

# Reconfiguration Plans for the Next-Generation ARM Facility

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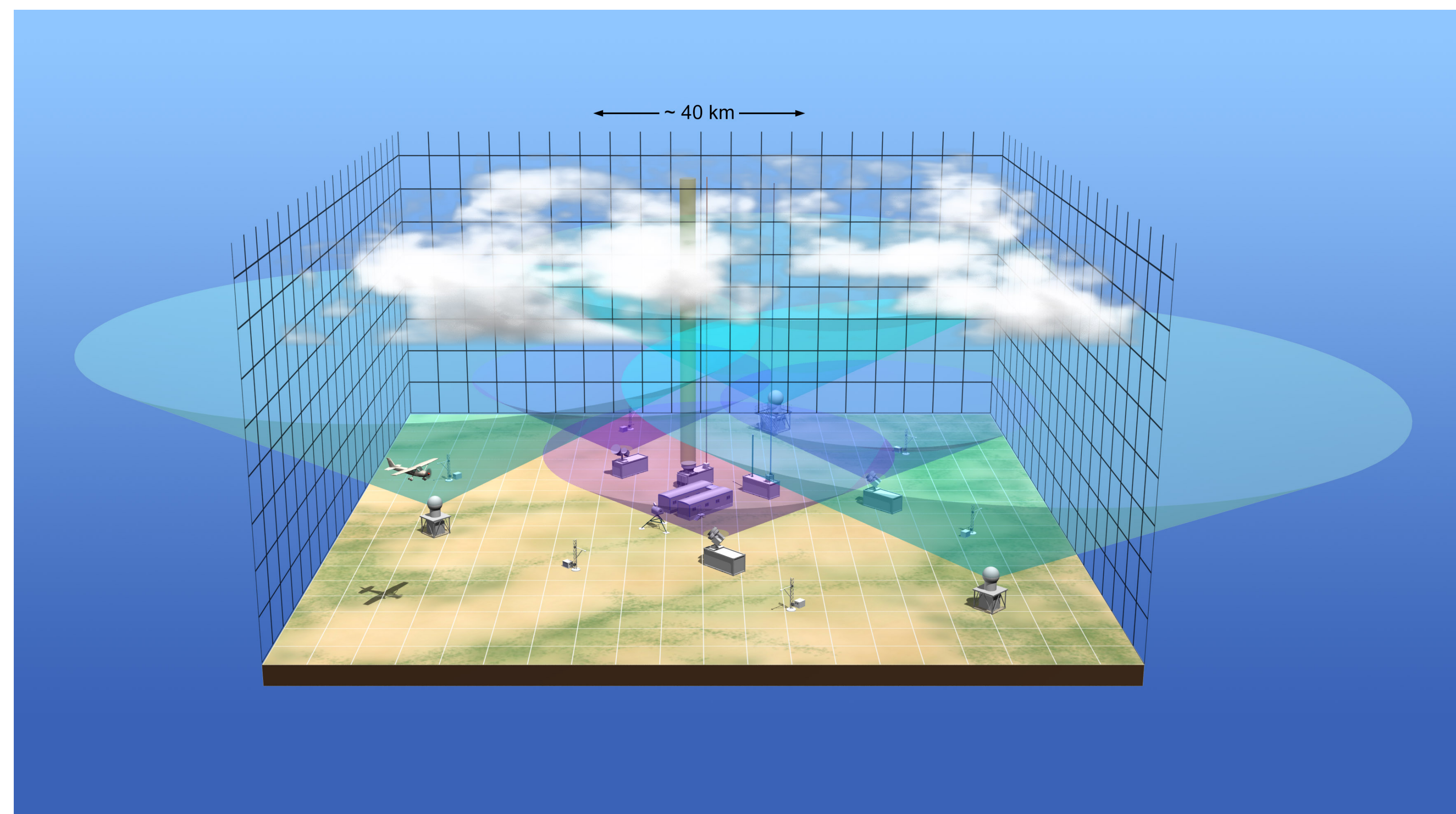
## Introduction

The ARM Climate Research Facility provides measurements to improve the understanding of processes associated with clouds, aerosols, radiation and the atmospheric state and the representation of these processes in climate models.

To provide more complete data sets in support of process studies and model development, ARM is undergoing a reconfiguration.

The next generation ARM facility will provide more spatially integrated information at a few locales to support process study analysis.

Sites in the Tropical Western Pacific will be closed to support the development of two supersites in the continental US and the North Slope of Alaska, where models will be run on a routine basis.



## Motivation

A consistent message from the ARM science user community has been to better integrate measurements and model simulations. In recent years, in various forums, this need has sharpened to a call for running high-resolution models at ARM sites on a quasi-routine basis.

The development of supersites is designed to address this need in order to accelerate the understanding of atmospheric processes.

At the same time, this reconfiguration of instruments into a fewer number of sites will make available funds to support model operations and the associated development of integrated observation data products needed for model constraints. The overall reduced footprint will also allow more concentrated support of complex instruments.

## Plans for the Southern Great Plains/Continental US

Over the next several years, there are going to be a number of changes made to the ARM Southern Great Plains (SGP) site:

- Instruments from the Tropical Western Pacific sites will be redeployed at the SGP to create a more spatially distributed set of measurements at a single locale.
- Many components of the SGP measurement suite will be reconfigured to be transportable, similar to an ARM Mobile Facility.
- Additional measurements will be added as needed and practical but could include combining lidars of multiple frequencies to support aerosol profiling or dense sampling of surface properties
- Atmospheric models will be run on a routine (though likely not continuous) basis over the SGP domain

The details of how instruments will be deployed at the SGP supersite, what additional instruments are needed as well as what models will be run – and how often – are currently under discussion and input from the community is encouraged on these points.

In this new strategy, this supersite will be deployed at the current SGP location for 2-3 years (once operational) and then will be moved to a new locale that presents a different set of science issues: urban heat island, orographic effects of mountain ranges, or deep convection. The new locale will be selected within the continental United States to minimize operations challenges. The deployment cycle for this new facility is planned to be approximately 3 years.

While the current SGP site will undergo significant changes through this period, it is anticipated that a core facility will remain when the supersite relocates. This core is expected to include support facilities and some core measurements.

## Plans for Other ARM Facility Components

While there are large changes going on in parts of the facility, there is no plan to change the deployment strategy for the Eastern North Atlantic or for the mobile facilities. The mobile facilities will continue to be available for deployments around the world.

There are no specific plans at this point to change the Aerial Facility, however, the optimum strategy for the AAF is under review. Key questions that will be examined over the next year for the AAF will be:

- What are the key science needs supported by aerial measurements?
- What is(are) the optimum platform(s) to meet these science needs?



## Modeling, Integrated Data Products and Tools, and Implications for Computing Infrastructure

An important component of the Next Generation ARM facility will be routine ("routine" will likely not mean 24/7/365) simulations over the observation domains. Like other components of the reconfiguration, the details of the modeling strategy are under discussion.

It is expected that the first simulations will be run over the Southern Great Plains and are expected to include Large Eddy Simulation and/or Cloud Resolving Models as well as Single Column Models. The operation of these models have several important implications. Notably:

- It will be critical to facilitate the confrontation of models with measurements from the supersites through a combination of integrated, data products, instrument simulators, and potentially data assimilation techniques appropriate to small scales.
- The generation of high-resolution, publicly accessible model simulations and associated multi-dimensional data products will require growth in capacity for data processing, storage, and access.

## Plans for the North Slope of Alaska

With the opening of the third mobile facility at Oliktok, Alaska in 2013, ARM has already begun expanding operations on the North Slope of Alaska (NSA). In addition to a second site in the Arctic, Oliktok is unique in that DOE operates a region of restricted air space around Oliktok where Unmanned Aerial Systems (UAS) and Tethered Balloon Systems (TBS) can be operated.

For the near term, the NSA supersite will include

- Two core ground-based facilities
- UAS, TBS, and manned aircraft to sample spatial heterogeneity

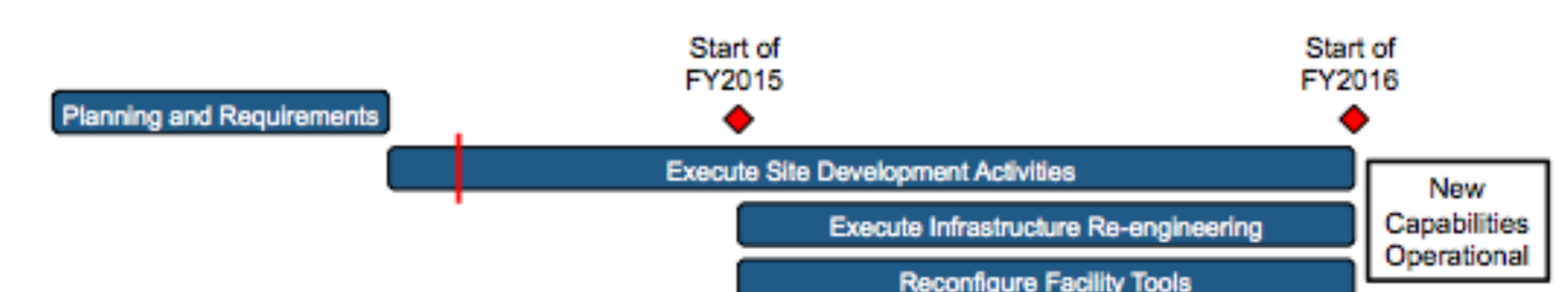
In the longer term, we will be exploring additional siting options across the North Slope to develop an increasingly integrated observation network.



## Reconfiguration Project Milestones

Many of the details of the reconfiguration plan will be developed over the next 6-12 months; however, the basic framework for the plan is in place and some activities, namely the draw-down of instrumentation in the tropics is already underway. A few key milestones are provided here to frame the pace of the reconfiguration plan:

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|---|---------------|
| • Removal of the Darwin SACR            | March 2014    |
| • End of Manus Operations               | May 2014      |
| • End of Darwin Operations              | December 2014 |
| • First ARM UAS flights at Oliktok      | March 2015    |
| • Beginning of SGP supersite operations | Early CY 2016 |
| • Relocation of CONUS supersite         | 2018/2019     |



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