Modeling Atmospheric Dust and Iron/Phosphorous Fluxes

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• Objectives
  – Improve dust emission and radiative properties (Water Cycle)
  – Incorporate treatments for dust and combustion iron/phosphorous dissolution (BGC nutrient cycle)
  – Coordinated with the university-funded project (PI – Mahowald/Cornell Univ) for the development of dust and combustion iron/phosphorous dissolution models

• Status and Plans for V2/V3

• Highlight of progress

• Timeline for V2
Dust and Fe/P/N nutrients in the V1 atmospheric model

Direct radiative effect

Indirect radiative effects

Land and ocean biogeochemistry
• Dust and Fe/P/N nutrients in the V2/V3 atmospheric model
Highlight of the Progress

- **Fe dissolution model - Mechanism of Intermediate complexity for Modelling Iron (MIMI)** – has been evaluated with CAM5 by Cornell Univ. (Hamilton et al. 2019)

<table>
<thead>
<tr>
<th>MIMI</th>
<th>Annual mean emissions /Tg a⁻¹</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>BAM-Fe</td>
</tr>
<tr>
<td>Dust</td>
<td>1800</td>
</tr>
<tr>
<td>Dust iron</td>
<td>57</td>
</tr>
<tr>
<td>Fire&amp;Comb. iron</td>
<td>1.9</td>
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</tbody>
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**Total Fe concentration**

**Fe solubility (%)**

- **Publications**
Highlight of the Progress

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- **Publications**
Milestones (past achievements and future plan for V2)

• Oct. – Dec. 2018: Evaluate dust seasonal cycle and vertical profiles
• Jan.- Mar. 2019: Implement the dust new emission and speciation codes
• Apr. – Jun. 2019: Evaluate the new dust emission scheme and speciation
• Jul. - Sept. 2019: Implement the dust and combustion iron dissolution model
• Oct. – Dec. 2019: Test the dust and combustion iron dissolution model