Impact of Biomass Burning Emissions on Arctic Sea Ice Loss

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12 CMIP6 models (first 3 ensemble members only) from 1850 to 2100 have been separated into a Sensitive or Non-sensitive category depending on if they exhibit an acceleration in sea ice decline from 1997-2009 that is 100% larger compared to 1978-1990.

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Sensitivity Experiment – Removing the variability in BB emissions over the GFED era
## Model Experiments

<table>
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<tr>
<th>Model Version</th>
<th>Forcing</th>
<th># of Ensemble Members</th>
</tr>
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<tbody>
<tr>
<td>CESM-LE</td>
<td>CESM1, CMIP5</td>
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<tr>
<td>CESM2-BB</td>
<td>CESM2, CMIP6 except for BB emissions from 1997-2014</td>
<td>10</td>
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Sea ice sensitivity to global mean surface temperature (1979-2014)
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Is there a forced signal in the recent reduced rate of Arctic sea ice loss?

*20-year linear trend
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Summary

• The CESM2-CMIP6, as well as a few other CMIP6 models, simulate an acceleration in sea ice decline that coincides with the start of the GFED era, followed by a recovery until the start of the 2020s.

• We conducted a sensitivity experiment in which we removed the inter-annual variability in biomass burning emissions over the GFED period.

• The sensitivity runs show reduced Arctic warming and sea ice decline compared to the CESM2-CMIP6 when the biomass burning variability is removed.

• Half of the increase in sea ice sensitivity from CMIP5 to CMIP6 in the CESM can be attributed to the increased variability in BB emissions during the GFED era.

• There is indication of a forced signal in the recent reduced rate of Arctic sea ice loss.

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