observations to the suite of ARM systems described below during the three-month deployment at Lamont, Oklahoma, and to operate these systems in a semi-continuous fashion (3-5 days on, 2-3 days off). The systematic instrument intercomparison project would involve balloon-borne instruments (e.g., carbon hygristor, humicap, and other sensors), surface and/or aircraft remote sensing systems (Raman lidar, microwave radiometer, FT interferometer, DIAL, and infrared spectrometer), and in situ aircraft observations (Lyman-α absorption hygrometer, chilled mirror dew point hygrometer, cryogenic collection, etc.).

GVaP requires high temporal resolution water vapor and wind profile measurements to obtain information concerning the spatial mean and sub-grid scale variability within satellite footprints and global climate model grid boxes (roughly 100 km on a side). Furthermore, the Water Vapor Reference Station would be partly concerned with understanding the causes and effects of this variability, particularly in relation to cloud processes. There is obviously considerable benefit to be gained by having GVaP coordinate its observing systems at this site with the ARM, GCSS, USWRP, and GCIP programs, particularly during the intensive intercomparison episode.

2.5 Atmospheric Radiation Measurement (ARM)/CART site

Bill Pennell

The Department of Energy's Atmospheric Radiation Measurement (ARM) goals are: (1) to provide an experimental test bed for improving the treatment of radiative transfer in global climate models (GCMs) under all kinds of cloud cover, and (2) to improve the parameterization and modeling of cloud formation, maintenance, dissipation, and related processes in GCMs. The following scientific requirements are most critical to the ARM objectives:

- Quantitatively describe the spectral radiative energy balance profile under a wide range of meteorological conditions.
- Identify the processes controlling the radiation balance by direct and comprehensive comparison of field observations with detailed calculations of radiative fluxes and associated cloud and aerosol contributions.
- Develop a knowledge base necessary to improve parameterizations of radiative properties of the atmosphere for use in GCMs. This requires intensive measurements on a variety of temporal and physical scales such as in the proposed multiscale experiment. A major thrust is placed on the role of clouds, including their distribution and microphysical properties.

Observations beyond the CART site such as in the proposed multiscale experiment are needed to address these issues.

2.6 Aviation Weather Program (AWP)

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Brant Foote

The Aviation Weather Program (AWP) combines additional weather observations, improved forecast technology, and more efficient distribution of information to pilots, controllers, and automated systems to improve the weather information provided to the air traffic control system, pilots, and other users of aviation weather information (e.g., dispatchers and airport operators). Specific objectives include the needs to:

- Improve airport and en-route capacity by accurate, high resolution, timely forecasts of changing weather conditions affecting airport and en-route operations (e.g., ceilings and visibility).
- Improve analyses and forecasts of upper-level winds for efficient flight planning and traffic management.
- Increase flight safety through improved aviation weather hazard forecasting (e.g., icing, turbulence, severe storms, microbursts, or strong winds).

The AWP would benefit from participation in a cooperative multiscale experiment by obtaining data for: evaluation of aviation weather forecast products (e.g., ceilings aud visibility, thunderstorm occurrences, and weather hazards), analysis or four dimensional data assimilation schemes, and experimental techniques for retrieving aerosol and other visibility parameters. A multiscale experiment would also be helpful to AWP by making it possible to evaluate the added benefit of enhanced data sets collected during the experiment on those forecast and analysis products. The goals of the CME are an essential step in attaining the long-term AWP objective of providing two-to-four hour location-specific forecasts of significant weather. Although the possibility of a funding role for the AWP in the Cooperative Multiscale Experiment is presently unclear, modest involvement of Federal Aviation Administration (FAA)/AWP personnel (particularly FAA-supported modeling work) could be expected.