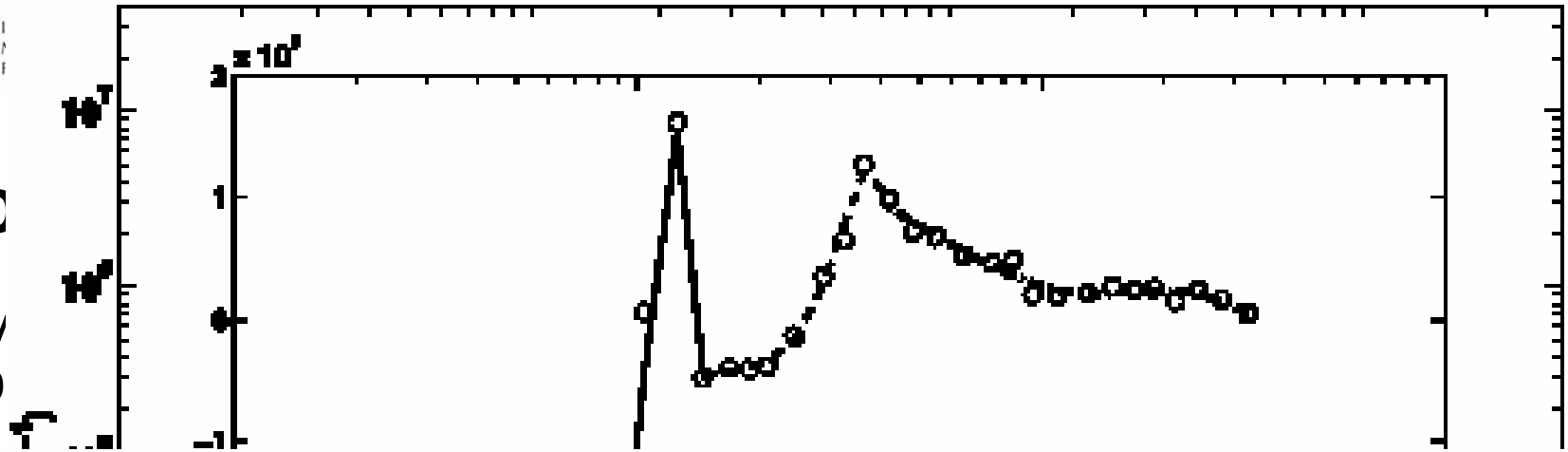
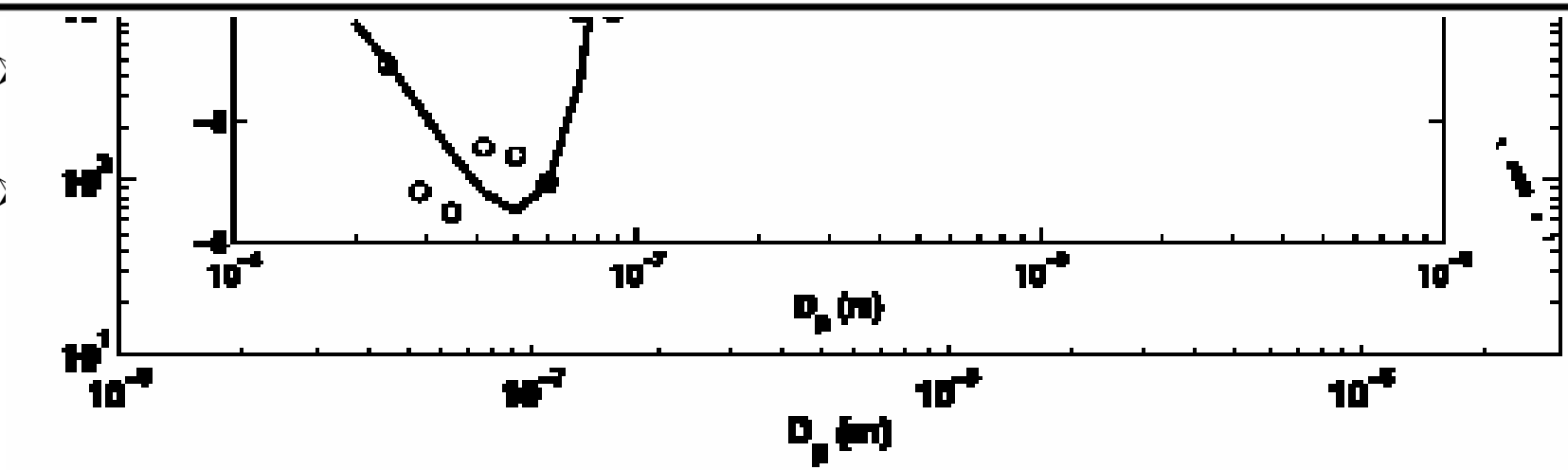


Table 1. Coefficients for the Parameterization of A_k ($c_4 - c_0$) and B_k ($d_4 - d_0$) in Equation (6) for the Three Size Intervals (k)

Size Interval, 10^{-6} m	c_4	c_3	c_2	c_1	c_0
0.020–0.145	-2.576×10^{35}	5.932×10^{28}	-2.867×10^{21}	-3.003×10^{13}	-2.881×10^{6}
0.145–0.419	-2.452×10^{33}	2.404×10^{27}	-8.148×10^{20}	1.183×10^{14}	-6.743×10^{6}
0.419–2.8	1.085×10^{29}	-9.841×10^{23}	3.132×10^{18}	-4.165×10^{12}	2.181×10^{6}
Size Interval, 10^{-6} m	d_4	d_3	d_2	d_1	d_0
0.020–0.145	7.188×10^{37}	-1.616×10^{31}	6.791×10^{23}	1.829×10^{16}	7.609×10^{8}
0.145–0.419	7.368×10^{35}	-7.310×10^{29}	2.528×10^{23}	-3.787×10^{16}	2.279×10^{9}
0.419–2.8	-2.859×10^{31}	2.601×10^{26}	-8.297×10^{20}	1.105×10^{15}	-5.800×10^{8}



Idea for hybrid sea salt emission model

- Re-parameterize the Martensson's data into something more physical and numerically stable
  - basic shape of flux dependence on particle size
  - dependence on water temperature and salinity
- Extrapolate the obtained dependencies to Monahan's size range using his formula as the basic shape-function
- Result: a unified scheme to 10 nm – 10 µm size range with explicit dependencies on salinity and water temperature

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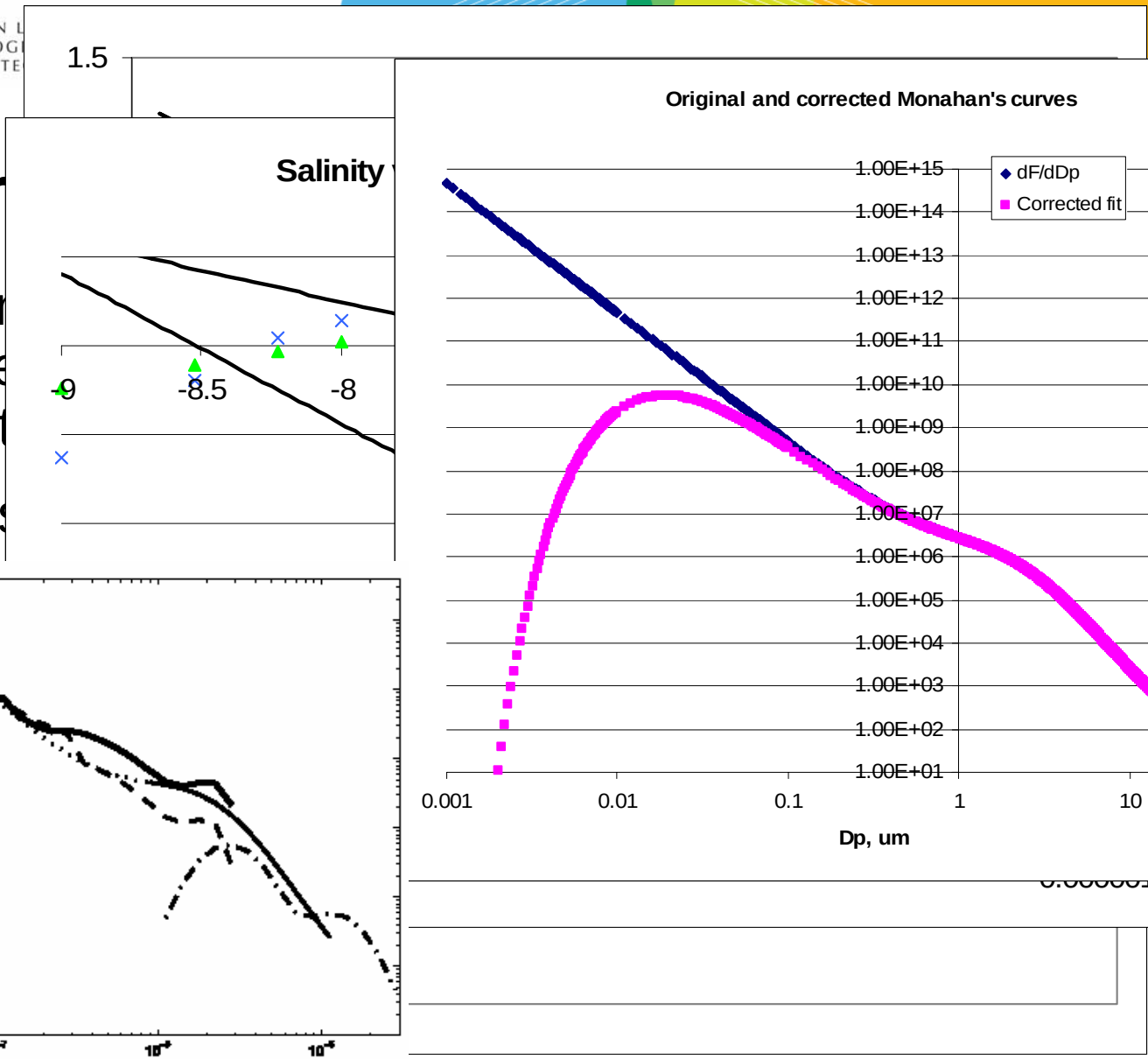

Next-step tasks

- Complete the transition and refinement of emission databases. Time variation coefficients remain a difficulty
- Re-analysis of 2003 will be done with ready-made fires emission database, which will give time for implementation of the assimilation system, which is to be started
- Next-step improvements and inter-comparison of the schemes for wind-blown dust and sea-salt emissions