

## Summary of Combined Hierarchical Diagnosis and Single-Column Model Breakout Session

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### Discussion of Intensive Operation Periods (IOPs)

The group made several recommendations for IOPs in general. One of the main points was that members of the Atmospheric Radiation Measurement (ARM) Science Team should be given as much advance notification as possible of planned or potential IOPs. The group also recommended that a lead scientist be appointed for each IOP. This scientist should have expertise in the topic of primary focus of the IOP. The lead scientist's main responsibility would be to make sure that the operations carried out in the IOP address the relevant scientific issues to the fullest possible extent. This would be done in coordination with both other Science Team members and the EST, as well as the Site Scientist and Site Manager. These same recommendations apply to campaigns. (Note: The specific information discussed during the breakout session and summarized here was current during the first week of March 1993, but may have been superseded.)

#### June 1993

This IOP was requested by the National Center for Atmospheric Research (NCAR) to test the five-beam profiler and to evaluate warm season data assimilation. It is a data-assimilation-oriented IOP. Although it was discussed during the November Single Column Model (SCM)/DA workshop, several Science Team members were not aware of this

IOP, hence, the general consensus was that there should be more advance notice for future IOPs. Science Team members need information about this IOP as soon as possible. Chris Walcek stated that ARM should provide rainfall data over the site for this IOP and agreed to work with Ric Cederwall (EST Contact for this IOP) to define the specific rainfall data requirements.

Dave Parsons made a brief presentation on this IOP. (He had given a presentation on this IOP at the SCM workshop in Richland, Washington in November 1992). Following are the main points of his presentation in Norman:

**What:** Warm season data assimilation and Integrated Sounding System (ISS) test, four-dimensional data assimilation (4DDA) using standard Cloud and Radiation Testbed (CART) data and comparing with LAPS or Mesoscale Analysis and Prediction System (MAPS)

**When:** June 93 for 10 days, exact dates depend on weather conditions

**Observations planned:**

4 radiosonde launches per day from each of the following National Weather Service stations: Oklahoma City, Dodge City, and Topeka

3 NCAR CLASS soundings, 8 per day

Additional radiation observations at Cross-chain Loran Atmospheric Sounding System (CLASS) sites—downwelling solar and IR

2 additional 915-MHz profilers (central facility 915, plus 2 others to make a small triangle to get u, v, and w and to get vertical vorticity component and divergence)

End product: 5-km horizontal grid of balanced fields for SCM and hierarchical diagnosis (HD)

Other points: Would like to get Andy Heymsfield to include formvar sounding. Bob Kropfli, Bob McIntosh, and Ken Sassen are planning to participate.

### Fall 1993

There will be an IOP sometime during the September - November 93 time period for the purpose of conducting a series of prototype unmanned aerospace vehicle (UAV) flights. (On the last day of the workshop, several presentations were given on the UAV program, including one on the plans for the prototype UAV flights.) The SCM/HD group requested that ARM make a general announcement of this IOP and schedule a planning meeting very soon.

### Spring 1994

As a result of a request from three Instrument Development Program (IDP) team members attending the breakout session, there will be an IDP-oriented IOP in March or April 1994. The primary focus of this IOP will be to validate and calibrate new instruments. A two-day workshop should be held soon to plan for this IOP. A lead scientist with appropriate specialization should be selected to coordinate this IOP.

## Science Team Guidance for Specific CART Sites

The group recommended that small committees of Science Team members be formed to focus on scientific issues for

specific sites. Jeff Kiehl is interested in forming a group of about ten people who would meet regularly to discuss the tropical western Pacific CART site.

## Discussions of HD “Key Questions”

This discussion resulted from a suggestion by Jeff Kiehl at the November 92 HD Workshop that the HD team compile a list of a few key scientific questions regarding the role of small-scale processes in climate processes. The goal was to bring the group together; the key questions could be the “glue” that would make the HD team a true working group.

Jeff received 17 suggestions (an additional one was submitted after the meeting). Although Jeff did not anticipate it, the call for questions caused some concern among the HD Science Team members that the establishment of such a list would appear to imply a prioritization of the HD research projects, i.e., that some were more important than others. Although there were mixed reactions to the key question concept a majority seemed to agree that, if handled properly, the exercise could be helpful.

Steve Ghan suggested that the questions could be divided into five categories:

- upper tropospheric water vapor
- issues involving cirrus clouds (their formation and radiative properties)
- effects of convective clouds
- effects of aerosols—direct and indirect (e.g., cloud-aerosol interactions)
- subgrid-scale cloud radiative properties.

The group selected five HD Science Team members to refine the key questions list: Bill Cotton, Tony Del Genio, Steve Ghan, Jeff Kiehl, and Ken Sassen.

The participants will decide soon if they need to reconvene in fall of 1993.