

Reason for Ozone Hindcasts

- Necessary for Methane Hindcasts:
 - Methane is a powerful greenhouse gas
 - We do not understand its current variations
 - How will it vary in the future?
- Large changes over the last few decades in:
 - STE
 - Emissions
 - El Nino, AO/NAO
 - Climate
 - temperature has increased by approximately $.6^{\circ}$ K since 1960
 - precipitable water vapor has increased by approximately 0.4 mm per decade between 1998 and 2003

Percent Change in Variable with Temperature: Interannual Variability And Climate Change

	SCAM	SNCEP	CAM 2090 –CAM 1990
O3	-1.2 +/- .78	NS	-1.1 +/- 0.3
CO	-2.5 +/- .9	-1.8 +/- .8	-1.3 +/- .4
OH	6.2 +/-1.3	6.3 +/- 1.8	3.9 +/- 0.4
HNO3	3.7 +/- 1.8	3.9 +/- 2.1	1.7 +/- .6
Sfc O3	-2.1 +/- .65	NS	-2.3 +/- .2
Sfc JNO2	-1.2 +/- .25	-1.1 +/- .6	NS
LNO ¹	12 +/-4.1	NS	9.6 +/- 2.5
PBLH ²	1.3 +/- .59	NS	-.7 +/- 0.1
PRECT ³	4.2 +/- .54	NS	2.5 +/- .2
Q ⁴	9.0 +/- 1.1	7.0 +/- 1.2	7.3 +/- 0.3

- Tropospheric multi-model simulations have generally been evaluated over a single measurement campaign, or at most a year.
 - Model assessment is needed to assess the ability of models to correctly predict transient trajectories, trends and variability of atmospheric composition on decadal timescales.
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- We don't understand how chemistry responds to changing interannual forcing?
 - But this understanding is necessary to predict the future.

Hindcasts

- About 13 models interested in participating in ozone hindcasts.
- Some models in CCM-val are planning similar simulations already.

What needs to be done?

- Define the forcings:

The stratosphere:

- Total O3 dataset for use in photolysis calculation?
- For models without stratospheric chemistry, stratospheric ozone variations?
- Volcanic forcing?

Emissions:

- Common emission dataset?
- But which one?
- Will common emissions adversely affect CH4 inversions?

What needs to be done

- **Define the observations**

- Pick a few observational datasets which we want to match:

- Long term
- Span as many locations as possible
- Trusted record

We don't need to match every dataset, but need a few crucial and revealing datasets we want to match.

Do appropriate datasets exist? Over what time spans?

What needs to be done?

- Define the time period:
 - 1980-present
 - 1990-present
 - 2000-present
- Can we justify running over the earlier period?
- Do we have appropriate datasets?
- Do we appropriate forcings?
- What do we want for the methane runs?

What needs to be done?

Define the diagnostics:

- HTAP and AEROCOM diagnostics
- Temporal frequency depends on questions and observations
- Special diagnostics to define key processes (e.g., stratospheric tracer)

What needs to be done?

- Model analysis, validation, papers
- who is interested in leading these?