Knowledge Transfer to
NWP & Climate Modeling Centers
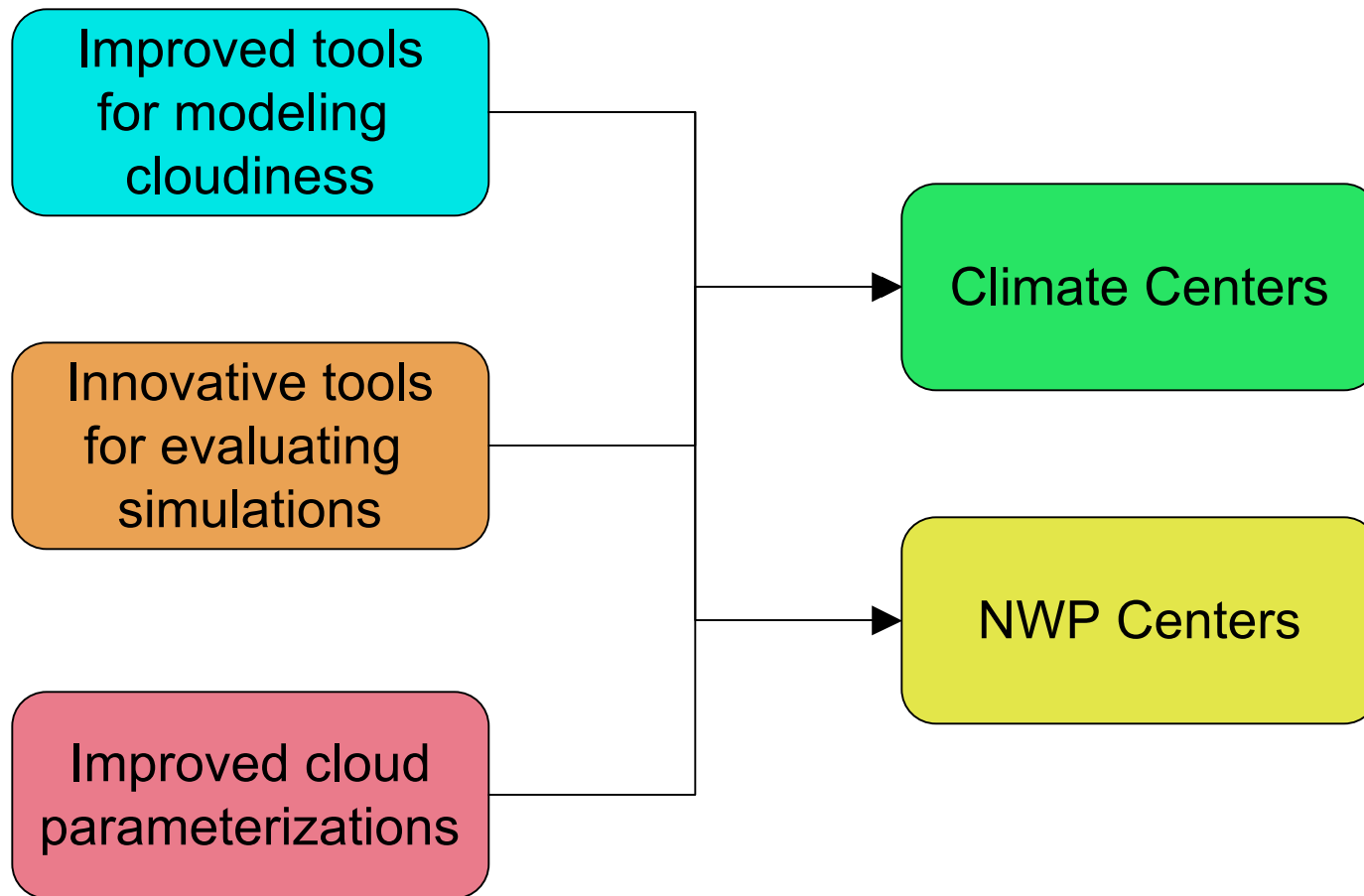
Goals from Science/Implementation Plan

Improved tools for modeling cloudiness

Innovative tools for evaluating simulations

Improved cloud parameterizations

Climate Centers

NWP Centers

Knowledge Transfer

CMMAP STM Meeting
Fort Collins, 7-9 Aug. 2007

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Recommendations & General Action Items
(Aug. 2006, Feb. 2007 STM)

Near-term Action Items:

- Develop student/post-doc interactions among CMMAP and modeling centers.

- Subject MMF to same tests used by climate community.

Long-term Action Items:

- Develop interactions among CMMAP and other high-res. modeling projects affiliated with centers

- Long-term: Foster feedback from centers to CMMAP on implications of advanced parameterizations for climate feedbacks, simulations of past/present/future climate.

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Action Items for Students

Major effort:

Work with KT Coordinator to create student-resource corner on CMMAP website

Student Corner *(Rodger Ames, Wayne Schubert, & Bill Collins)*

Recommendations for standard tests
(Feb. 2007 STM)

- **Subject MMF to NWP diagnostic frameworks**

- **Test MMF with deterministic short-range forecasts:**
  - *Long-term (climate) errors exposed by short forecasts*
  - *Also, could run MMF and conventional parameterizations in parallel*
  - *Advantage: these tests are comparatively cheap.*
  - *ALREADY UNDERWAY*

- **Continue tests of MMF in community intercomparisons:**
  - *AMIP-style simulations*
  - *GCSS-style case studies*
  - *ALREADY UNDERWAY?*

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Philosophy of standard tests

- How does diagnosis in community frameworks constitute knowledge transfer?

- One answer: Once the results are sufficiently compelling for both climate and NWP, then climate centers will begin active work on MMF.

- Role of centers: KT recipients or stake-holders

- Anonymous NWP modeler:
  "Put to bed the idea that NWP centers would use MMF in near future."

- What is the role of traditional MMF-inspired parameterization in the KT process?

- Should we get the centers to transfer knowledge **into** CMMAP regarding their major challenges.

Discussion of standard tests

- It is vitally important to analyze MMF in frameworks familiar to modeling centers:

  - NCAR diagnostic package

  - GFDL diagnostic package

  - NCEP diagnostic package

- This will help centers understand the implications of MMF using critical diagnostics for their applications.

- Action items/issues:

  - Liaison to NWP and climate centers for this work?

  - Translation of MMF results into IPCC AR4 PCMDI framework

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Notes on discussion follow

Notes during my talk

- Pincus: Papers on MMF AMIP runs at T42 and T85 are in press.
- The runs have not yet been transferred to PCMDI (true?)
- It would be useful to analyze these runs using GFDL, NCAR, and NCEP diagnostics.
- Could the NCEP diagnostics be used for the CAPT runs using MMF?
- Could the IPCC framework for standardizing output be applied to MMF?
- GCSS case studies using CSRMs are well underway (not sure of the relevance of this comment).
- It would be very helpful to have a liaison to coordinate diagnostics.
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Discussion after presentation

- COLA is interested in prediction studies with MMF

- There is evidence that some of the lack of predictive skill can be traced to cloud parameterizations.

- Would be interested in using a coupled version of the MMF.

- Prediction time scales: monthly, seasonal, and decadal.

- LD (Leo Donner): What are the issues with coupling?

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Discussion

- Has SAM been discussed in context of coupled model?
- It's ready now given the CCSM framework, but biases obviate immediate implementation.
- MM (Martin Miller): Concern about actual *knowledge* transfer -- how is this activity informing the NWP and climate centers.
- SK (Steve Klein): "If MMF does a great job with MJO and the mechanism could be identified, this would represent knowledge transfer."

Discussion

- BC (Bill Collins): Maybe the centers could exchange information into CMMAP regarding the major outstanding issues.

- MK (Marat): Could run MMF on same short-range cases as those analyzed by NCEP.

- BC: How does COLA link changes in physics to improvements/degradations in predictive skill?

- MM: Short-range (5 day) forecasts are the basis for moving forward in NWP centers.

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Discussion

- SL (Steve Lord): We could try putting MMF into NWP models.

- Christine: Currently we do monthly predictions with CCSM and evaluate predictions scores -- we want to do the same simulations with MMF.

- MM: Put to bed the idea that NWP centers would use MMF in near future.

- MZ (Minghua Zhang): KT would consist of new parameterizations and process understanding.

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Discussion

- BC: Would the trigger be dramatic improvements in CAM (both climate and short-range predictive skill) for tests @ GFDL, NWP centers?

- MM: "Do not waste too much time tuning T42"

- CHM (Chin-Hoh Moeng): This is like GCSS, only with a large number of cases.

- Mitch: We should recall that one of the major objectives of MMF is to improve traditional parameterizations.

- CHM: The reason for inventing CMMAP was to get out of the trap of traditional parameterization development.

Discussion

- JF (Jay Fein): CMMAP proposal acknowledged that a global ultra-high resolution model was probably out of reach, but it would produce more physically based parameterizations.

- JF: Legacy: The legacy of the C4 center was not proposed up front (role of aerosols and the radiative imbalance of the atmosphere).

- JF: Producing a basis for moving towards the goal, but not necessarily reaching the goal, would still be a tremendous legacy.

- Mitch: We need to think much more carefully about the type of data sets we need to evaluate the simulations.

- LD: Politely disagrees.

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Discussion

- LD: We are not at the stage yet where internal consistency of the data is a limiting feature -- errors in climate models are O(1).

- LD and MZ: Necessary but not sufficient condition is to perform well under traditional metrics.

- KMZ (Kuan-man Zhou): Project to merge Cloudsat, CALIPSO, MODIS, and CERES into a single product underway @ NASA LaRC.

- MZ: Mark Webb and others are creating CALIPSO and CloudSat simulators.

- RP (Robert Pincus): "Well, we have the MMF, what we would we like to do to get info to centers. We need to demonstrate that the simulations are demonstrably better, and the reasons can be attributed to processes. It makes sense to run the simulations through CMOR, CAPT, etc. What we will find out is that the MMF does not do a hugely better job (either in climate or NWP), then we need to understand why?"