Deep future scenarios

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CESM Meeting 2017
SSP 2300 extensions

Fossil/cement carbon emissions

Cumulative total carbon emissions

GtCO₂

Trillion tonnes C

Year

Year
SSP 2300 extensions

Global Mean temperature (central estimate)

Total Radiative Forcing (central estimate)
SSP 2300 extensions

Likelihood $(T_{\text{global}} - T_{1860}^{\text{global}}) < 2K$

Likelihood $(T_{global} - T_{1860}^{global}) < 1.5K$
Going further: a first sketch
MiCES

Minimal
Complexity
Earth
Simulator
If there is a potential for instability - it will happen
A first pass...
High emission and overshoots are subject to huge C-cycle uncertainty

Varying land Beta Parameter
0-2.8 GtC/ppm
But key processes are missing from the simple models for these timescales.
Issues going forward

- What are appropriate emissions assumptions for multi-century timescales?
- What are priorities? Large uncertainties: use low resolution/parameter space sampling or full model integration?
- Do we need better simple models to capture the relevant physical and c-cycle dynamics at multi-century timescales?
- Models might break at high forcing levels: will need support.