

Emission changes in DMS, OM(ni) and sea-salt during spinup of NorESM2 and their impact on the radiative forcing

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1 Radiative efficiency based on atmosphere-only simulations

Based on year 5–30 of the atmosphere-only experiments, one can derive the radiative efficiency of DMS, sea-salt, and OPOM emissions.

Table : emission and TOA imbalance change in atmosphere-only experiments.

Modification	Emission change [Tg yr ⁻¹]	TOA imbalance change [W m ⁻²]
1xDMS → 2xDMS	35.4	-1.42
1xsea-salt → 2xsea-salt	3365.1	-2.16
1xOPOM → 2xOPOM	12.9	-0.54

2 Overview of the coupled spinup simulations

Table : overview of (some of the) pre-spinup and spinup simulations with NorESM2.

Experiment	Start	End
<i>PRE-SPINUP</i>		
N1850OCBDRDDMS_f19_tn14_noresm-dev-22062018_Original	1	60
N1850OCBDRDDMS_f19_tn14_noresm-dev-22062018_clubb_gamma_coef..27_micro_mg_dcs_400.D-6	1	60
N1850OCBDRDDMS_f19_tn14_doubletsalt	1	195
N1850OCBDRDDMS_f19_tn14_2rosc1dp	1	405
<i>SPINUP</i>		
N1850OCBDRDDMS_f19_tn14_201218	1	90 (135)
N1850OCBDRDDMS_f19_tn14_250119 (not found on nird)	91	645
N1850OCBDRDDMS_f19_tn14_03042019	421	560
N1850OCBDRDDMS_f19_tn14_12042019	561	625
N1850OCBDRDDMS_f19_tn14_15042019	626	795
N1850OCBDRDDMS_f19_tn14_25042019	796	995
N1850OCBDRDDMS_f19_tn14_08052019	996	1035
N1850OCBDRDDMS_f19_tn14_10052019	1036	1100
N1850OCBDRDDMS_f19_tn14_13052019	1101	1515
N1850_f19_tn14_06062019	1516	1565
N1850_f19_tn14_11062019	1566	1600

3 Characteristics of some simulations

3.1 Pre-spinup

I have selected a few simulations which I thought would be relevant.

N1850OCBDRDDMS_f19_tn14_noresm-dev-22062018_Original

- Initial tests with NorESM2 based on CESM2.0

N1850OCBDRDDMS_f19_tn14_noresm-dev-22062018_clubb_gamma_coef_.27_micro_mg_dcs_400.D-6

- Modification of γ and DCS.

N1850OCBDRDDMS_f19_tn14_doublesalt

- Doubling of sea-salt emissions by using pre-factor of two (it implies that also OPOM doubles). The emission strength is still proportional with $U^{3.41}$.

N1850OCBDRDDMS_f19_tn14_2rosc1dp

- Contains convection modifications
- Different wind-dependence for sea-salt and OPOM emissions : the emission strength is proportional with $U^{3.74}$. The emission amounts more than double.

3.2 Spinup

I have not found the data from the simulation N1850OCBDRDDMS_f19_tn14_0304201. It mean that some data is missing between the [simulation of years 1-90](#) and the [simulation of years 421-560](#).

N1850OCBDRDDMS_f19_tn14_201218

- NorESM2 on 2x2 is now using a different ice-option.

N1850OCBDRDDMS_f19_tn14_250119 (*missing on nird*)

N1850OCBDRDDMS_f19_tn14_03042019

- Using NorESM2 based on CESM2.1.0 from here onwards.
- The model characteristics of the Gibraltar straight have been changed.
- Hybrid restart.

N1850OCBDRDDMS_f19_tn14_12042019

- Large change in DMS emission (global total + geographical distribution (?))

N1850OCBDRDDMS_f19_tn14_15042019

- There is a change in sea-salt and OPOM emissions (however, it is not clear where the change comes from).

N1850OCBDRDDMS_f19_tn14_25042019

- There is a drop in the DMS emissions.

N1850OCBDRDDMS_f19_tn14_08052019

N1850OCBDRDDMS_f19_tn14_10052019

N1850OCBDRDDMS_f19_tn14_13052019

N1850_f19_tn14_06062019

N1850_f19_tn14_11062019

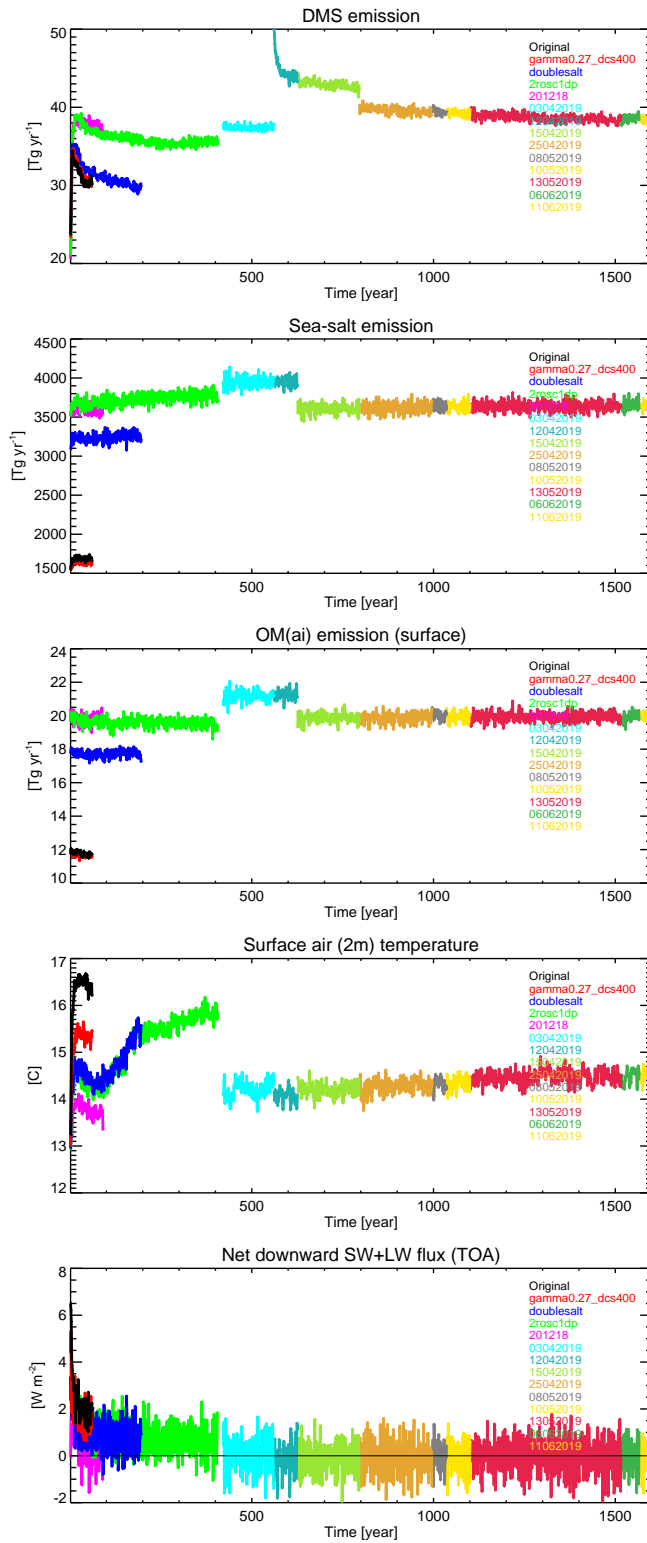


Figure : Global- and annual mean timeseries of DMS emissions, surface OM emissions, sea-salt emissions, near-surface (2 m) air temperature, and TOA imbalance.