

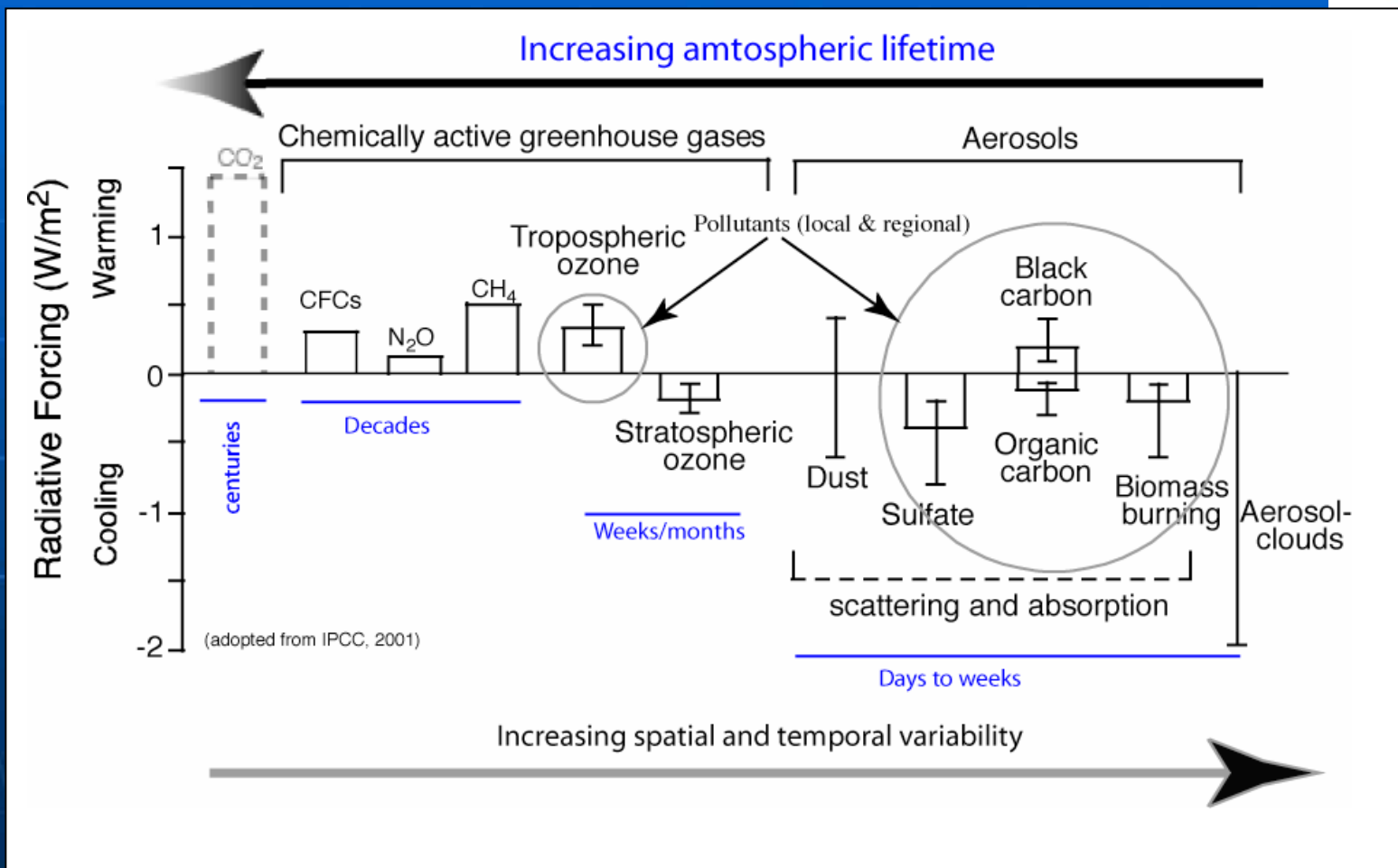


WCRP-SPARC/IGBP-IGAC Atmospheric Chemistry and Climate Project Briefing

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AEROCOM Meeting
Virginia Beach, October 18, 2006

What is this all about?





Atmospheric Chemistry and Climate Project: Background



- Much of human induced climate forcing occurs through chemically active species.
- Climate Forcing agents are highly varied.
- Information needed to calculate the impact of different forcing agents is different for different agents.
- Many radiative forcing agents are also pollutants! ("win-win" options? "win-lose" consequence?)
- Lifetimes determine policy decision information.
- Explore the key issues in the first phase via modeling.



Choice of 1st Problem to be tackled by AC&C



- Based on initial discussions (w/in IGAC & WCRP) to define an important, tractable problem
- Emphasis will be on improved modelling of:
 - Aerosols (formation, cloud processing, photolysis, reactivity)
 - Ozone
 - Deposition processes*→ emphasis on improving representation of these in models*
- Problems relevant to many aspects of climate change AND will yield short-term needed info
 - Intend to compliment AIMES/earth system modelling efforts (shorter timescales, and more focussed on processes)
 - Relevant to climate and air-quality
- Common to all advanced next generation models for Climate Change Studies.



The Phase 1 task: Modeling Study



- Many modeling centers have already built or are building higher resolution global models with interactive chemistry
- Help the centers to systematically:
 - Define gaps in current representations
 - Assist in filling those gaps
 - Define simulations relevant to an inter-comparison activity
 - ❖ Emissions, boundary condition
 - ❖ Verification/validation datasets
 - compare model behavior
 - ❖ Define metrics
 - identify deficiencies
 - Archive simulation outputs

The goal is NOT to repeat or "take over" existing activities

(like AEROCOM)



The Phase 1 task: Modeling Study



- What is the Role of Observations in AC&C Initiative?
 - Our premise: *Model Emphasis provides the target for contributions by observations and theory.* Focus differs from traditional approach
 - ❖ Traditional: contribution increases understanding of a component process.
 - ❖ Alternate: contribution increases our ability to represent that process in our integrative model
- We want and need an observational component. But we think the intent of the contribution ought to be on "constraining/improving models" rather than be on "statement about process". So we need the model component first.



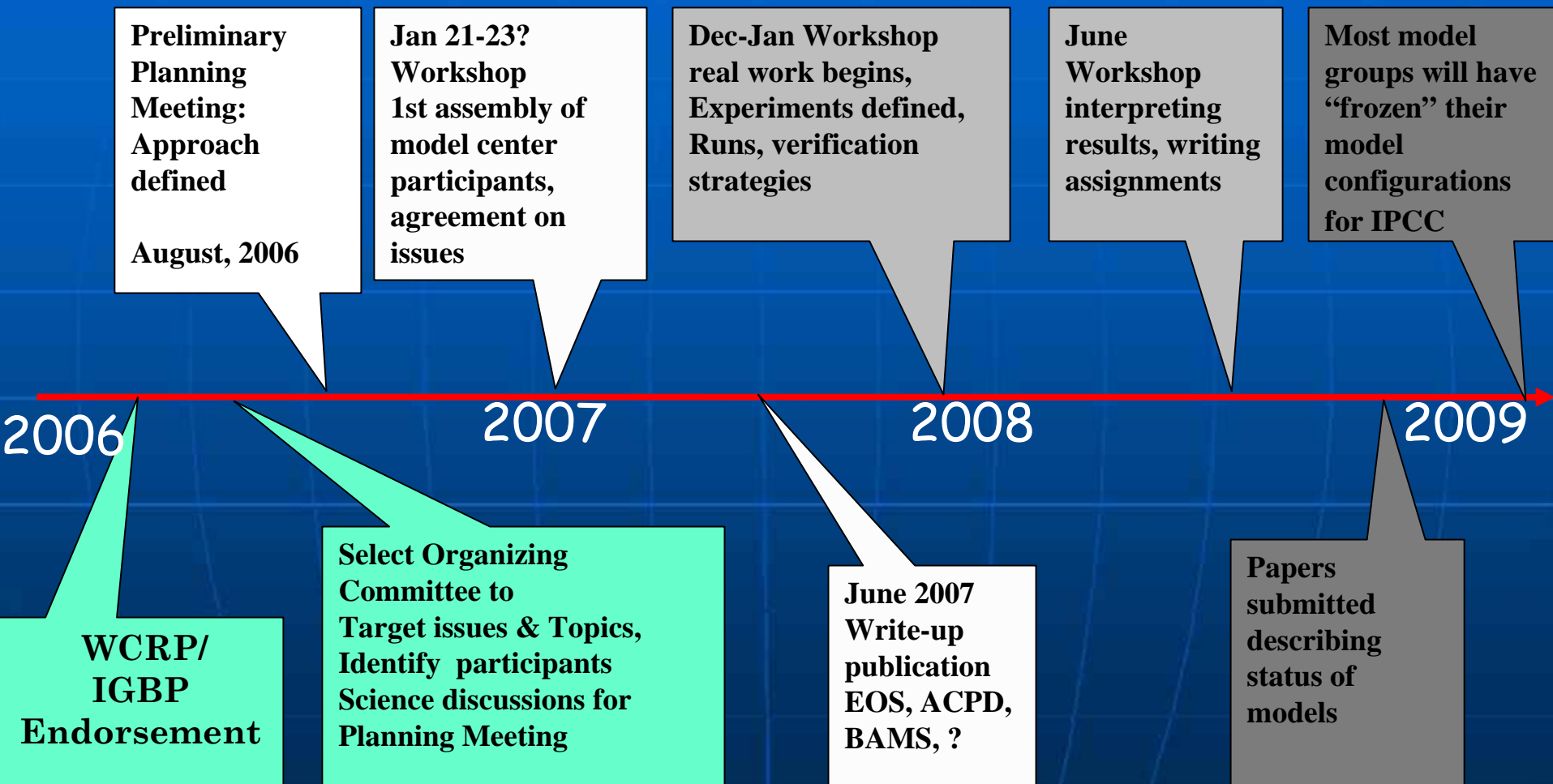
The path forward...



- There is a great deal of existing data (e.g. from CCM-Val, AEROCOM, ACCENT-MIP, other?) that could be "mined" and/or coordinated to address over-arching questions
- A role of AC&C could be to help coordinate these existing activities - i.e. common diagnostics/data bases.
- Integration via key science questions.



Possible Timeline





Aug 2006 Boulder Meeting



- about 20 people
- Have we identified the "right" problems? What is missing?
- included representatives from "related projects"
 - AIMES (Analysis, Integration and Modeling of the Earth System)
 - AEROCOM (Aerosol intercomparison/evaluation)
 - CCM-Val (Stratospheric CCM model intercomparison/evaluation)
 - ACCENT (Modeling Intercomparison Project)
- What has been learned to date? Successes/failures? Plans for future?
- How do we interact with these projects?
- Given a set of scientifically relevant topics
 - how do we define simulations?
 - datasets?
 - metrics?
 - how do we interact with measurement and theory communities?
 - how should we move forward?



Boulder meeting findings

- "related projects" (CCM-Val, ACCENT-MIP & AEROCOM) welcomed our participation
- Three major themes evolved...
 - ❖ composition effecting climate
 - ❖ climate effecting composition
 - ❖ climate impacts on "large scale" air quality
- Key science questions identified for each of these areas (*to be iterated in 1st AC&C workshop*)
- Science questions as a means to identify key processes in models that need addressing
- White paper summary



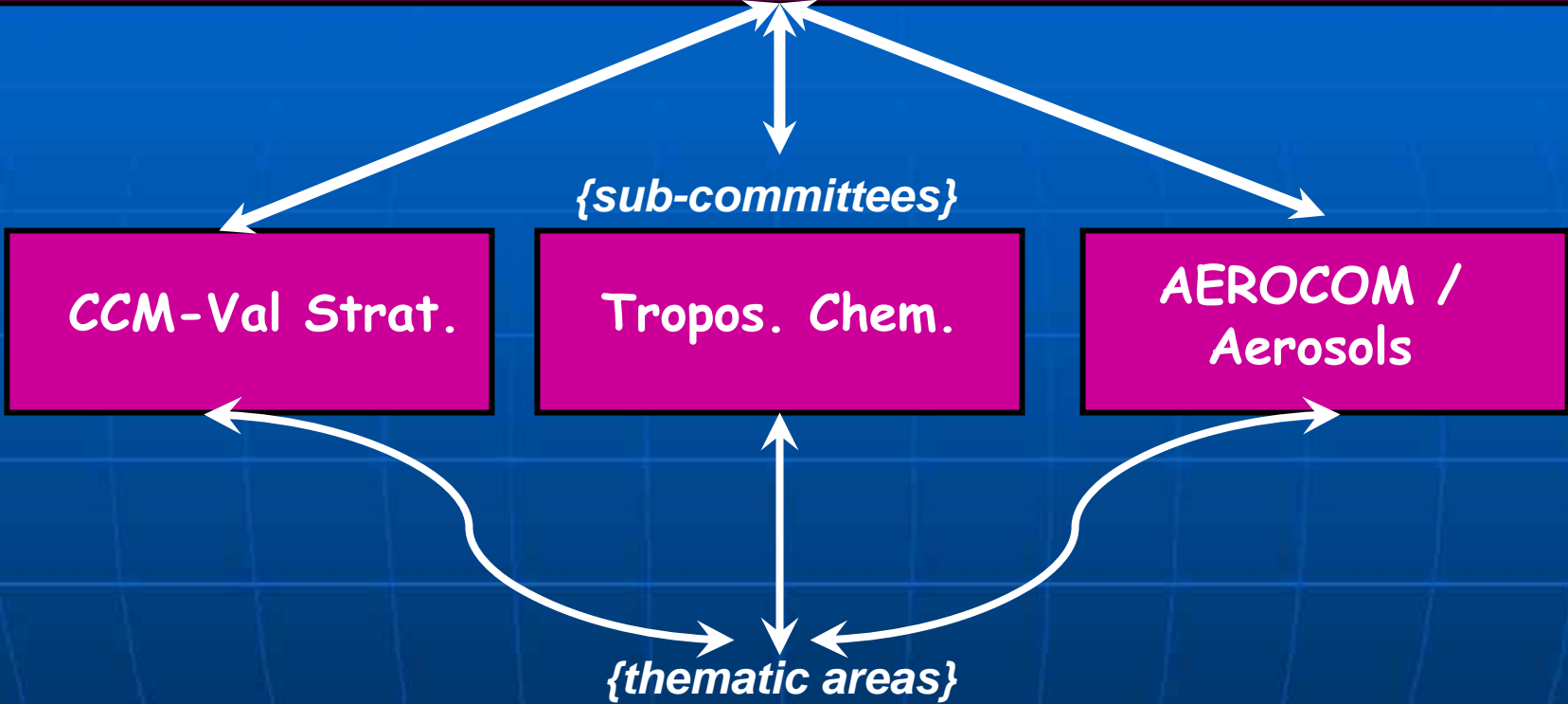
Boulder meeting findings



- **Example** issues:
 - Wet deposition
 - Transport processes
 - ❖ Is climate change going to change the boundary layer height, ventilation and deposition?
 - ❖ Is climate going to change long-range transport?
 - Secondary organic aerosol formation
 - ❖ Functional grouping as a way of parameterizing?
 - Relative roles of changes in climate vs. changes in precursors in determining future aerosol fields
 - What is the influence of aerosols on the composition of the troposphere i.e. via chemical reactions/interactions on/in aerosols and also via radiative flux impacts on photolysis rates?

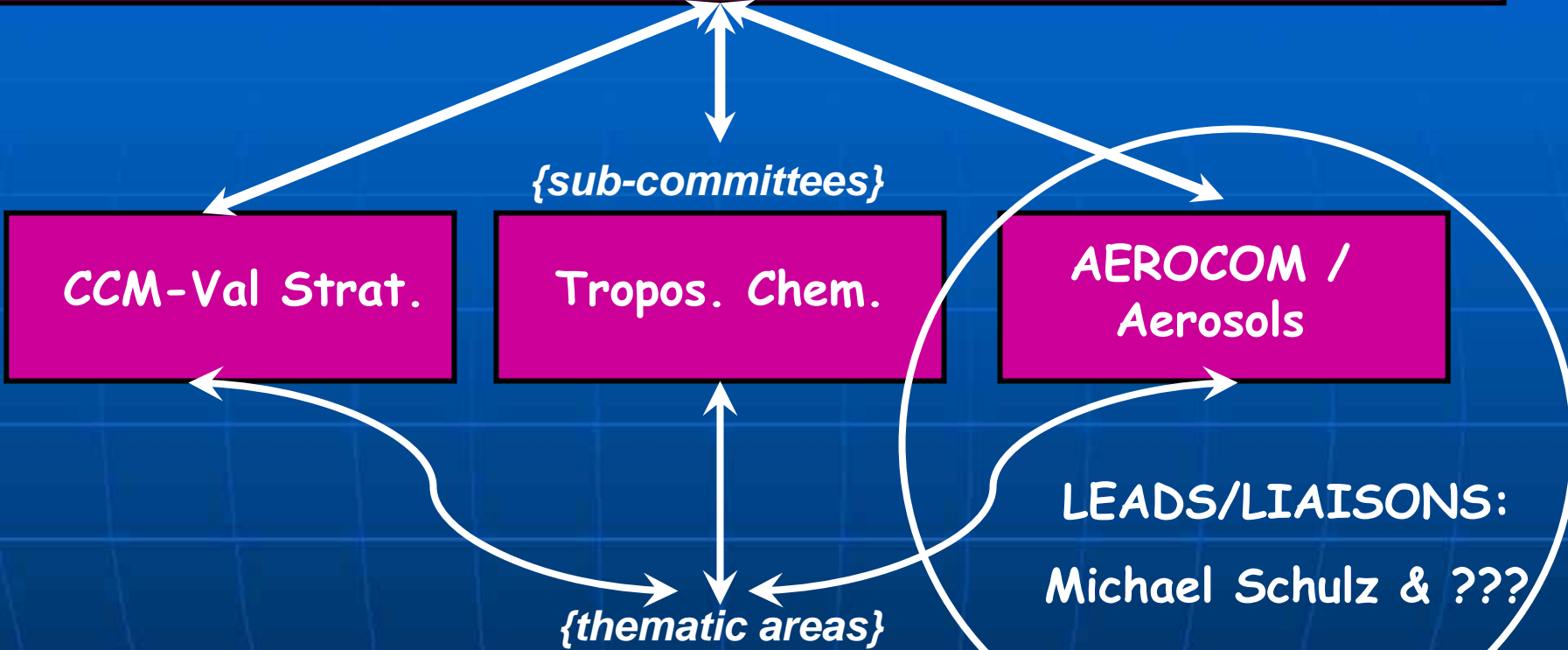


WCRP-SPARC/IGBP-IGAC Atmospheric Chemistry & Climate Initiative



- 1) Composition impacts on climate
- 2) Climate impacts on chemistry
- 3) Climate impacts on surface-level ozone & aerosols ("air quality")

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Proposed thematic leads:



1) Composition impacts on climate

Drew Shindell

???

2) Climate impacts on chemistry

Peter Hess

Mark Lawrence

3) Climate impacts on surface-level ozone & aerosols ("air quality")

J. F. Lamarque

Didier Hauglustaine



AC&C Next Steps



- Need to consider/include:
 - ❖ more of aerosol community
 - ❖ GEWEX (=WCRP water cycle project)
 - ❖ HTAP (=Hemispheric Transport of Atmos. Pollutants)
 - ❖ CCSP efforts on Aerosol/Climate and short lived species
- Proposed meeting Jan 21-23? piggybacking on HTAP meeting in Geneva or Paris
- Suggestions for "subcommittee" members
- AC&C looking at bigger topics with big picture view
- Emissions not receiving enough attention in this. More interaction with GEIA?
- IGAC Wet Deposition initiative
- Possible need for Data Center. Broaden CCM-Val effort?



We need the AEROCOM community to
be on board with this!

Whatta ya say?