README for type0 simulations with ECHAM-SALSA

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1 Aerosol model

SALSA is a sectional aerosol module. In its standard setup (which I used for the simulations here), SALSA has 10 size sections (bins), with aerosol sizes between $3\,\text{nm}$ and $10\,\mu\text{m}$. We treat aerosols in two externally mixed aerosol populations, which we call soluble (1a and 2a) and insoluble (2b). Within each size bin of one population, the aerosols are internally mixed. We include the aerosol species black carbon (BC), organic carbon (OC), sulphate (SO_4), mineral dust (DU), and sea salt (SS). The sub-population 1a spans sizes from $3\,\text{nm}$ to $50\,\text{nm}$ and the sub-populations 2a and 2b span sizes from $50\,\text{nm}$ to $10\,\mu\text{m}$. The upper and lower bounds of each size section can be computed with the following python code:

```python
import numpy as np

#boundaries between size bins
bin_sizes_1a = np.logspace(np.log10(3e-9) ,np.log10(50e-9),4)
bin_sizes_2a = np.concatenate([
    np.logspace(np.log10(50e-9),np.log10(700e-9),5)[:-1],
    np.logspace(np.log10(700e-9),np.log10(10e-6),4)
])

bin_sizes_2b = np.concatenate([
    np.logspace(np.log10(50e-9),np.log10(700e-9),5)[:-1],
    np.logspace(np.log10(700e-9),np.log10(10e-6),4)
])

#combined lower and upper limits of the size bins; order 1a-2a-2b
lolims = np.concatenate((bin_sizes_1a[:-1],bin_sizes_2a[:-1],bin_sizes_2b[:-1]))
hilims = np.concatenate((bin_sizes_1a[1:],bin_sizes_2a[1:],bin_sizes_2b[1:]))
widths = hilims/lolims
```

The numerical values are

```
bin     lolim[m]    hilim[m]     width
-----   ----------  ----------   --------
1a1     3.00e-09    7.66e-09    2.55e+00
1a2     7.66e-09    1.96e-08    2.55e+00
1a3     1.96e-08    5.00e-08    2.55e+00
2a1     5.00e-08    9.67e-08    1.93e+00
2a2     9.67e-08    1.87e-07    1.93e+00
2a3     1.87e-07    3.62e-07    1.93e+00
2a4     3.62e-07    7.00e-07    1.93e+00
2a5     7.00e-07    1.70e-06    2.43e+00
2a6     1.70e-06    4.12e-06    2.43e+00
2a7     4.12e-06    1.00e-05    2.43e+00
2b1     5.00e-08    9.67e-08    1.93e+00
2b2     9.67e-08    1.87e-07    1.93e+00
2b3     1.87e-07    3.62e-07    1.93e+00
2b4     3.62e-07    7.00e-07    1.93e+00
2b5     7.00e-07    1.70e-06    2.43e+00
2b6     1.70e-06    4.12e-06    2.43e+00
2b7     4.12e-06    1.00e-05    2.43e+00
```

2   Provided data

The data provided are named according to the naming convention in the ftp upload instructions. Most of the data are are computed from 3-hourly instantaneous model output. However, some of the requested data are not directly available from the model output and are computationally quite costly to do in post processing. As we are currently limited to 1TB of workspace on our supercomputer, I cannot save the 3-hourly data. Knut and I therefore agreed that I provide an estimate of these parameters by using monthly means of the model outputs. In such cases, I changed the naming convention of the uploaded files to include a '_MM' (for monthly mean) in the name to reflect this. Furthermore, if I only uploaded data for the northern hemisphere, I added a '_NH' to the file name.

In addition to the requested data, I also uploaded the monthly mean emissions in the model. This includes both subscribed emissions and emissions computed online (SS and DU). The emissions are divided by species and sector ('emi_SPEC_SECTOR') and totals per species are also available ('emi_SPEC').