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Southern Great Plains Newsletter

Cloud Radar Overhauled and Renamed

Photo courtesy of ARM

The KAZR (left) is being tested with a 2-meter antenna used with MMCRs at other ARM sites. This pre-operational test will help uncover any data anomalies prior to the KAZR being installed in its new home in the shelter on the right when it replaces the MMCR.

In mid-December 2010, a new Ka-band ARM zenith radar (KAZR) began a two-week pre-operational test alongside the ARM millimeter wavelength cloud radar (MMCR) at the Southern Great Plains site. This ushers in a new era for the fixed-position cloud data previously acquired by the MMCR. The MMCR will be retired at all of ARM's permanent research sites in favor of the new KAZR, which is expected to provide significantly improved sensitivity.

Since it began operating in 1996, the MMCR set the standard for providing data about cloud boundaries, vertical velocity, and reflectivity. Through the American Recovery and Reinvestment Act of 2009, ARM was provided the opportunity to significantly update the radar's technology. As a result, the KAZR is essentially a new radar.

Sourced by a different manufacturer, it uses only two of the same components—the antenna and transmitter—as the previous model. Although the user community must familiarize itself with a new instrument name, the ingested data format is as similar as possible to the historical MMCR ingest. Additionally, the change should be transparent for researchers who use data from the MMCR through the widely used Active Remotely Sensed Cloud Locations, or ARSCL, value-added product.

Photo courtesy of ARM

Did you know…?

The SGP was chosen as the first ARM field measurement site for several reasons including its relatively homogeneous geography and easy accessibility, wide variability of climate cloud type and surface flux properties, and large seasonal variation in temperature and specific humidity. It also already had a large, existing network of weather and climate research and instrumentation.

Special Interest Articles:

Individual Highlights:

Midlatitude Continental Convective Clouds Experiment (MC3E)

During April and May of 2011, the Midlatitude Continental Convective Clouds Experiment (MC3E) will take place at the ARM Southern Great Plains site in central Oklahoma and is a collaborative effort between the U.S. Department of Energy and the National Aeronautics and Space Administration (NASA). The campaign leverages the largest observing infrastructure currently available in the central United States combined with an extensive sounding array, remote sensing and in situ aircraft observations, NASA ground validation remote sensors, and the new ARM radar instrumentation purchased with funding from the American Recovery and Reinvestment Act of 2009. The overarching goal is to provide the most complete characterization data set for convective cloud systems, precipitation, and their environment that has ever been obtained, providing details for the representation of cumulus clouds in computer models that have never before been available.

Convective processes play a critical role in the Earth's energy balance through the redistribution of heat and moisture in the atmosphere and subsequent impacts on the hydrologic cycle. Global observation and accurate representation of these processes in numerical models is vital to improving the current understanding and future simulations of Earth's climate system. Despite improvements in computing power, current operational weather and global climate models are unable to resolve the natural temporal and spatial scales that are associated with convective and stratiform precipitation processes.

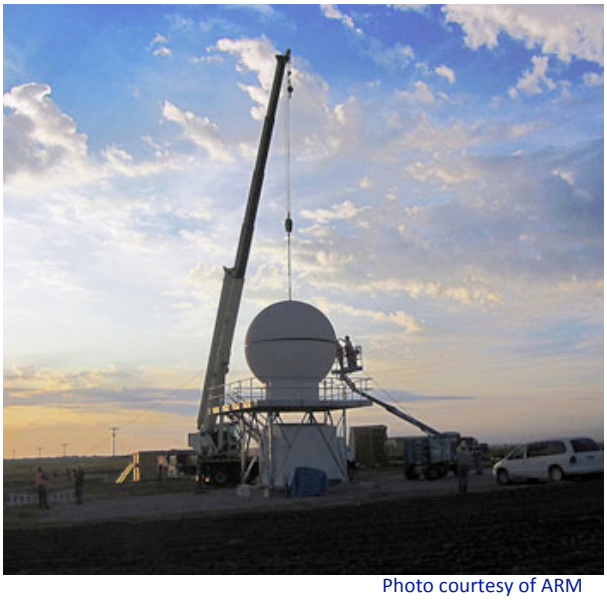

Photo courtesy of ARM

MC3E will use a new multi-scale observing strategy with the participation of a network of distributed sensors (both passive and active). The objective is to document and monitor in 3D not only precipitation, but also clouds, winds, and moisture in an attempt to provide a holistic view of convective clouds, their environment, and associated feedbacks.

Patterns Connect Cloud and Climate Prediction

New technique links large scale atmospheric processes with specific cloud properties

Clouds remain one of the most complex components in the climate system. To improve the accuracy of their use in climate models, scientists need a better understanding of the statistical connection between large-scale climate dynamics and the cloud fields they produce. Researchers from the University of Washington developed a classification technique to identify various atmospheric states and test the statistical significance of each state using cloud radar observations of vertical cloud occurrence. Applying their technique to long-term data centered on the ARM Southern Great Plains (SGP) site in Oklahoma, they connected specific atmospheric states with ground-based quantities such as cloud occurrence, precipitation, liquid water path, cloud optical depth and surface fluxes, and satellite quantities such as fractional cloud cover, top-of-atmosphere fluxes and cloud effect, and retrieved cloud properties. The multi-year record allowed them to investigate both the seasonal and interannual variability of the dynamic patterns, the duration of particular patterns, and the transition probability from any state to another state. The researchers plan to apply this technique to climate model output to determine to what extent they can duplicate the linkage between dynamical states and associated hydrological and radiative properties.

Photo courtesy of ARM

Ask a Scientist…

For more “Ask a Scientist”, please visit the Education section of our website!

Q: **What is the ARM Program doing to help scientists better understand climate change?**

A: The ARM (Atmospheric Radiation Measurement) Program is providing high-quality climate data on a continuous basis to scientists that are studying climate change and global warming. ARM has set up outdoor research sites in three locations around the world. The first site is located in the Southern Great Plains, the second is in the very climatically sensitive North Slope of Alaska, and the third is in the Tropical Western Pacific region.

Each site has special instruments that measure the water vapor in the air, the temperature of the air, the radiation coming from the sun, and the radiation reflected back from the ground and back into space. Lots of other measurements are recorded as well. The data files are sent to the ARM Data Center and then to the ARM Archive where scientists from around the world can access the data for use in climate models.

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Peter Lamb Elected to AMS Council

Congratulations to Pete Lamb, Southern Great Plains site scientist, on his recent election to the American Meteorological Society (AMS) Council. This distinguished group consists of the two past presidents and 15 other voting members of the society and serves as the governing board for the 14,000+ member organization. As summarized in his "candidate statement," Pete is passionate about balance and objectivity among meteorologists and climate scientists. He said that the AMS must "maintain a broad scientific perspective that extends from short-term/small-scale weather phenomena to regional/seasonal climate variability to much longer-term/global climate change." His election to the council for a three year term (2011-2014) will be certified and made official at the AMS annual meeting in Seattle. Pete has been the SGP site scientist since 1992 and is the director of the NOAA Cooperative Institute for Mesoscale Meteorological Studies at the University of Oklahoma. His research interest in North Africa's Subsaharan rainfall was notable in securing the RADAGAST field campaign, which deployed the ARM Mobile Facility to Niamey, Niger, in 2006. He continues to foster that progress through collaborations with the University of Niamey. More about his experience and distinguished contributions can be found with his candidate statement published in the August 2010 Bulletin of the AMS.

Photo courtesy of ARM

ARM Activity Corner…

For more activities, please visit the Education section of our website!

Storm Word Seek

M	B	L	K	D	Z	F	T	E	X	V	Y	F	B	U
O	V	Q	Y	C	U	L	D	L	Q	O	I	W	B	G
N	B	R	I	D	Z	S	L	R	R	V	J	H	R	H
S	T	E	D	R	N	A	T	T	W	B	U	S	U	K
O	O	T	L	G	U	C	E	S	L	J	E	N	O	Y
O	R	S	B	Q	Z	X	L	I	T	J	V	C	T	M
N	N	I	S	N	K	E	Z	E	Q	O	E	G	U	W
C	A	W	B	S	N	Z	G	Y	N	R	R	D	X	X
B	D	T	P	N	A	H	D	X	C	O	H	M	S	I
S	O	A	U	R	M	R	X	N	L	Y	L	R	G	C
W	K	F	D	T	S	U	N	A	M	I	Z	C	K	J
Z	Q	Y	U	P	U	N	O	O	H	P	Y	T	Y	Q
Y	E	L	V	T	D	N	I	W	L	R	I	H	W	C
L	V	M	R	O	T	S	R	E	D	N	U	H	T	W
H	M	Q	I	V	H	U	R	R	I	C	A	N	E	V

Try to find these words:

blizzard	thunderstorm
cyclone	tornado
duststorm	tsunami
funnel	twister
hurricane	typhoon
monsoon	vortex
squall	whirlwind