U.S. DEPARTMENT OF ENERGY | Office of Science

ARM Operations and Engineering Procedure Mobile Facility Site Startup

JW Voyles

May 2014

ARM CLIMATE RESEARCH FACILITY

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1.0 Introduction and Purpose

This procedure exists to define the key milestones, necessary steps, and process rules required to commission and operate an Atmospheric Radiation Measurement (ARM) Mobile Facility (AMF), with a specific focus toward on-time product delivery to the ARM Data Archive. The overall objective is to have the physical infrastructure, networking and communications, and instrument calibration, grooming, and alignment (CG&A) completed with data products available from the ARM Data Archive by the Operational Start Date milestone. Figure 1 provides a high-level example of an AMF Deployment Schedule.

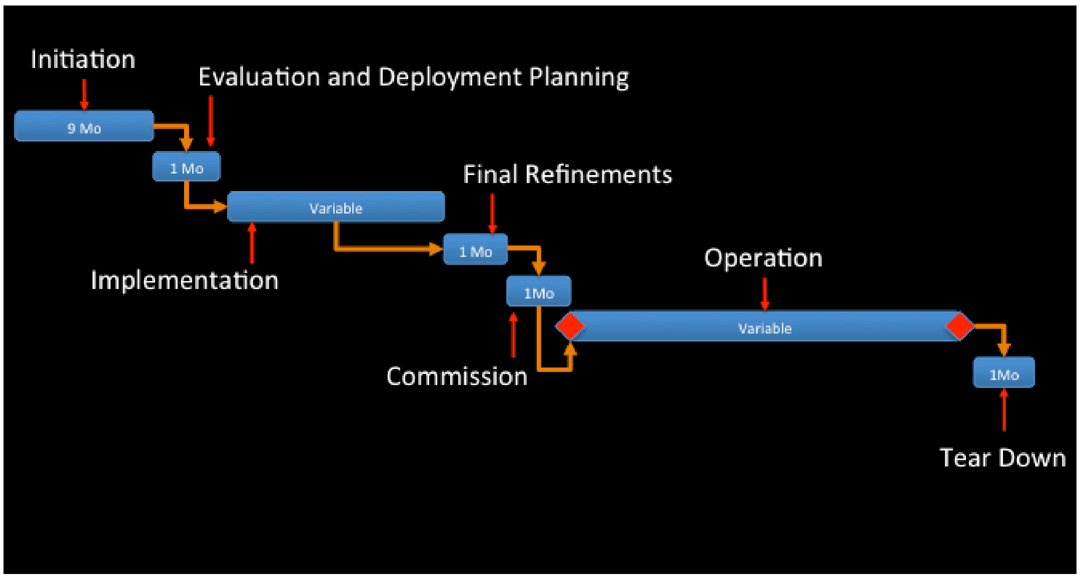


Figure 1. Above is an example AMF Deployment Schedule.

2.0 Initiation - Campaign Planning

AMF deployments are approved by the U.S. Department of Energy (DOE) as an output of the annual ARM Facility call for proposals. The Science Liaison manages this process:

1. Pre-proposal review: initial screening and analysis by infrastructure management to evaluate feasibility (see **Appendix A**, Pre-Proposal Checklist)
2. Principal Investigator (PI) notification for the development of a full proposal, including associated caveats
3. Infrastructure receipt of full proposals: costs, siting, and logistical analysis (see **Appendix A**, Full-Proposal Checklist)
4. Science Board review
5. Assessment of campaign start dates and schedules to manage infrastructure resources
6. DOE approval, with caveats, and Operational Start Date milestone defined
7. Facility AMF timeline updated (see **Appendix B**, ARM Facility AMF Timeline**)**
8. Notification by Science Liaison to Infrastructure for AMF deployment execution.

3.0 Evaluation and Deployment Planning

In this phase, the formative planning and execution documents are drafted. The Site Manager is required to engage the PI and members of the infrastructure to coordinate an integrated set of plans. The plans are living documents, refined during the Implementation phase. All descriptive documents should be attached to the relevant Engineering Change Order (ECO). (See **Appendix A**, Plan, Execute, and Document Checklist).

1. **Timeframe**:
   - Start at the approval and announcement of the AMF Deployment
   - Complete within one Month after task start
2. Draft the Construction Installation Plan (CIP) (see **Appendix C**)
3. Draft and communicate the Deployment Schedule (sub-component of the CIP)
4. Draft Operations Plan (within the CIP) and evaluate the need to refurbish tasks. Assign Operations Support System (OSS) reconfiguration tasks and define CM/PM rules. (sub-component of the CIP)
5. Draft Instrument and Measurement List (see **Appendix E**, Instrument List Example)
6. Request Science Plan from PI. The Science Plan should define relationships and collaborations including ARM instrumentation, visiting instruments, aerial measurements, radar science and engineering, and modeling science areas. The Science Plan should also include a measurement priority list to identify critical measurements. (see **Appendix D**, Science Plan Example)
7. Provide descriptive metadata for the intensive operational period (IOP), site, facility, and instruments
8. Discuss and identify Value-Added Product (VAP) Processing Plan (see **Appendix F**, VAP Plan Example)
9. Discuss and identify collaborative PI products
10. Discuss and identify External Data Products
11. Identify and discuss requirements for supplemental facilities
12. Discuss and identify ingest development requirements
13. Draft Network and Communications Plan and Disk Swap/Shipping protocol. If network communications are not technically possible, product delivery and measurement management rules must be defined within the CIP. Some encoded health and status information needs to be communicated, and local operations staffing need to have a technical understand of all instruments and systems to ensure quality product delivery. (See **Appendix G**, Data System Plan Example)
14. Review Instrument and Measurement site-specific requirements (See **Appendix A**, Plan, Execute, and Document Checklist)
15. Review Ancillary Measurements: this includes any instruments or systems that are not part of the AMF instrument suite. For example: MAOS, SKIP, Mobile C-Band, and visiting instrument systems
16. Review the status and content of the ARM web pages, documenting the IOP, including measurement metadata.

4.0 Implementation

During the Implementation phase, the site infrastructure is formed and evaluated for operations. It is important for the Site Manager to work with Data System Engineering to have a viable network and communications capability in place for the final refinements phase at least two months before the Operational Start Date. Equipment, instrumentation, and systems arrive on site during this phase for final refinements.

1. **Timeframe**:
   - Start one month after announcement of the AMF Deployment
   - Complete two months before the Operational Start Date
2. Execute deployment activities and CIP
3. Plan and execute any system refurbishment activities required
4. Finalize instrument and measurement site-specific configuration
5. Finalize Ancillary Measurement configuration
6. Make network and communications operational. If network communications are not technically possible, product delivery and measurement management rules must be defined within the CIP
7. Integrate AMF assets and ancillary systems on location
8. Draft data processing plan (Data Management Facility (DMF) configuration, Data Product Tracking Table, ingests). (See **Appendix H**, Plan and Data Product Delivery Example)
9. Draft Data Quality (DQ) Assessment Plan, including Quality Assurance (QA) limits and ranges
10. Draft Value-Added Processing Plan
11. Define PI expectations and delivery rules for local or real-time data, including the quality assessment of data products (localized data dissemination protocol).

5.0 Final Refinements

With everything on site, this phase verifies that all final pre-operation activities and tasks are completed for the commissioning phase. The process workflow for product delivery, which spans the final refinements and site commissioning activities, is outlined in figure 2 (also available from **Appendix I**, Product Delivery Workflow). All campaign planning documentation will be communicated and made available in the ECO and on the Operations web page.

1. **Timeframe**:
   - Start two months before Operational Start Date
   - Complete one month before Operational Start Date
2. Final verification of Instrument installation details
3. Final Instrument and Measurement List
4. Final Network and Communications Plan (includes collection configuration)

5. Final Data Processing Plan (DMF configuration, Data Product Tracking Table)
6. Final DQ Assessment Plan
7. Final VAP Processing Plan
8. Final rules for local research data delivery
9. Finalize processing steps for External Data Products
10. Final collaborative PI-product definitions
11. Draft Operations web page online and update ARM web pages
12. Review and provide public and educational outreach products
13. Draft Operations Site Log and make IOP discussion wiki operational.

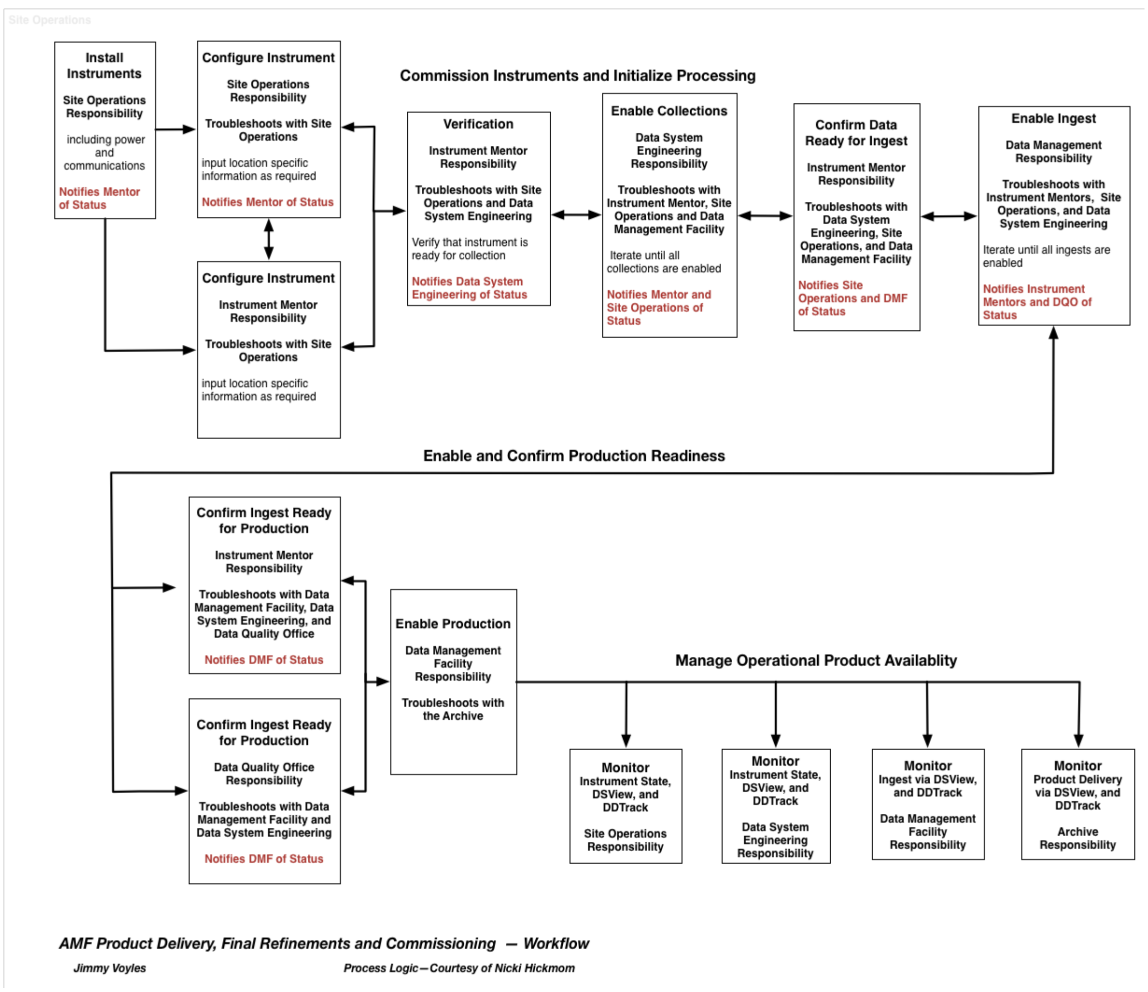


Figure 2. This graphic shows the Commission Instruments and Initialize Processing workflow.

6.0 Commission

This phase is the last pre-operational activity required to guarantee all systems are producing properly characterized measurements, processed quality-assured data, with data available from the ARM Data Archive user interface.

NOTE: *The pre-operational startup data will be bundled with a readme file included to describe the usability. Data Quality Reviews (DQRs) and Data Quality Problem Reports (DQPRs) are not active during the commissioning phase. These data can be delivered for analysis and review if explicitly requested.*

1. **Timeframe**:

   Start one month before Operational Start Date

   Complete on or before Operational Start Date

2. Issue Baseline Change Request (BCR) and Engineering Work Order (EWO) to announce availability and facilitate communications across Operations, Site Data System Engineering, and Instrument Mentors

3. Coordinate product delivery coordination call (status report/review, actions, assignments, and target completion dates). This call (see **Appendix J**, Teleconference Announcement) is initiated by the Site Manager (see figure 3) to coordinate with the identified stakeholders. This procedure and process uses the Data Product Tracking Table (**Appendix K**) to manage closure.

   During the commissioning phase, all instruments are brought online and CG&A activities are conducted and managed by the Instrument Coordinator with direction from the Site Manager. A checklist is recommended for each instrument system to ensure proper system configuration (e.g., shadowing of radiometric instruments, reflections onto radiometric instruments, beam blockage or field-of-view issues with radars and lidars, correct height of meteorological instruments). A "rule book" should be developed by the Instrument Team to provide onsite guidance for the operations crew by providing "do's and don'ts" for each instrument.

   Site scientist and mentors should have inspected the site prior to data collection or have been supplied with a comprehensive collection of photographs of the deployment configuration. The Site Operations crew should not alter mounting configurations without consent from the Site Scientist and Mentors and a designation of configuration changes should be documented as "permanent" or "site-specific."

4. Require a fully functional site infrastructure that includes a robust network and communications capability for data flow to the DMF and Mentor Login for instrument CG&A. If network communications are not technically possible, product delivery and measurement management rules must be defined within the Operations/Site Plan.

5. Initialize and test local data delivery for research accounts

6. Complete DMF configuration

7. Configure collections

8. Data Product Tracking Table active

9. DQ Assessment Plan active

10. Operations web page online
11. Operations Site Log and IOP discussion wiki operational.

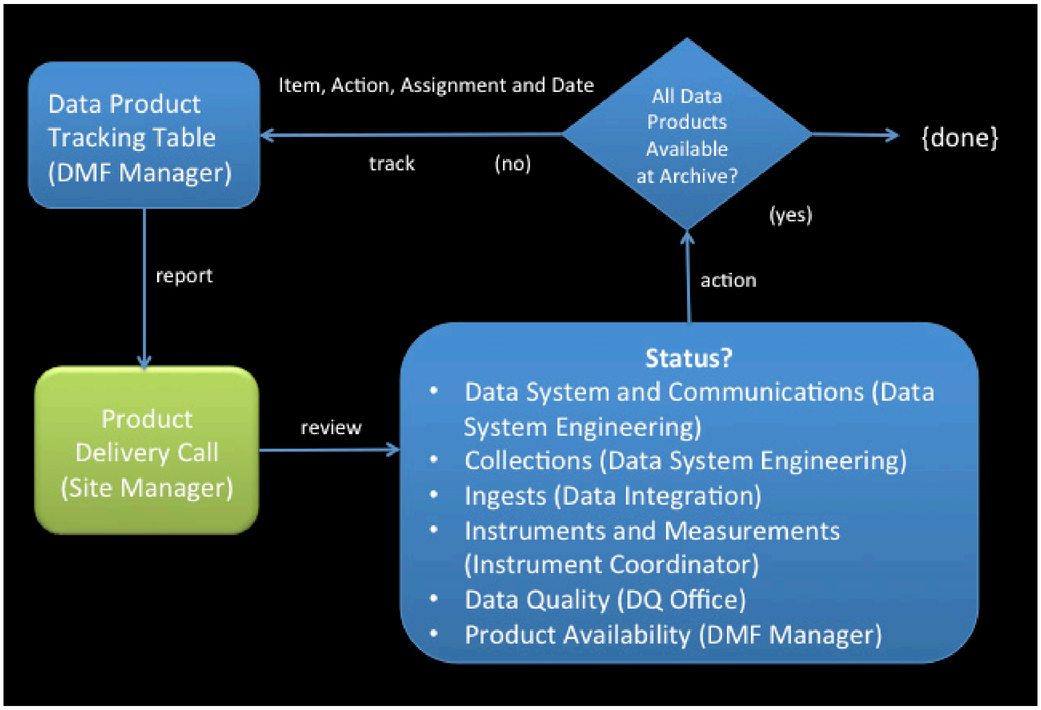


Figure 3. This graphic shows the Product Tracking to the ARM Data Archive.

7.0 Operation - Operational Start Date Milestone

1. Begin production operation of AMF and associated ancillary measurements. All data products processed, quality assured, and available through the ARM Data Archive
2. Communicate operational status to Infrastructure Management Board (IMB) and infrastructure area leaders.
3. EWO, DQPR and DQR used to troubleshoot and document quality issues
4. General site discussions and environmental descriptions captured in Operations wiki.

8.0 End of Operational Phase

As the operational phase ends and the system is brought to an offline state, the Data System Engineering group needs to be consulted. A shutdown sequence is defined in the Data System Plan. Any tasks that are performed on AMF instruments or system reconfiguration will be directed and managed by the Site Operations Manager.

9.0 Definitions, Roles, and Responsibilities

Table 1. Definitions, Roles, and Responsibilities.

Task	Description	Responsible
Pre-proposal Review	Initial screening and feasibility analysis.	IMB and Site Manager
Full-proposal Infrastructure Review	Costs, siting, and logistical analysis.	Site Manager
Deployment Award	Based on inputs from Infrastructure and Science Board Reviews.	DOE Program Management
Planning Start	Announcement, instructions, and caveats communicated to Infrastructure and PI.	Science Liaison
Facility Timeline	Update the Facility Timeline by adding this deployment.	Chief Operating Officer
ECO for Deployment	An ECR is entered to describe and document the AMF deployment.	Site Manager
Deployment Schedule	Given the Milestone for the Operational Start Date, this schedule lays out the tasks and dependencies leading up to the initiation of operations. Include in the CIP.	Site Manager
Construction Installation Plan (CIP)	Overall description of the activities and tasks required for siting the AMF facility and associated infrastructure, instruments, and systems.	Site Manager
Operations Plan	The Operations Plan is a sub-component of the CIP, describing the operational rule required to successfully execute the AMF deployment. This plan requires an active dialog with the PI and DOE to manage expectations. As a part of the Operations Plan, tasks will be invoked to update OSS records and define CM/PM rules and documentation.	Site Manager
Instrument and Measurement List	This list includes the requested baseline instrument suite for the experiment. Ancillary measurements are appended to this list. The development of this list requires an active dialog with the PI and DOE to manage expectations.	Site Manager
Science Plan	The PI develops the Science Plan and all requirements that impact siting, logistics, measurements/instruments, VAPs, collaborative PI products, and defines special research data delivery needs. The Science Plan should define relationships and collaborations with Radar and Modeling Science areas. This information feeds into the Operations/Site Plan and requires a cohesive understanding between the PI team, Site Management, and DOE.	Principal Investigator
Value-Added Product Processing Plan	If value-added product development is required to support the field campaign, a plan for value-added products (VAPs) needs to be communicated to the infrastructure (Site Manager) for scope, schedule, and resource definition.	Site Manager
PI-Product Plan	Data from collaborative instruments that may be deployed around or near the experiment that belong to PI contributors can be officially associated to the IOP by using our Data Product Registration and Submission form (for measurements that are part of an existing stand-alone PI asset) or by using the Intensive Observational Period Review (IOPR) system (for collaborative measurements added to the baseline). This plan is developed in cooperation with the PI team.	Site Manager
Network and Communication Plan	Part of the Data System Plan. This plan is developed in cooperation with the Site Manager and is required to ensure a robust network connection to the AMF and associated components. This activity needs to be in place and operational two months before the Operational Start Milestone. If network communications are not technically possible, product delivery and measurement management rules must be defined within the Operations/Site Plan.	Data System Engineering and Site Data System groups

Table 1. (contd)

Task	Description	Responsible
Data System Plan	This plan defines the overall configuration and operational rules for the Site Data System. Including the system startup sequence, operational monitoring, and shutdown sequence. Contact and support information.	Data System Engineering and Site Data System groups
Review Site-Specific Instrument and Measurement Requirements	This activity is required to ensure that all instruments are properly sited, installed, and have the appropriate approvals. For this activity, the Site Manager will coordinate actions with the Instrument Coordinator (Site Scientist, if relevant) and Instrument Mentor to complete this analysis and final configuration.	Site Manager
Ancillary Measurements*	Identify and define all ancillary measurements. Negotiate constraints (scope, schedule, and resources) with PI and DOE. Plan and integrate approved Ancillary Measurements.	Site Manager
PI Expectations for Local Data Delivery	To satisfy PI research and analysis requirements the local delivery of research data (real-time), either raw or processed data may be required. The Site Manager will work with the PI and the Data Lifecycle Group to clearly establish the associated rules for this service.	Site Manager
Data Processing Plan	The Data Processing Plan includes the DMF Configuration task and Data Product Tracking Table that will be used during the Product Delivery Coordination call.	DMF Management
DQ Assessment Plan	The Data Quality Office will coordinate with the Site Manager, DMF Manager, and Instrument Coordinator/Mentor to have plans in place for Pre-operational (final refinements phase).	DQO Manager
Product Delivery Coordination Call	This teleconference should be initiated at the beginning of the Commissioning phase. The Data Product Tracking Table, a DMF Management responsibility, is used for reporting, reviewing, assigning, and tracking actions necessary to establish Data Product Delivery from the site to the ARM Data Archive.	Site Manager
Operations Webpage	The AMF Site Operations web page is available from the ARM Website. Site Manager will task website needs to the Communications Team. All campaign planning documentation will be communicated and made available in the ECO and on the Operations web page.	Site Manager
Operations Site Log and IOP discussion Wiki	AMF Operations Site Log and IOP discussion wiki is available from the ARM Website. Site Manager will task website needs to the Communications Team.	Site Manager
BCR for Operational Start	This BCR will communicate the facility status at Commission Start Milestone.	Site Manager
*****This includes any instruments or systems that are not part of the AMF instrument suite. For example: MAOS, SKIP, Mobile C-Band and visiting instruments.		

Appendix A
Field Campaign Proposal Checklist

Field Campaign Proposal Checklist - Operations

1.0 Pre-Proposal: Preliminary assessment of request.

		INITIATE AND TRACK	RESPONSIBLE
1	Pre-proposal received	**Science Liaison**	**Science Liaison**
2	Contact PI	**Science Liaison**	**Site Manager**
3	Verify experiment schedule and duration	**Science Liaison**	**Site Manager**
4	Review with Engineering and Science Liaisons	**Science Liaison**	**Site Manager**
5	Review science and experiment objectives	**Science Liaison**	**Site Manager**
6	Document baseline instrument suite	**Science Liaison**	**Site Manager**
7	Review experiment logistics	**Science Liaison**	**Site Manager**
8	Review shipping and transportation options	**Science Liaison**	**Site Manager**
9	Document site location and ownership	**Science Liaison**	**Site Manager**
10	Conduct initial location assessment	**Science Liaison**	**Site Manager**
11	Develop feasibility summary	**Science Liaison**	**Site Manager**
12	Recommend or reject – for Full Proposal	**Science Liaison**	**DOE to Science Liaison**

2.0 Full-Proposal: The full proposal logistics, impacts, and costs are developed.

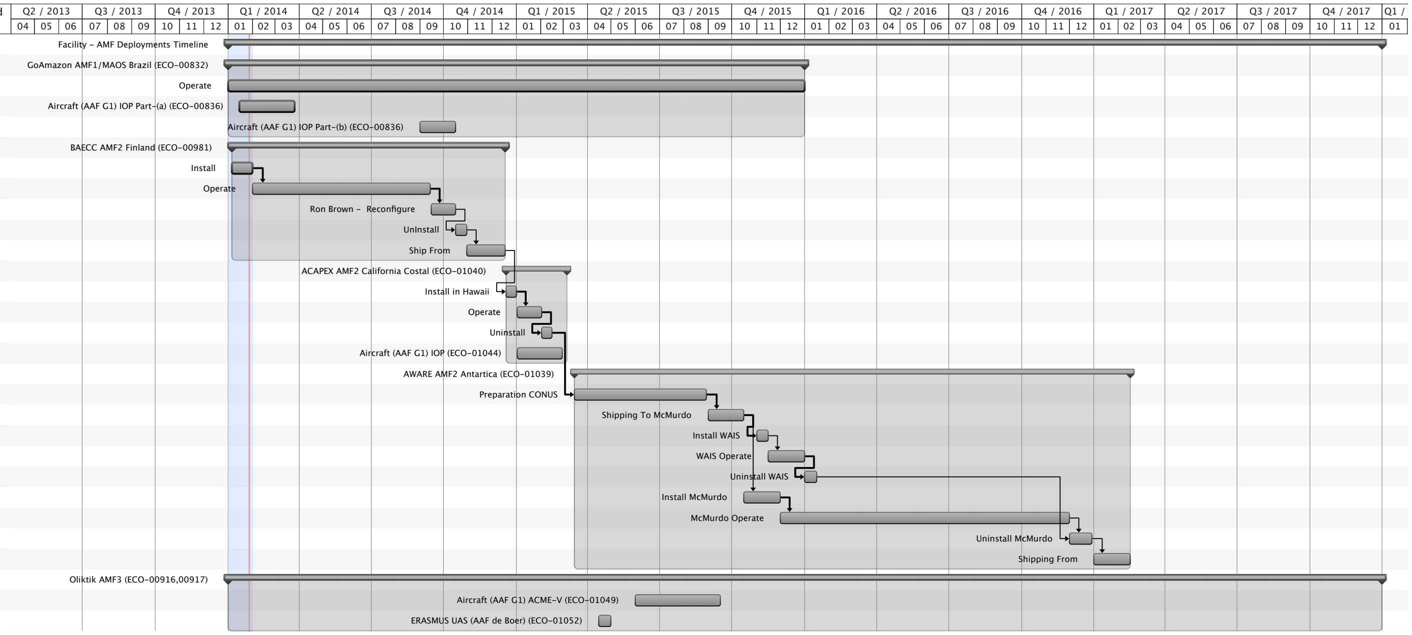
		INITIATE AND TRACK	RESPONSIBLE
1	IMB Determination regarding proposal	**Science Liaison**	**Science Liaison**
2	Contact PI	**Science Liaison**	**Site Manager**
3	Identify in-country sponsor/contact	**Science Liaison**	**Site Manager**
4	Contact or notify embassy	**Science Liaison**	**Site Manager**
5	Verify experiment schedule and duration	**Science Liaison**	**Site Manager**
6	Review with Engineering and Site Scientists	**Science Liaison**	**Site Manager**
7	Review science and experiment objectives	**Science Liaison**	**Site Manager**
8	Verify baseline instrument suite	**Science Liaison**	**Site Manager**
9	Verify and document additional instruments and measurements and costs (MAOS, Radars etc.)	**Science Liaison**	**Site Manager**
10	Verify ability to perform radar external calibration (see comment details); consult with Instrument Mentor as needed	**Science Liaison**	**Site Manager**
11	Identify issues that may intefer with microwave tip curves; consult with Instrument Mentor as needed	**Science Liaison**	**Site Manager**
12	Identify issues that may cause radiometer shading; consult with Instrument Mentor as needed	**Science Liaison**	**Site Manager**
13	Consult with Aerosol Mentors for site specific requirements	**Science Liaison**	**Site Manager**
14	Verify experiment logistics	**Science Liaison**	**Site Manager**
15	Document shipping and transport options and costs	**Science Liaison**	**Site Manager**
16	Identify technical infrastructure support for subcontracting costs	**Science Liaison**	**Site Manager**
17	Document site location and ownership and rental costs	**Science Liaison**	**Site Manager**
18	Identify special considerations, e.g., environment, safety, and health and associated costs	**Science Liaison**	**Site Manager**
19	Identify available space and costs	**Science Liaison**	**Site Manager**
20	Identify available power and costs	**Science Liaison**	**Site Manager**
21	Identify phone service and costs	**Science Liaison**	**Site Manager**
22	Document site layout and instrument configuration	**Science Liaison**	**Site Manager**
23	Identify Internet service and costs (consult with Site Data System Engineering)	**Science Liaison**	**Site Manager**
24	Identify personnel facilities, health and sanitation, and associated costs	**Science Liaison**	**Site Manager**
25	Identify medical and emergency services	**Science Liaison**	**Site Manager**
26	Document access/travel, local transportation, and costs	**Science Liaison**	**Site Manager**
27	Document security requirements and cost as necessary	**Science Liaison**	**Site Manager**
28	Identify balloon launching area	**Science Liaison**	**Site Manager**
29	Document storage and associated costs	**Science Liaison**	**Site Manager**
30	Identify office space and associated costs	**Science Liaison**	**Site Manager**
31	Document local service providers and associated costs	**Science Liaison**	**Site Manager**
32	Document local resupply availability (e.g., helium, etc.) and cost	**Science Liaison**	**Site Manager**
33	Identify and document consumable costs (Sondes etc.)	**Science Liaison**	**Site Manager**
34	Identify operations personnel and related costs	**Science Liaison**	**Site Manager**
35	Document local building codes and estimate impacts/cost	**Science Liaison**	**Site Manager**
36	Document language, interpretation and estimate impacts/cost	**Science Liaison**	**Site Manager**
37	Identify Value Added Product requirements	**Science Liaison**	**Site Manager**
38	Identify Collaborative PI Product requirements	**Science Liaison**	**Site Manager**
39	Review actions and schedule with contracts team	**Science Liaison**	**Site Manager**
40	Provide summary report of findings to IMB and ARM Science Board	**Science Liaison**	**Site Manager**
41	Provide deployment schedule details	**Science Liaison**	**Site Manager**
42	Provide cost analysis for IMB and ARM Science Board.	**Science Liaison**	**Site Manager**

3.0 Execute Approved Deployment: Plan, execute, and document.

		INITIATE AND TRACK	RESPONSIBLE
1	Open and ECR/ECO to for tracking and documentation	**Site Manager**	**Site Manager**
2	Deployment Schedule - if necessary a refurbishment plan should be executed	**Site Manager**	**Site Manager**
3	Construction Installation Plan - Site Installation - Operational rules and guidlines - OSS Reconfiguration - CM/PM Reconfiguration - Review of Critical Spares - Risk mitigation and safety - Calibration and availability of test equipment	**Site Manager**	**Site Manager**
4	Instrument and Measurement List	**Site Manager**	**Site Manager**
5	Science Plan (see embedded comment)	**Site Manager**	**IOP PI**
6	Real-Time data delivery requirements (Research Account)	**Site Manager**	**IOP PI**
7	Discuss and identify collaborative PI products - register via the ARM Data Product Registration Form	**Site Manager**	**IOP PI and Team**
8	Data System Plan and Network and Communications Plan - Contact and Support information - Disk Swap/Shipping process and expendables - Remote System Management - Network Communications up on Month Prior to Operations Start Date - Collections Configured 3 Weeks before Start Date - System Start-up and Shutdown Sequence - Time syncronization - System Monitiring Rules	**Site Manager**	**Data System Lead**
9	Data Processing Plan - Ingest plan - Product Tracking Table - DMF configuration set One Month before IOP Start Date	**Site Manager**	**DMF Lead**
	Value Added Processing Plan - there needs to be a dialog between the Site Manager, PI, and Data Lifecycle team to vet this requirement.	**Site Manager**	**IOP PI**
10	DQ Assessment Plan	**Site Manager**	**DQ Office**
11	Verify with Instrument Mentors that individual instrument and sensor calibrations are current and in keeping with factory or Program standards (refer to Instrument Handbooks for calibration recommendations, standards, etc)	**Site Manager**	**Instrument Coordinator**
12	Frequency Allocations	**Site Manager**	**Site Manager**
13	Laser - Operational Permits	**Site Manager**	**Site Manager**
14	Radar Operations (Instrument Mentor consultation)	**Site Manager**	**Radar Operations**
15	Verify ability to perform radar external calibration :	**Site Manager**	**Radar Operations**
16	*SACR corner reflector tower:*		
17	** For Ka/W-SACR – one tower, ~ 15m high at a range of 450m – 700m with no significant structures or vegetation clutter within 50 meters of the tower*		
18	** For X-SACR – two towers, one at ~15m high at a range of 200m – 250m and the other at ~15m high at a range of 350m – 500m with no significant structures or vegetation clutter within 50 meters of the tower.*		
19	** No direct line-of-sight with a high power scanning radar. When this happens, it is possible for the other radar to transmit directly into the SACR and destroy the rf front end.*		
20	** Adequate sky coverage to meet the desired science needs.* ** Two separate towers are necessary for X/Ka-SACR on AMF2 deployments*		
21	Aerosol Observations (Instrument Mentor consultation)	**Site Manager**	**AOS Mentor**
22	Identify issues that would prevent/obstruct microwave tip curve calibration (Instrument Mentor consultation)	**Site Manager**	**MWR Mentor**
23	Identify and eliminate radiometer shading issues (Instrument Mentor consultation)	**Site Manager**	**Radiometer Mentor**

Appendix B
ARM Facility AMF Timeline

#	WBS-Code	Info	Title	Expected Start	% Complete	Expected End
0			**Facility - AMF Deployments Timeline**	1/1/14	0%	12/31/17
1	1		**GoAmazon AMF1/MAOS Brazil (ECO-00832)**	1/1/14	0%	12/31/15
2	1.1		Operate	1/1/14	0%	12/31/15
3	1.2		Aircraft (AAF G1) IOP Part-(a) (ECO-00836)	1/15/14	0%	3/26/14
4	1.3		Aircraft (AAF G1) IOP Part-(b) (ECO-00836)	9/1/14	0%	10/15/14
5	2		**BAECC AMF2 Finland (ECO-00981)**	1/6/14	0%	12/17/14
6	2.1		Install	1/6/14	0%	1/31/14
7	2.2		Operate	2/1/14	0%	9/13/14
8	2.3		Ron Brown - Reconfigure	9/15/14	0%	10/15/14
9	2.4		UnInstall	10/16/14	0%	10/29/14
10	2.5		Ship From	10/30/14	0%	12/17/14
11	3		**ACAPEX AMF2 California Costal (ECO-01040)**	12/19/14	0%	3/5/15
12	3.1		Install in Hawaii	12/19/14	0%	12/31/14
13	3.2		Operate	1/2/15	0%	2/1/15
14	3.3		Uninstall	2/2/15	0%	2/14/15
15	3.4		Aircraft (AAF G1) IOP (ECO-01044)	1/2/15	0%	2/27/15
16	4		**AWARE AMF2 Antartica (ECO-01039)**	3/15/15	0%	2/15/17
17	4.1		Preparation CONUS	3/15/15	0%	8/28/15
18	4.2		Shipping To McMurdo	9/1/15	0%	10/15/15
19	4.3		Install WAIS	11/1/15	0%	11/15/15
20	4.4		WAIS Operate	11/16/15	0%	12/31/15
21	4.5		Uninstall WAIS	1/1/16	0%	1/15/16
22	4.6		Install McMurdo	10/16/15	0%	11/30/15
23	4.7		McMurdo Operate	12/1/15	0%	11/30/16
24	4.8		Uninstall McMurdo	12/1/16	0%	12/28/16
25	4.9		Shipping From	1/1/17	0%	2/15/17
26	5		**Oliktik AMF3 (ECO-00916,00917)**	1/1/14	0%	12/31/17
27	5.1		Aircraft (AAF G1) ACME-V (ECO-01049)	6/1/15	0%	9/15/15
28	5.2		ERASMUS UAS (AAF de Boer) (ECO-01052)	4/15/15	0%	4/30/15



Appendix C
Construction Installation Plan

AMF2-2nd ARM Mobile Facility

Construction and Installation Plan

CIP – 5-12

MAGIC Experiment

CALIFORNIA-HAWAII 2012-2013

Contact:

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630-252-1554

Date: 06/18/2012

1 OVERVIEW

This installation document is a guide for general information on the Marine ARM GPCI Investigation of Clouds (MAGIC) project and to provide information on the objectives of the project and to define responsibilities and responsible parties. This document is also intended to identify the required task lists and statements of work that will be incorporated into contracts between Argonne National Laboratory (ANL) and the Horizon Lines and other local entities.

1.1 Science Plan

In 2007 the Intergovernmental Panel on Climate Change (IPCC) reiterated that "clouds remain the largest source of uncertainty in climate projections". In this context, boundary layer clouds, and in particular the transition from stratocumulus to cumulus, play a key role in the cloud-climate feedback. These clouds are also important to the surface energy balance and the sea surface temperature distribution and are key elements in biases in seasonally coupled model forecasts and simulated mean climate.

The observations from the proposed deployment will constitute a unique dataset for climate model evaluation. This research will be carried out in the context of the GCSS Pacific Cross-section Intercomparison (GPCI) study. The GCSS mission is to "develop better parameterizations of cloud systems for climate models by improving our understanding of the physical processes at work within several types of cloud systems".

The objectives of this proposal fit well the DOE Atmospheric System Research (ASR) Program goals of (i) "determining the properties of and interactions among aerosols, clouds, precipitation, and radiation that are most critical to understand in order to improve their representation in climate models", and of (ii) "utilizing integrated data products to develop, evaluate, and ultimately improve the parameterization of aerosol-cloud-precipitation-radiation processes in models over a range of scales".

Overall the current proposal is crucially relevant to the general mission of the ARM Climate Research Facility in the context of "studying, monitoring, assessing and predicting the interactive physical, chemical, and biological processes that regulate the total Earth system and the changes that are occurring in the Earth system and the environment and how these changes are influenced by human actions".

2 Implementation

ARM approved the deployment of the ARM 2nd Mobile Facility (AMF2) in support of MAGIC with Ernie Lewis and Warren Wiscombe as Principle Investigators. The installation location for the AMF2 is on the Horizon Lines Spirit vessel. Operational status for the deployment will be October 1, 2012 through September 30, 3013.

2.1 Proposed Operational Dates

AMF2 Operations: October 1, 2012 – September 30, 2013. Each trip from Los Angeles to Hawaii and back is a 12-day trip. We are calling each trip a LEG. The ship leaves LA on a Saturday travels ~4 days to Hawaii, is in port for one day and then travels back to LA in ~7 days. The ship is in port in LA for 2 days. The following dates are for the Horizon Spirit and should only be used for planning purposes. The table shows the estimated dates of each of the 25 legs.

Scoping trip	October 2011
Leg0 Trip:	February 2012
Horizon Contract:	June 25, 2012
AMF2 MAGIC Prep:	June 11 – August 15, 2012 (at ANL)
Transit ANL to Ca.:	August 15 – 22, 2012
Ship Preparations:	July 1 – September 30, 2012
AMF2 Installation:	August 23 – October 1, 2012
Operations Phase 1:	October 1, 2012 – January 23, 2013
Dry Dock De-Stage:	January 24 – February 22, 2013
Dry Dock:	February 27 – May 8, 2013
Dry Dock Re-Install:	May 9 – 31, 2013
Operations Phase 2:	June 1 – September 30, 2013
Final Pack up:	October 1 - 31, 2013

Leg	Date	Leg	Date
INS1	Aug 23-Sep 6	12	May 25 – Jun 6
INS2	Sep 8 – Sep 20	13	Jun 8 – 20
INS3	Sep 22 – Oct 4	14	Jun 22 – Jul 4
1	Oct 6 – 18	15	Jul 6 – 18
2	Oct 20 – Nov 1	16	Jul 20 – Aug 1
3	Nov 3 – 15	17	Aug 3 – 15
4	Nov 17 – 29	18	Aug 17 – Aug 29
5	Dec 1 – 13	19	Aug 31 – Sep 12
6	Dec 15 – 27	20	Sep 14 – Sep 26
7	Dec 29 – Jan 10	Pack1	Sep 28 - Oct 10
8	Jan 12 – 24	Pack2	Oct 12 - 24
9	Jan 26 – Feb 7	Pack 3	Oct 26 – Nov 7
10	Feb 9 – 21		
11	May 11 – 23		

2.1.1.1 Tentative Ship Schedule by Leg

3 Major Project Activities

3.1 Project Completion Timing

Referring to Appendix A – Gantt chart depicting project timing. The following milestones should be noted:

- AMF2 site works and infrastructure preparation to commence July 9, 2012 and end on August 15th.
- Installation and commissioning on Spirit beginning on August 23, 2012, completion by October 1, 2012.
- Training of staff and final instrument verification from September 22, 2012 through October 1, 2012.

3.2 Project Coordination

AMF2 ANL will manage communication between AMF2 staff, MAGIC Science Team, and contacts. We will require a point of contact (POC) for all contracts. Ernie Lewis will serve as the lead POC for the MAGIC Science Team.

The AMF2 team will work together to ensure all tasks are coordinated and a status is known for each task. This information will be communicated to ARM DOE management each week.

A weekly coordination call with the MAGIC Science Team will begin 5 June 2012 and continue through the operations period of the program. We will work with the Science Team to confirm status of all ongoing tasks involved in completing the work for MAGIC.

3.3 Project Responsibilities and Management

Overall project responsibility and resource accessibility will be through Argonne National laboratory AMF2 Operations Office (ANL/AMF2-OO). During different phases of the deployment, differing types of technical support and expertise will be required. Please use the following table for guidance.

Phase	Support
1- Ship Works and Infrastructure	Dockside, Horizon, Rosenblatt
2-Deployment and Unpack	NE, ANL, ProSensing
3-Installation and Commission	NE, PNNL, ANL, BNL
4-Training and Verification	NE ANL, BNL
5-Operational Period	NE, ANL, PI's
6-Decommissioning and Removal	NE, ANL, PNNL, ProSensing
7-Site Rehabilitation	Dockside

NE - Native Energy acting as a subcontractor to ANL (Tom Flannery, etc).
ANL – Argonne National Laboratory (Nicki Hickmon, Mike Ritsche)
PNNL – Pacific Northwest National Laboratory (Nitin Bharadwaj, Albert Mendoza)
ProSensing – ProSensing, Incorporated. (Chad Baldi)

All inquiries relating to this document and the to deployment of the AMF2 should be directed to:

Nicki Hickmon
Argonne National Laboratory
Phone: 630-252-7662
Email: nhickmon@anl.gov

3.4 Site Access

Access to the AMF2 sites shall be coordinated through the ARM Site Access Request System: http://www.db.arm.gov/SAR2/. We will add further information and procedures regarding access for other personnel soon. We do not expect every visitor to the site will require TWIC identification. We will respect the seriousness of port access and security and will require only as much information as necessary to suffice these requirements and our hosts requests. The ARM SAR system will ensure compliance with any additional requirements.

AMF2 staff will obtain Transportation Workers Identification Credentials (TWIC) to allow them access to terminal and ship as needed for the frequent personnel rotation.

Please direct all inquiries and visit needs to:

Nicki Hickmon
Argonne National Laboratory
Phone: 630-252-7662
Email: nhickmon@anl.gov

3.5 Safety Signage and First Aid

Safety signs will be supplied and installed as part of the infrastructure installation at all sites. The AMF2 site is supplied with first-aid trauma kits and an Automatic Electronic Defibrillator (AED). Their location will be clearly marked and all AMF2 personnel will be required to be trained in their use. All staff and visitors will be required to be familiar with their location and operation.

3.6 Work Conduct

All personnel and subcontract staff must adhere to the Ships Environmental Safety and Health standards and practices and standard OSHA regulations. Failure to do so will result in an immediate breach of contract and/or remedial action. All AMF2 personnel, while being cognizant of their official ARM/ASR representation, are required to act in a professional, tolerant and considerate manner. Ship deployments in particular call for a higher level of social awareness. There may be a requirement for sensitivities and understanding not normally required for land based deployments.

3.7 Safety Briefing

All personnel visiting the sites will be required to attend a travel and safety briefing conducted by the AMF2-Operations Office prior to departure. All personnel visiting or working at the site will be required to adhere to the respective Health and Safety Manual. All personnel working at or visiting the AMF2 are required to read and sign the Health and Safety manual indicating their agreement to abide by those rules and requirements.

3.8 Instrumentation

The detailed list of proposed AMF2 instruments is located in Appendix B. Permission to operate the instruments for the proposed operational and commissioning phase for each location is requested. Any RF emitting device is listed in Appendix C. All RF licensing approvals will be obtained from regulatory authorities to enable their operation well before operations commence.

4 AMF2 Ship Works and Infrastructure

4.1 Ship Modification

The ship will require modifications to the bridge deck to support the weight of the containers and to secure the stabilized platforms and other sensor mounts and modules.

RosenBlatt & Associates in conjunction with Horizon Engineers are drafting an engineering analysis to determine necessary modifications. Ship modifications will be performed by both Dockside Machine and Ship Repair and the crew of the Horizon Spirit.

See Appendix E for the latest CAD drawing of the proposed ship modification.

The following sections outline other work required.

4.1.1 Grounding

The three AMF2 vans (OPS, AOS, SACR) will be required to be properly grounded according ship practices. Instruments on the deck will need grounding also. We will work with the ship's electrical engineer to properly ground all containers and instruments.

4.1.2 Ship Power Connectivity

Each van is equipped with its own multi-tap step down transformer that converts most commercially available electrical distribution to 240/120VAC, the internal power for the AMF2. The ship electrical supply is 480VAC/60Hz. A total of five (5) service connections will be needed on the deck.

The weather-proof power drop point and associated connectivity are to be provided by and installed by the ships electrical engineer and/or RosenBlatt and paid for by the AMF2 following the approval of cost estimates.

The approximate power usage of the vans and PDU at the Gan Airport Site is 36 kvA with the following breakdown by system:

- OPS Van approximate power requirement: 6 kvA
- AOS Van approximate power requirement: 7 kvA
- Radar Van approximate power requirement: 10 kvA
- Stabilized platforms: 4 kvA

All connections to the power drop point will be via an AMF2 supplied cable. The ships electrician or Dockside will be required to make these connections. See Appendix F for an example of the power distribution.

4.2 Storage Requirements

There is limited requirement for storage on the ship outside of the AMF2 containers. Some provision for sondes and balloons will need to be made. There will be space at the Dockside facility to store one or two containers that will be used to store the sondes for the entire deployment and other spares and consumables. Some space in buildings and warehouses owned by Dockside may be available but the size of the space is unknown at this time.

4.3 Plumbing
This section is not applicable to this deployment.

4.4 Potable Water Supply
Potable water is available on the ship.

4.5 Electric Fencing
This section is not applicable to this deployment.

4.6 Fencing
This section is not applicable to this deployment.

4.7 Fire Protection and Detection
At this time it is unclear if the AMF2 fire alarms need to be tied into the ships fire detection system. We will comply with any requirements of Horizon regarding this.

4.8 Roads, Gates and Paved Areas
This section is not applicable to this deployment.

4.9 Landscaping
This section is not applicable to this deployment.

4.10 Public Identification of Site
This section is not applicable to this deployment.

4.11 Garbage Removal
Consistent with all of our deployments AMF2 personnel will attempt to minimize garbage generation. During this deployment there is even more limited space available for use. The AMF2 and our staff will be respectful to the environment and our host's requests in these matters. The Horizon Lines operate as a ZERO waste generator. Meaning nothing gets dumped into the ocean. AMF2 personnel will need to be extremely diligent to not let nuts, bolts, zip ties, Velcro strapping, etc. from falling, or being blown off the ship and into the ocean. Waste generated by the SONDE launches will need to be captured and disposed of in port.

5 AMF2 DEPLOYMENT AND UNPACK

5.1 Transport, Logistics and Freight

Transportation of vans and equipment to and from the Port of Los Angeles will be handled through existing shipping contracts held with ANL.

5.1.1 On-site Handling

AMF2 on-site technicians (Native Energy) will be responsible for the direction of placement of the vans. Prior to placement the AMF2 on-site technicians will ensure that all site preparations have been accomplished according to plan.

Once placed, the vans will be connected to the grounding system. The unpacking and installation team led by Mike Ritsche will arrive on or around August 27, 2012 to commence unpacking of the vans and begin the installation of the AMF2. All vans will be unpacked, instrument installed, the stabilized platforms installed and the modules placed and installed as appropriate. Some items like the vans and the stabilized platforms and modules may be set into place prior to the install team arriving.

A floating crane will be required for the placement of the stabilized platforms, modules and the power distribution units. A floating crane may also be required to lift the KAZR antennae and the RWP antennae to the roof of the Radar van.

5.1.2 AMF2 Freight from Argonne National Lab

The AMF2 vans (OPS and AOS) are scheduled to arrive the week of August 20, 2012. Arrangements are being made through American Overseas Transport (AOT, Marlene Hines) to deliver these vans to the Dockside. It is expected that all modifications will have been completed according to the plan enabling the vans to be positioned as per the site design in Appendix D and modification plan in Appendix E. Horizon will coordinate the container loading, Dockside will coordinate loading of other equipment and supplies.

5.2 Electrical

Upon arrival and placement the AMF2 vans will be connected to the power drop using the AMF2 provided cables. A licensed or ships electrician will be required to make these connections. AMF2 personnel will accomplish the power cabling in between the vans and sensors.

All cabling from the power drop to the vans, in between vans, from the vans to the instruments and will be above deck where possible and will consist of flexible cable with water resistant plugs. The cables will be covered with a mechanical protection similar to the following:

Linebacker cable protectors or similar: See: http://www.checkerindustrial.com/. It is possible that armored cable will be required. Discussions with the Rosenblatt and Horizon Line Management and ship captain are continuing with respect to the best way to lay cabling aboard the ship.

All electrical circuits are to be tested for compliance by a licensed or ship electrician.

NOTE: We anticipate possible changes in cable layout and securing to protect the cables from ship motion and vibration as well as provide tripping safety mitigation.

5.2.1 Instrument Grounding

Connect instrument grounds to the instrument systems as required.

5.2.2 Electrical Connectivity to Power Drop

The ships electrician is required to make the connection between each van/transformer and the power drop. The electrician is required to ensure compliance with the ships regulations and SOPs.

5.2.3 HVAC Units

There is no local assistance required for the HVAC units. They are wall units and no installation or servicing should be required.

5.2.4 Grounding

Lightning protection air terminals will be installed on the working vans and will be connected to the grounding system. The air terminals and grounding straps will be supplied and installed by the AMF2 and AMF2 personnel.

5.2.5 Stand-by Generator

This section is not applicable to this deployment.

5.3 Telecommunications – Data

Data communications while at sea will be via Iridium satellite. Limited connectivity will be available and access to AMF2 instruments will be restricted. Offsite communication will consist of hourly transmission of Data Quality reports and quick look images. Voice communication will be available if necessary and email to AMF2 technicians will be available. While in and near port 3G/4G cellular communications will be used to provide access for mentors as needed and others for downloading data and instrument diagnostics as necessary.

NOTE: A Data Communications Plan will be drafted the week of June 25, 2012 to cover this in more detail.

5.4 Instrument Safety

The ARM instrumentation in general poses no threat to humans apart from electrical and mechanical hazards. The instrumentation consists primarily of passive sampling devices. The table in Appendix B indicates frequency and power emissions of the instruments that are emitting and actively transmitting. The radars are the only systems that pose potential risk to humans. These radar systems are installed elevated above the deck or with restricted access so as to prevent exposure to radio frequency (RF) emissions.

5.4.1 Instrument Visual Impacts and Eye Safety

Only two instruments have a visual impact. The High Spectral Resolution Lidar (HSRL) and the Micro-Pulse Lidar (MPL). Both of these sensors are lasers that operate in the visible green wavelengths and they can be seen when there is a moisture-laden environment (high water vapor content) or when there are clouds above the sensors (can be seen as a reflection on the clouds). Both lasers are eye safe and pose no threat to anyone viewing them from the surface or for pilots flying over the site and looking down into the instrument field. Laser eye protection is required and supplied for any necessary internal maintenance on the systems.

5.5 Transportation and Accommodation

All members of the unpack/install team and on-site technicians will be staying aboard ship in staterooms. Attempts will be made to assign a single person to a room. However, due to the number of available births it is likely sharing rooms will be necessary. Arrangements with off-port hotels will be handled as needed to accommodate transitions and additional maintenance.

NOTE: Horizon has given some information with respect to number of births, timing, and availability. We will follow up with Horizon in the near future to confirm these items and address any issues.

6 AMF2 INSTALLATION AND COMISSIONING

AMF2 staff will undertake the AMF2 installation and commissioning. The AMF2 vans that have already been transported and unpacked during the Deployment and Unpack phase will be configured and commissioned. This will involve the setting up of all instruments, data and communication systems to an operable state.

6.1 Hours of Operation

All installation and commission staff will be required to work on the site within hours as determined most suitable with the following in mind:

- Environmental conditions
- Ship access restrictions
- Avoidance of working outside during non-daylight hours

NOTE: Further details will be added as we develop the tasking and staffing requirements.

6.2 Generator

This section is not applicable to this deployment.

6.3 SONDE Integration

The AMF2 SONDE system will be housed in one of the vans but the antennae may be installed on the ships main mast above the bridge.

7 TRAINING AND VERIFICATION

7.1 Training

On site SONDE operators will be required to perform indoor and outdoor work. They may be required to work in adverse conditions and must follow operational safety guidelines.

- On-site SONDE operators must be able to work with equipment weighing up to 50 lbs.

7.2 SONDE Training Document List

1. AMF2 MAGIC SONDE Launch Procedures
2. AMF2 MAGIC Site Safety Plan
3. AMF2 BBSS Instrument Handbook

8 AMF2 OPERATIONAL PERIOD

8.1 Hours of Operation

AMF2 technical staff (1 person) will be on duty from 08:00 to 17:00 every day for a deployment consisting of 2 legs with a 2-day overlap/transition for the next technician. This equates to a 30-day duty cycle. On occasion, however, there will be the need to extend beyond the normal working hours if there are technical difficulties that require immediate attention.

Sensors are running on a 24/7 basis; however operations staff will only be accessible during their assigned work hours. During routine operations the on-site SONDE operators (2) are responsible for the 00, 06 and 12Z balloon launches and the site technician is responsible for the 18z balloon launch with assistance from ship crew, one of the operators or other personnel if wind conditions warrant a two-person launch. Launches will not occur while in port, only when underway and within safety criteria. During IOP periods a second technician or on-site scientist will be required to assist with the additional launches. SONDE operators/technicians are responsible for the 00, 03, 06, 09 and 12Z launches. On-site technician(s) and/or scientist are responsible for the 15, 18 and 21Z launches.

8.2 HVAC Maintenance

This section is not applicable to this deployment.

8.3 Generator Maintenance

This section is not applicable to this deployment.

8.4 Local Supply/Purchases

In the event that local purchases for supplies from local vendors (hardware store) assistance or facilitation by Dockside personnel may be necessary. All incurred expenses are reimbursable.

8.5 Transport, Logistics and Shipping

Transportation from the hotel to the dock will be done using a taxi service. The expectation is to have a single provider that we will call when taxi service is required.

Shipping to the Port of Los Angeles will be handled through existing shipping contracts held at ANL.

8.6 Site Access

Balloon operations are 24/7. AMF2 technicians will be required to be able to access the site 24/7. On occasion a visiting scientist or technician will also require 24/7 access.

8.7 Helium Supply

Helium supplies have yet to be finalized. We are gathering information to layout options for use and storage on the ship, storage and transport in port (likely handled by Dockside), supply and transport to port.

If storage off all assets is required, we will require a storage facility for up to 300 bottles and regular shipment from that storage facility to the dock. We are investigating rack options for hoisting and use of cylinders. Safety underway is a high priority in these decisions.

8.8 State Rooms

Each room has a single full bed or two doubles. Each room is also equipped with a bathroom with sink shower and toilet.

8.8.1.1 Single Birth Room on Horizon Spirit

9 STANDARDS USED

All electrical work is to be undertaken using US Occupational Safety and Health Administration (OSHA) standards when applicable. Local standards must also be considered when local requirements differ from OSHA requirements.

The following OSHA standards apply:

Protective equipment

- 1910.137, Electrical protective devices.

Electric power

- 1910.269, Electric Power Generation, Transmission, and Distribution.

Design safety standards for electrical systems

- 1910.302, Electric utilization systems.
- 1910.303, General requirements.
- 1910.304, Wiring design and protection.
- 1910.305, Wiring methods, components, and equipment for general use.
- 1910.306, Specific purpose equipment and installations.
- 1910.307, Hazardous (classified) locations.
- 1910.308, Special systems.

Safety-related work practices

- 1910.331, Scope.
- 1910.332, Training.
- 1910.333, Selection and use of work practices.
- 1910.334, Use of equipment.
- 1910.335, Safeguards for personnel protection.

General electrical

- 1926.400, Introduction.
- 1926.402, Applicability.
- 1926.403, General requirements.
- 1926.404, Wiring design and protection.
- 1926.405, Wiring methods, components, and equipment for general use.
- 1926.406, Specific purpose equipment and installation.
- 1926.407, Hazardous (classified) locations.
- 1926.408, Special systems.
- 1926.416, General requirements.
- 1926.417, Lockout and tagging of circuits.
- 1926.431, Maintenance of equipment.
- 1926.432, Environmental deterioration of equipment.
- 1926.441, Batteries and battery charging.
- 1926.449, Definitions applicable to this subpart.
- IEEE-518, Guide for the Installation of Electrical Equipment to Minimize Electrical Noise Inputs to Controllers from External Sources.
- NI-3344, Filed Wiring and Noise Considerations for Analog Signals.

Power transmission and distribution

- 1926.950, General requirements.
- 1926.951, Tools and protective equipment.
- 1926.952, Mechanical equipment.
- 1926.953, Material handling.
- 1926.954, Grounding for protection of employees.
- 1926.960, Definitions applicable to this subpart.

10 Distribution:

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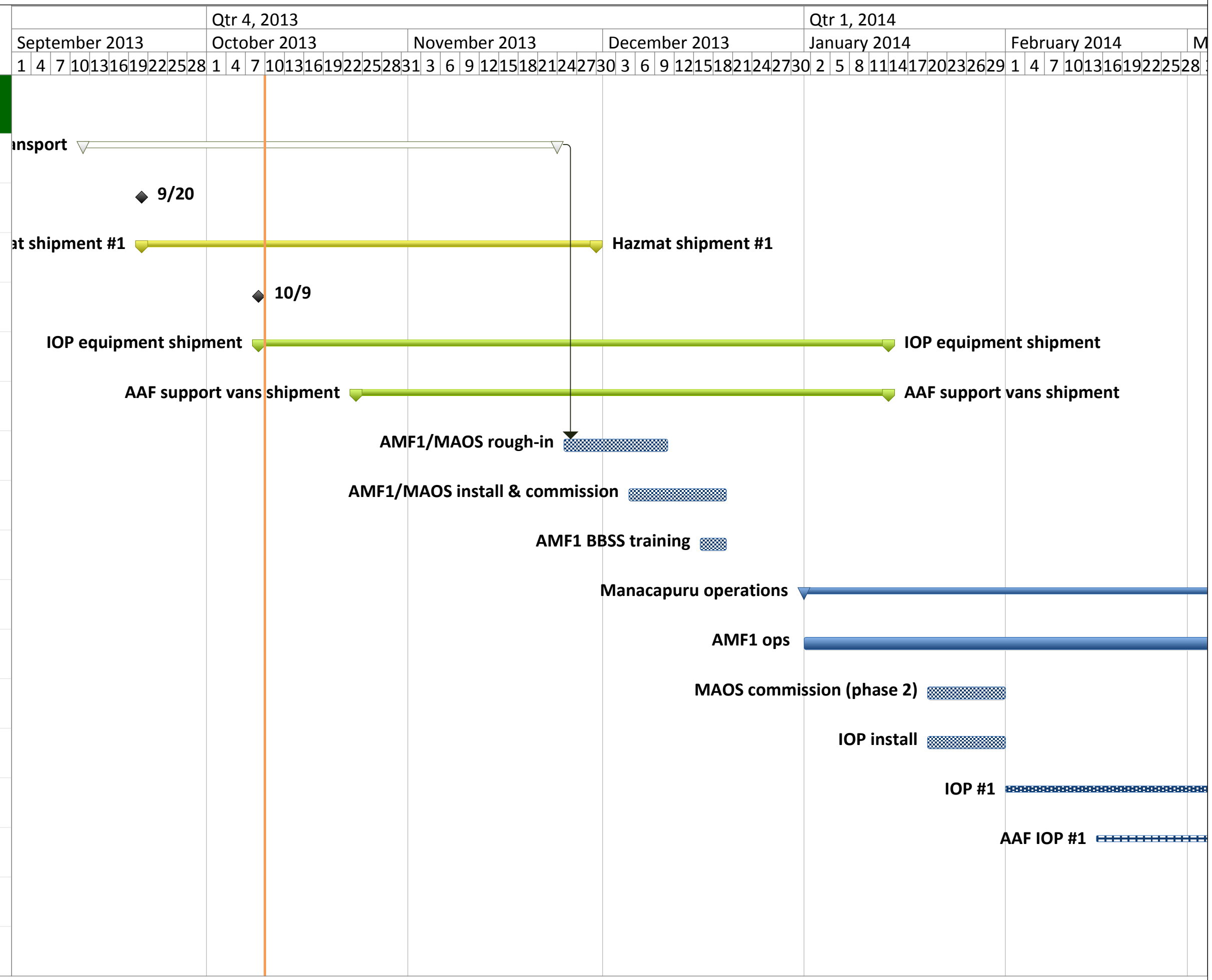
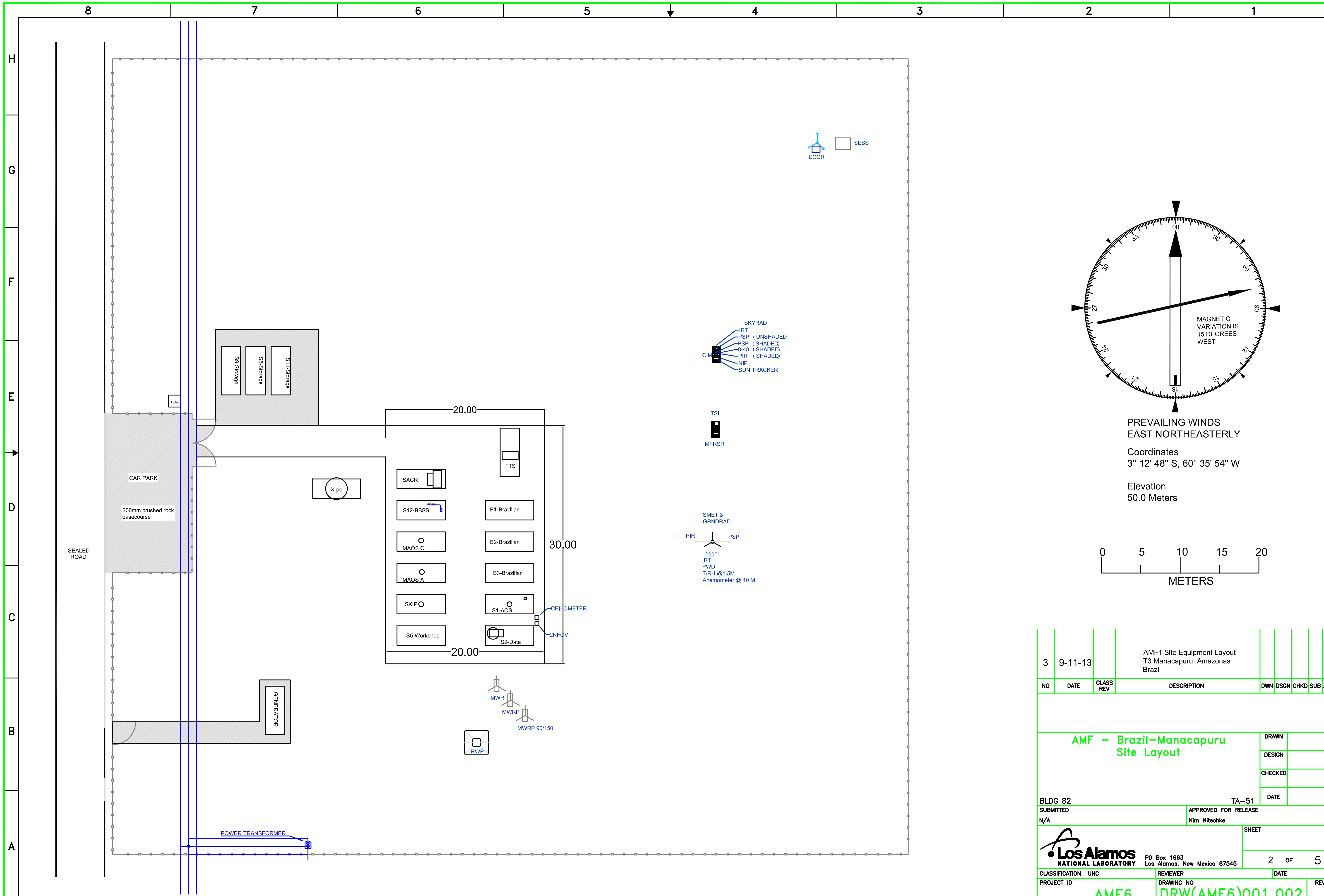
GOAmazon Project Timeline

September 2013 - October 2014

Field Instrument Deployments & Operations

ID	Task Name	Start	Finish
1	**GOAmazon (Brazil)**	**Thu 9/12/13**	**Tue 12/30/14**
1	**AMF1/MAOS to Manacapuru Transport**	**Thu 9/12/13**	**Sat 11/23/13**
17	**Hazmat items due @ Chesapeake**	**Fri 9/20/13**	**Fri 9/20/13**
18	**Hazmat shipment #1**	**Fri 9/20/13**	**Fri 11/29/13**
23	**IOP equipment due @ LASF**	**Wed 10/9/13**	**Wed 10/9/13**
24	**IOP equipment shipment**	**Wed 10/9/13**	**Mon 1/13/14**
31	**AAF support vans shipment**	**Thu 10/24/13**	**Mon 1/13/14**
36	**AMF1/MAOS rough-in**	Mon 11/25/13	Tue 12/10/13
37	**AMF1/MAOS install & commission**	Thu 12/5/13	Thu 12/19/13
38	**AMF1 BBSS training**	Mon 12/16/13	Thu 12/19/13
39	**Manacapuru operations**	Wed 1/1/14	Tue 12/30/14
40	AMF1 ops	Wed 1/1/14	Tue 12/30/14
41	MAOS commission (phase 2)	Mon 1/20/14	Fri 1/31/14
42	IOP install	Mon 1/20/14	Fri 1/31/14
43	IOP #1	Sat 2/1/14	Mon 3/31/14
44	AAF IOP #1	Sat 2/15/14	Wed 3/26/14
45	IOP #2	Fri 8/15/14	Wed 10/15/14
46	AAF IOP #2	Mon 9/1/14	Fri 10/10/14





SKYRAD
IRT
PSP (UNSHADED
PSP (SHADED)
8-48 (SHADED)
PIR (SHADED)
NIP
SUN TRACKER
CIM
ECOR
SEBS
TSI
MFRSR
SMET &
GRNDRAD
PIR
PSP
Logger
IRT
PWD
T/RH @1.5M
Anemometer @ 10 M
S9-Storage
S8-Storage
S11-Storage
Toilet
CAR PARK
200mm crushed rock basecourse
SEALED ROAD
X-pol
20.00
30.00
FTS
SACR
S12-BBSS
B1-Brazilian
MAOS C
B2-Brazilian
MAOS A
B3-Brazilian
SKIP
S1-AOS
CEILOMETER
S5-Workshop
S2-Data
2NFOV
MWR
MWRP
MWRP 90/150
RWP
GENERATOR
POWER TRANSFORMER
MAGNETIC VARIATION IS 15 DEGREES WEST
PREVAILING WINDS
EAST NORTHEASTERLY
Coordinates
3° 12' 48" S, 60° 35' 54" W
Elevation
50.0 Meters
0 5 10 15 20
METERS
3
9-11-13
AMF1 Site Equipment Layout
T3 Manacapuru, Amazonas
Brazil
NO
DATE
CLASS REV
DESCRIPTION
DWN
DSGN
CHKD
SUB
APP
AMF – Brazil–Manacapuru
Site Layout
DRAWN
DESIGN
CHECKED
DATE
BLDG 82
TA–51
SUBMITTED
N/A
APPROVED FOR RELEASE
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DRAWING NO
DRW(AMF6)001.002
REV

Appendix D
Science Plan Example

DOE/SC-ARM-12-020

MAGIC: Marine ARM GPCI Investigation of Clouds

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Co-Investigators

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October 2012

DISCLAIMER

DOE/SC-ARM-12-020

MAGIC: Marine ARM GPCI Investigation of Clouds Science/Implementation Plan

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October 2012

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Summary

Clouds remain a major source of uncertainty in climate projections. In this context, subtropical marine boundary layer (MBL) clouds play a key role in cloud-climate feedbacks that are not well understood yet play a large role in biases both in seasonal coupled model forecasts and annual mean climate forecasts. In particular, current climate models do not accurately represent the transition from the stratocumulus (Sc) regime, with its high albedo and large impact on the global radiative balance of Earth, to shallow trade-wind cumulus (Cu), which play a fundamental role in global surface evaporation and albedo. Climate models do not yet adequately parameterize the small-scale physical processes associated with turbulence, convection, and radiation in these clouds. Part of this inability results from lack of accurate data on these clouds and the conditions responsible for their properties, including aerosol properties, radiation, and atmospheric and oceanographic conditions.

The second Atmospheric Radiation Measurement (ARM) Mobile Facility (AMF2) will be deployed aboard the Horizon Lines cargo container ship merchant vessel (M/V) *Spirit* for MAGIC, the Marine ARM GPCI[1] Investigation of Clouds. The *Spirit* will traverse the route between Los Angeles, California, and Honolulu, Hawaii, from October 2012 through September 2013 (except for a few months in the middle of this time period when the ship will be in dry dock). During this field campaign, AMF2 will observe and characterize the properties of clouds and precipitation, aerosols, and atmospheric radiation; standard meteorological and oceanographic variables; and atmospheric structure. There will also be two intensive observational periods (IOPs), one in January 2013 and one in July 2013, during which more detailed measurements of the atmospheric structure will be made.

The primary objectives of MAGIC are to improve the representation of the Sc-to-Cu transition in climate models by characterizing the essential properties of this transition, and to produce the observed statistics of these Sc-to-Cu characteristics for the deployment period along the transect. This first marine deployment of AMF2 will yield an unparalleled and extremely rich data set that will greatly enhance the ability to understand and parameterize clouds and precipitation, aerosols, and radiation and the interactions among them; the processes that determine their properties; and factors that control these processes. Deployment of AMF2 on a ship that routinely traverses this transect will provide a long-term data set over a vast cloud region which is of intense interest to climate modelers. Specifically, the proposed transect lies closely along the cross-section used for the GPCI[1], and the data collected will provide constraint, validation, and support for this modeling effort, and for associated modeling efforts such as CFMIP[2], CGILS[3] and EUCLIPSE[4]. The founders of ARM recognized the importance of these marine cloud regimes, and the original document recommending locales for ARM sites (ARM 1991) explicitly called for sites in the Eastern North Pacific or Eastern North Atlantic Ocean. The MAGIC deployment will meet the identified requirement for ARM measurements in this region.

[1] GPCI: Global Energy and Water Cycle Experiment (GEWEX) Cloud System Studies (GCSS) Pacific Cross-section Intercomparison
[2] CFMIP: Cloud Feedback Model Intercomparison Project
[3] CGILS: CFMIP-GCSS Intercomparison of Large Eddy Models and Single Column Models, a joint project of the GCSS and the World Climate Research Programme Working Group on Coupled Modelling Cloud Feedback Model Intercomparison Project (CFMIP)
[4] EUCLIPSE: European Union Cloud Intercomparison, Process Study & Evaluation Project

Acronyms and Abbreviations

3D	three-dimensional
ACSM	aerosol chemical speciation monitor
ADCP	acoustic Doppler current profiler
AIRS	Atmospheric Infrared Sounder
AMF	ARM Mobile Facility
AOS	aerosol observing system
ARM	Atmospheric Radiation Measurement (Climate Research Facility)
ASR	Atmospheric System Research
CIP	Construction and Installation Plan
CCN	cloud condensation nucleus
CFMIP	Cloud Feedback Model Intercomparison
CGILS	CFMIP-GCSS Intercomparison of Large Eddy Models & Single Column Models
CRM	cloud-resolving model
Cu	cumulus
DOE	U.S. Department of Energy
ECMWF	European Centre for Medium-Range Weather Forecasts
EUCLIPSE	European Union Cloud Intercomparison, Process Study & Evaluation Project
GCM	global climate model
GCSS	GEWEX Cloud Systems Study
GEWEX	Global Energy and Water Cycle Experiment
GPCI	GCSS Pacific Cross-section Intercomparison
IOP	Intensive Observational Period
IPCC	Intergovernmental Panel on Climate Change
ITCZ	Intertropical Convergence Zone
KAZR	Ka-band ARM zenith radar
Knts	knots
LES	large-eddy simulation
LWP	liquid water path
MAGIC	Marine ARM GPCI Investigations of Clouds
MBL	marine boundary layer
MPL	micropulse lidar
M/V	merchant vessel
M-WACR	marine W-band ARM cloud radar
MWR	microwave radiometer
NASA	National Aeronautics and Space Administration
PI	principal investigator

RH	relative humidity
Sc	stratocumulus
SCM	single-column model
SST	sea surface temperature
TSG	thermosalinograph
UTC	Coordinated Universal Time

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1.0 Introduction

Clouds are essential to Earth's climate, weather, radiation budget, and hydrological cycle, but despite this great importance, many aspects of their properties and their roles in various processes are not well understood. Important reasons for this lack of understanding are:

1. the vast range of spatial scales on which cloud processes occur—from nanometer-scale phenomena such as cloud drop activation, to mesoscale phenomena such as pockets of open cells, to synoptic scale phenomena such as midlatitude cyclones
2. their high temporal variability, with some clouds lasting only minutes
3. the three-dimensional (3D) nature of clouds, making determination and representation of their shape difficult.

The description and parameterization of clouds in global climate models (GCMs), with time steps of hours and length scales of tens of kilometers, are still relatively primitive, and understanding of cloud processes is still evolving.

Because of their vast extent, marine clouds play an especially critical role in the global radiation budget and hydrological cycle, and thus in climate and climate change. However, most non-satellite investigations of such clouds have been on relatively short-term (~1 month) research cruises or aircraft campaigns in fairly small regions. Non-satellite characterization of cloud properties and their temporal and spatial variability over large regions of the oceans for extended periods (i.e., months to years) has not been made. Among all marine clouds, clouds in the marine boundary layer (MBL) in particular exert an outsized influence on climate and climate change, but this influence also remains poorly understood in spite of many field campaigns, with large differences among models resulting from differing parameterizations of cloud properties (e.g., Bony and Dufresne 2005, Andrews et al. 2012). Likewise, there are large differences in the radiative influences of clouds among current climate models and between models and observations (e.g., Bender et al. 2006). These differences translate, among other things, into poor knowledge of the effects of increasing greenhouse gas concentrations (and the resultant warming) on clouds, which constitute the largest uncertainty in modeled climate sensitivity (IPCC 2007).

Marine clouds and their behavior are inexorably coupled to other components of the environment. Surface fluxes of sensible and latent heat, which are controlled by atmospheric structure and oceanic conditions, determine many characteristics of the cloudy MBL and are in turn influenced by clouds. Aerosols affect clouds by providing nuclei upon which cloud drops are formed, with the number concentration and sizes of cloud drops depending on the sizes and compositions of these nuclei. In turn, aerosols are affected by clouds through chemical processing within cloud drops and by removal through in-cloud or below-cloud scavenging. Absorption of shortwave radiation by clouds can lead to evaporation; in turn clouds affect Earth's radiative balance by scattering incoming shortwave radiation and by absorbing and re-emitting outgoing longwave radiation. Thus the ability to understand clouds and improve their representation in models requires high quality data sets not only of clouds and cloud properties, but also of oceanic and atmospheric conditions (i.e., sea surface salinity, temperature, and velocity, and vertical profiles of atmospheric temperature, relative humidity, and wind velocity), aerosols properties (concentration, size distribution, and composition, which is often inferred from measurements of hygroscopic growth, light scattering, and cloud formation properties) and radiative properties (vertical profiles of shortwave and longwave upwelling and downwelling radiation).

Because of the importance of MBL clouds to the global climate system, several modeling projects have been developed to better understand and parameterize these clouds in GCMs. In particular, GCSS (GEWEX [Global Energy and Water Cycle Experiment] Cloud System Studies), an international group of cloud modelers, has chosen a transect extending from 35°N, 125°W to 1°S, 173°W (from the western coast of the U.S. heading southwest to the equator; see Figure 1) to compare model results for the GCSS Pacific Cross-section Intercomparison (GPCI). Of particular interest are the types of clouds and the transitions between different cloud regimes, which are poorly represented in models. The inability to accurately represent these transitions in models is the cause of one of the largest uncertainties in knowledge of cloud feedback on climate.

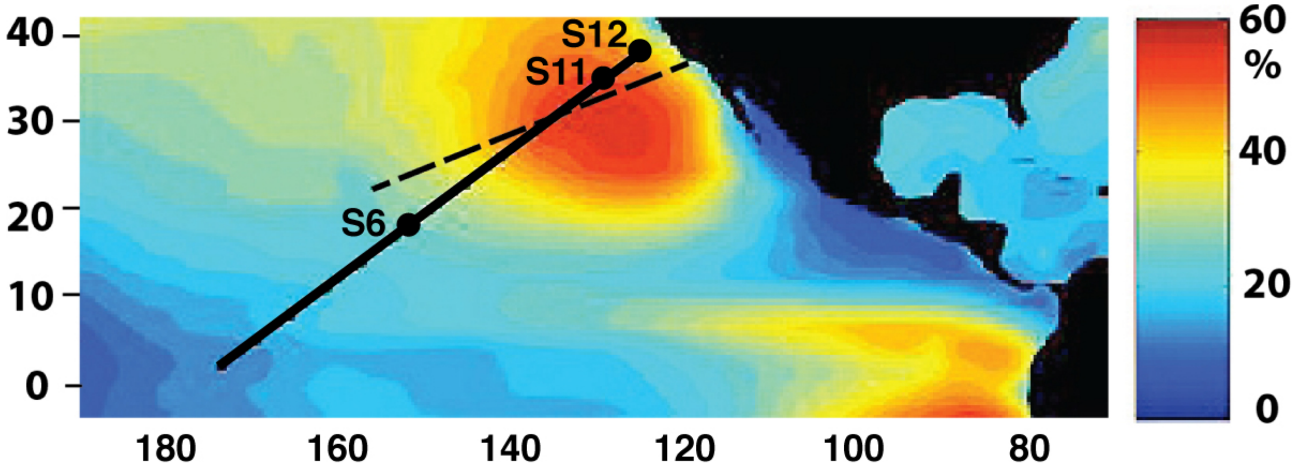

Figure 1. Annual average low-level cloud cover from ISCCP (International Satellite Cloud Climatology Project), with Horizon Spirit route (dashed) from Los Angeles to Honolulu and GPCI transect (solid), along which Points S6, S11, and S12 used in CGILS are also shown.

The cloud type and cover along this transect from east to west vary from low marine Sc with high coverage near the California coast to puffy Cu with much lower coverage in the trade-wind regions near Hawaii to patchy high cumulus near the equator (Figure 1). The low marine Sc decks, with their high albedo and large areal coverage, provide an extremely important forcing of Earth's climate. The trade Cu play a large role in the global surface evaporation and also Earth's albedo. The Sc regions are accompanied by lower sea surface temperatures (SSTs), with transition occurring by Cu formation under Sc, and then Sc evaporation leaving a patchy Cu layer which is accompanied by higher SST (Wyant et al. 1997, Bretherton and Wyant 1997). Probabilities of cloud thermodynamic quantities such as liquid water path (LWP) also change east to west along this transect from Gaussian to skewed, and the MBL height increases from typical values near 500 m to more than 1 km. Additionally, the mean SST in June, July, and August increases from ~290K to ~297K, and the relative humidity (RH) in the lowest several meters above the sea surface increases from slightly below 80% to near 90%. The SST has a strong influence on cloud properties through the fluxes of latent and sensible heat from the sea surface.

GCSS was initiated in the early 1990s (Browning et al. 1993, Randall et al. 2003) with key objectives being developing the scientific basis for the parameterization of cloud processes and promoting the evaluation and intercomparison of parameterization schemes for cloud processes. GPCI was a working group within GCSS (now Global Atmospheric System Studies, or GASS), whose main goal was to evaluate and improve how climate and weather models represent subtropical and tropical cloud regimes and transitions between them, particularly the Sc-to-Cu transition.

In the GPCI study, models were analyzed along a cross-section from the Sc regions off California, across the shallow convection trade-wind areas, to the deep convection regions of the Intertropical Convergence Zone (ITCZ) (Figure 1). This approach took GCSS, whose other working groups focused on a single cloud type, in the direction of increased generality by providing a framework for 3D model evaluation that includes several connected cloud regimes: Sc, shallow Cu, deep Cu, and the transitions between them. More than twenty weather and climate models participated in the first phase of GPCI (Teixeira et al. 2011), which provided a detailed characterization of how models represent the Sc-to-Cu transition and helped identify some key model shortcomings. The results confirmed previous problems with climate models such as underestimating cloud amounts in the Sc regime and overestimating clouds in the shallow Cu regime, with corresponding consequences for shortwave radiation; large spread in cloud cover, LWP, and shortwave radiation among the models (Figure 2); and large inter-model differences of vertical properties of clouds, vertical velocity, and surface RH. GPCI has been a useful forum for confronting these models with the newest generation of satellite data sets. It has also been demonstrated that those climate and numerical weather prediction models that have actively worked on further developing the representation of cloud related processes have shown a significant improvement of the representations of these two cloud regimes.

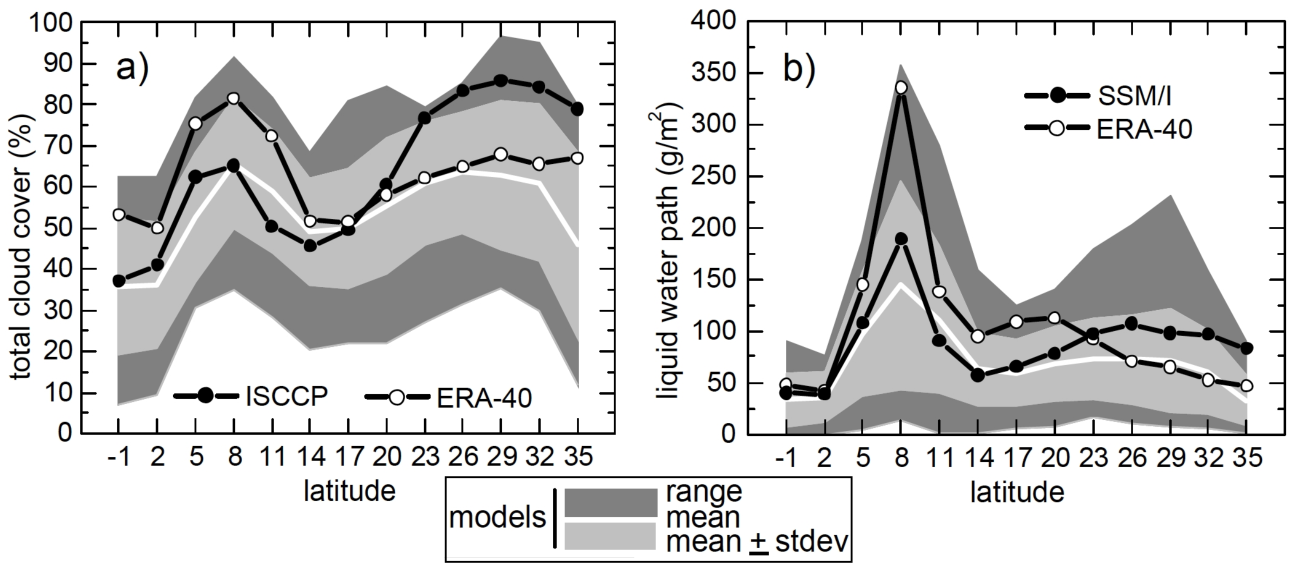

Figure 2. Model results for a) total cloud cover, and b) total LWP, along GPCI for JJA 1998, shown as ensemble results from 23 models, the mean plus or minus the standard deviation; range extends from minimum to maximum values. Also shown are results from ISCCP, European Centre for Medium-Range Weather Forecasts (ECMWF) reanalysis (ERA-40), and Special Sensor Microwave Imager (SSM/I). From Teixeira et al. 2011.

Another modeling effort, CGILS (a joint project of the GCSS and the World Climate Research Programme Working Group on Coupled Modelling CFMIP) focuses on the marine Sc and Cu clouds along the GPCI transect, specifically the following locations:

- S12 (35°N, 125°W), characterized by shallow coastal Sc
- S11 (32°N, 129°W), near the climatological summertime maximum of low-level cloud cover
- S6 (17°N, 149°W), characterized by shallow Cu (Figure 1).

CGILS uses idealized large-scale dynamical conditions to evaluate subtropical MBL cloud feedback processes in GCMs. Its objectives are to understand the physical mechanisms of these feedbacks in GCMs by using single-column models (SCMs) and to assess the physical credibility of low-cloud processes in the SCMs by using cloud-resolving models (CRMs) and large-eddy simulations (LESs). Advantages to this approach are that it isolates the model physics from the dynamics (greatly simplifying the problem), allows use of LES to be compared with SCMs forced under identical conditions, and allows determination of the sensitivity of simulated clouds to different aspects of the large-scale dynamics conditions. The initial study, involving S11, included 16 SCMs and 5 LES models.

EUCLIPSE, a collaborative effort of twelve institutes throughout Europe, is designed to improve the evaluation, understanding, and description of the role of clouds in the Earth's climate focusing on the cloud feedback in a warming climate. Its central objective is reducing the uncertainty in the representation of cloud processes and feedbacks in the new generation of earth system models in support of the IPCC's fifth Assessment Report. Nine climate and weather prediction models participated in the first EUCLIPSE intercomparison (Siebesma et al. 2004), which used the GPCI transect. It was found that although there was much inter-model variation, nearly all models strongly underpredicted cloud cover and amount in the Sc regions while overpredicting these quantities in the Cu region.

A fundamental limitation to further progress in all these activities has been the lack of observational data to constrain the models and evaluate how they represent the Sc-to-Cu transition. Most of the observational data sets used to evaluate the cloud related processes are top-of-the-atmosphere data (radiation) or vertical integrated data (water vapor, cloud cover), while the new products that have vertical resolution (such as Cloudsat and Atmospheric Infrared Sounder [AIRS]) are unreliable in the lowest kilometer of the atmosphere. Thus, although these activities have been successful in evaluating biases in cloud representation in climate models, the lack of near-surface observational data inhibits identification of the physical origins of these biases. It is therefore essential to have complementary observations from the surface, both in situ as well as remote sensed, such as surface fluxes (radiation, latent and sensible heat); cloud properties (fractional coverage, base height, thickness, water content); MBL height; cloud dynamics (e.g., updraft velocities); and profiles of temperature, humidity, and wind in the lowest kilometers. AMF2 and the additional instrumentation on this deployment will provide many of these necessary observations. Each of the modeling studies described above is poised to make immediate use of the data from this deployment. In particular, GPCI and EUCLIPSE will undertake new model intercomparisons solely because of this deployment, and the MAGIC data will be central to a planned CGILS seasonal contrast study.

2.0 Deployment Site

The MAGIC deployment will be on board the Horizon Lines cargo container *Spirit* (Figure 3), which makes round trips along a great circle route from Los Angeles, CA (33.7°N, 118.3°W) to Honolulu, HI (21.3°N, 157.9°W) every two weeks. During the voyage from Los Angeles, the *Spirit* travels at ~21 kts (~10.5 m s^{-1}) and covers the 4100 km in 4.5 days. After approximately 24 hrs in port in Honolulu for unloading and loading, the *Spirit* returns to Los Angeles at ~16 kts (~8 m s^{-1}), making the trip in ~6.5 days. The ship is in port at Los Angeles for approximately 48 hrs before returning to Hawaii.

Figure 3. *Horizon Spirit*.

Three AMF2 containers will be on the bridge deck of the *Spirit*, and other instrumentation will be positioned around the bridge, its railings, and on the bridge deck and mast. The planned location of the containers and instruments is described in the Construction and Installation Plan for MAGIC (CIP 5-12, 2012). The bridge deck is ~20 m above the water line (depending on loading), and the bridge roof is approximately 3 m higher. The bridge area is expected to receive marine air that is largely unperturbed by ship contamination, as the ship is a steam ship with two stacks at midship. At least two technicians will be on board the ship to operate AMF2 and to launch weather balloons with radiosondes. Four radiosondes will be launched each day, at 0:00, 06:00, 12:00, and 18:00 UTC, except during the two IOPs, which will occur during one round trip from Los Angeles to Hawaii in January and July 2013, during which more frequent soundings (eight per day instead of the usual four) will be made to provide a more detailed picture of the atmospheric structure and its daily cycle in two different seasons.

Three MAGIC/ARM personnel rode the ship in February 2012 to observe conditions, investigate weather balloon launches, make meteorological measurements, and characterize the ship motion. This Leg0 proved extremely valuable in estimating the range of conditions that can be expected during MAGIC. Information on this leg can be found in the Leg0 Cruise Report (Lewis et al. 2012).

The *Spirit* route from Los Angeles to Honolulu lies in a region of great climatic importance. As discussed above, the typical cloud type and cover along this route vary from low marine Sc with high coverage near the California coast to puffy Cu with much lower coverage in the trade-wind regions near Hawaii (Figure 1). Cirrus are also common. The *Spirit* route lies close to the GPCI transect and passes through the same cloud regimes GPCI is investigating. Other modeling activities also use this route or points along it for model evaluation and intercomparisons, making the data from MAGIC extremely valuable for these activities.

3.0 Science Goals

The primary objectives of MAGIC are to improve the representation of the Sc-to-Cu transition in climate models by characterizing the essential properties of this transition and to produce the observed statistics of these Sc-to-Cu characteristics for the deployment period along the transect. These goals will necessitate measurements of the following:

- Properties of clouds and precipitation: specifically cloud type, fractional coverage (as a function of height), cloud boundaries (base, height), physical thickness, LWP, cloud and liquid water content (as a function of height), cloud drop number concentration, size distribution, and effective radius, cloud optical depth, and drizzle and precipitation frequency, drop size distribution, amount, and extent.
- Atmospheric conditions: specifically temperature, pressure, RH, wind speed and direction, and the vertical profiles of these quantities, including boundary-layer height and inversion strength.
- Properties of aerosols: specifically concentration, size distribution, light-scattering behavior, hygroscopic behavior, cloud condensation nuclei (CCN) behavior, and composition. Although not measured during this deployment, individual particle composition would have been especially valuable, as it provides information on mixing state and could be used to identify source regions.
- Spectral and broadband shortwave and longwave radiation and their interaction with clouds and aerosols: specifically broadband and narrow-channel direct and diffuse fluxes, downwelling and upwelling spectral radiances, and cloud and aerosol spectral optical thicknesses.
- Surface fluxes of momentum, moisture, and latent and sensible heat.
- Oceanographic conditions: specifically sea state and sea surface temperature, salinity, and current speed and direction. These measurements are necessary for computation of vertical fluxes of sensible and latent heat and for identifying factors that control cloud properties, especially cloud types and their transitions.

4.0 Measurement Requirements

Measurements of many of the required quantities listed above will be made with the instruments in AMF2 (the current instrument list is provided in the next section). As accurate knowledge of atmospheric structure and boundary-layer transitions is of utmost importance to MAGIC, sonde launches will be made every six hours at 0:00, 06:00, 12:00, and 18:00 UTC during regular operations, and every three hours at 00:00. 03:00, 06:00, 09:00, 12:00, 15:00, 18:00, and 21:00 UTC during two IOPs (in January 2013 and July 2013, each lasting one round trip) to provide more detailed information on atmospheric structure, boundary-layer transitions, and their seasonal variability.

Although ARM has considerable experience making land-based measurements of many of the required quantities, ship-based measurements are much more challenging. Environmental conditions are harsh, requiring consideration of effects of wind, corrosion, soot, vibration, jarring, power availability, and a host of other issues, many of which cannot be foreseen. Most of the instruments are not specifically designed for shipboard measurements, and the performance of many of them at sea is untested.

There are several key concerns with ship-based measurements. First, the ship does not remain at a fixed location, and this motion imposes stringent conditions on sampling rates, as the relative motion of clouds may be much greater than it would be from a fixed site. The ship moves at ~10 m s 1, and wind speeds at the surface can have comparable levels, with those at cloud height even greater. At relative winds of 25 m s 1, for instance, the ship will move 100 m (the length of a small cumulus) in 4 s. Thus, all measurements of cloud properties using lidars, ceilometers, and other cloud instruments must be made considerably more frequently than this time to attain adequate resolution of such clouds.

An additional difference between ship-based and land-based deployments is that the ship does not retain a fixed orientation (characterized by pitch, roll, and yaw). As this factor affects vertically pointing instruments and those such as radiometers that require accurate knowledge of sun position, accurate knowledge of orientation and vertical and angular velocities is necessary for correction of data from radars (for Doppler spectra, for instance) and other instruments. Motion of an instrument in the vertical direction due to ship motion (heave) will also affect determination of Doppler spectra. Based on the data collected during Leg0, measurements of pitch/roll/yaw and the three components of translational motion, plus the accelerations of these quantities, at 10 Hz should be sufficient to account and correct for ship motion.

Both ship motion and changing orientation necessitate real-time and post-processing of some datastreams beyond what is required for land-based measurements. Other concerns facing shipboard measurements are screening by ship structures, which limits views of the sky; ship effects on meteorological and radiation measurements through shading, reflection, and heating; and ship-induced flow perturbations, which affect determination of wind speed and direction and thus flux determinations. Additionally, downdrafts around the ship greatly increase the difficulty in making successful radiosonde launches.

Remedies such as stabilized tables and placement of multiple sensors can alleviate some of these concerns, but many issues will remain. Careful calibration of all instruments is, of course, essential. Likewise, it is crucial that redundant measurements are made wherever possible, both to ensure that measurements of quantities of interest can be obtained in case of instrument malfunction or breakage, and as a quality control/validation/comparison of instruments that attempt to measure the same quantities. This is especially important for meteorological measurements, which are most likely to be impacted by ship motion, shading, and other ship artifacts.

The nature of the conditions along transect also imposes sampling requirements. Clouds are often thin and may be small, especially cumulus, which may be only ~100 m or so, placing restrictions on sampling rates as noted above. Marine stratocumulus clouds are optically thin and have low LWPs, often 100 g m 2 or less. The cloud drop effective radius is calculated from the cloud optical depth (which is measured by the Cimel Sunphotometer, [CSPHOT]) and LWP. As both of these quantities are typically quite low, accurate determination of the effective radius requires determination of the cloud optical depth to ±1 or 2 and of LWP to ±~10 g m^{-2}.

Radar measurements are the cornerstones of this campaign; thus, their calibration is key for the entire deployment. To this end, radars should be calibrated after being placed on the ship (to ensure that they are in calibration after being shipped and loaded) and periodically throughout the campaign. The radar sampling strategy must also be customized for shipboard deployment, as noted above. The dominant sampling should be for low clouds, but measurements of cirrus should also be made at regular intervals (e.g., once per minute, or once per kilometer).

Measurements of some of the necessary quantities were not possible. Three-dimensional cloud properties, which would have been provided by scanning radars, would have allowed better understanding of dynamics and cloud structure rather than the soda-straw view given by fixed radars. Such information would also have enabled the possibility of radiative closure, to name but one example. Furthermore, lack of a zenith stabilization on radars means that this straw is moving. Motion corrections for non-zenith-pointing radars, lidars, and optical instruments will introduce additional processing requirements and result in increased noise due to averaging over a range of angles, increasing the difficulty in determining vertical velocities of hydrometeors, for instance.

Individual aerosol particle composition and mixing state are crucial properties that would have yielded information on aerosol sources and additionally would allow direct calculation of other aerosol properties such as cloud activation and hygroscopic properties. These measurements could have been provided with a single-particle mass spectrometer, although this instrument is large and labor-intensive. The aerosol chemical speciation monitor (ACSM), which provides aerosol (as opposed to individual particle) composition would have provided some of this information. Measurements of sea surface current (speed and direction), which are necessary for accurate determination of relative wind speed to calculate fluxes, could have been made with an acoustic Doppler current profiler (ADCP) or a smaller Doppler speed logger. Sea surface temperature and salinity, which are the two most commonly recorded oceanographic quantities and are important for surface fluxes and as tracers of water masses, could have been measured with a thermosalinograph (TSG). Direct measurements of fluxes of momentum, moisture, and latent and sensible heat are key quantities that could be measured by an eddy covariance system, although these are extremely difficult to employ from ships, especially non-research vessels.

5.0 Instruments

The following tables, based on the information in the Construction and Installation Plan for MAGIC (CIP 5-12, 2012), list the instruments to be deployed during MAGIC, their acronyms, and the key quantities they measure. Note that there may be some ambiguity in the categorization of the instruments; e.g., the microwave radiometer (MWR) arguably measures cloud and atmospheric properties. Some of these instruments will not be deployed at the start of the campaign, as noted below the tables.

Table 1. Instruments measuring cloud and precipitation properties.

Instrument Name	Instrument Acronym	Key Quantities Measured
Marine W-band ARM cloud radar (on stable table)	M-WACR	cloud height, structure, and microphysics, precipitation
Ka-band zenith ARM cloud radar (fixed to deck)	KAZR	cloud height, structure, and microphysics, precipitation
Ceilometer	VCEIL	cloud height
High spectral resolution lidar	HSRL[1]	cloud height, structure
Micropulse lidar	MPL	cloud height
Total sky imager	TSI	cloud fraction
Disdrometer		drop size distribution, precipitation rate and amount

Table 2. Instruments measuring aerosol properties.

Instrument Name	Instrument Acronym	Key Quantities Measured
Condensation particle counter	CPC	aerosol particle concentration
Cloud condensation nucleus counter	CCN	cloud condensation nuclei concentration at various supersaturations
Hygroscopic tandem differential mobility analyzer	HTDMA	hygroscopic growth factor, aerosol size distribution
Particle soot absorption photometer	PSAP	aerosol absorption at three wavelengths
Humidified and ambient nephelometers	f(RH)	aerosol light scattering at ambient and various RH
Ultra-high sensitivity aerosol spectrometer	UHSAS	aerosol size distribution
Ozone	O3	ozone concentration

Table 3. Instruments measuring atmospheric and oceanic properties.

Instrument Name	Instrument Acronym	Key Quantities Measured
Balloon-borne sounding system	SONDE	profiles of wind speed and direction, T, RH
Radar wind profiler	RWP[2]	profiles of wind and virtual temperature
Atmospheric sounder spectrometer by Infrared Spectral Technology	ASSISTII	profiles of temperature and water vapor
Infrared thermometer	IRT	sky and sea surface equivalent black body brightness temperature
Infrared sea surface temperature autonomous radiometer	ISAR	sea surface temperature
Microwave radiometer, 2-channel	MWR	column water vapor and liquid
Microwave radiometer, 3-channel	MWR3C	column water vapor and liquid
Psychrometer		RH
Meteorological system on mast	MET	wind speed and direction, T, P, RH, precipitation
Meteorological system on the aerosol observing system (AOS)		wind speed and direction, T, P, RH, precipitation

Table 4. Instruments measuring radiation properties.

Instrument Name	Instrument Acronym	Key Quantities Measured
Portable radiation package	PRP	solar irradiance, hemispheric direct and diffuse fluxes
Shortwave Array Spectroradiometer-Zenith	SASZE[3]	solar radiance as function of wavelength
Precision infrared radiometer	PIR	infrared solar and terrestrial irradiance
Precision spectral pyranometer	PSP	shortwave solar irradiance
Sun pyranometer	SPN	solar irradiance
Cimel sunphotometer	CSPHOT[4]	cloud optical depth
MicroTopsII sunphotometer		aerosol optical depth at several wavelengths

Notes:

1 The HSRL is scheduled to be deployed in May 2013.

2 RWP (Radar Wind Profiler) cannot be operated in port, as it does not operate at an authorized U.S. frequency.

3 The SASZE is scheduled to be deployed in late October 2012.

4 The CSPHOT is scheduled to be deployed in December 2012.

6.0 Logistics

MAGIC principal investigator Ernie Lewis will interface with ARM personnel and/or technicians on board the *Spirit* frequently to ensure that the measurements necessary to achieve the science goals are obtained. It is anticipated that a science observer will ride on most of the legs. Although this observer will not actively participate in measurements except as specifically stipulated beforehand, he/she will have tasks such as making sun photometry measurements with the MicroTops, writing blogs for ARM, making cloud observations for satellite overpasses, etc. His/her presence will be all the more important as there will be no near-real-time access to the data from shore and limited real-time communications with the ship.

Good relations between all MAGIC/ARM personnel aboard the *Spirit* and the captain, chief engineer, and the rest of the *Spirit* crew are essential for all aspects of this deployment. In this regard, MAGIC/ARM personnel must be cognizant of the fact that they are visitors aboard the *Spirit*, where the captain and crew live and work, and as such they must at all times act accordingly. The designated AMF2 lead will be the point of contact between AMF2 and the captain. This does not limit communications; however, if there is any issue aboard the ship, the lead is in charge, and official communication with the ship must go through the lead. Additionally, all efforts should be made to establish good communications with captain and crew. Establishing effective communications with the chief engineer to obtain advanced notice of the daily cleaning of the ship's stacks, which could result in possible soot contamination of optics and other instruments, is especially important, as advanced notice of the timing of such events will allow instruments to be turned off or covered if necessary.

7.0 Relevance to DOE Mission

MAGIC's goals are fully in line with those of the Office of Biological and Environmental Research, which seeks to "*[advance] understanding of the roles of Earth's biogeochemical systems (the atmosphere, land, oceans, sea ice, and subsurface) in determining climate*."

MAGIC will aid the DOE's Atmospheric System Research (ASR) Program in achieving its mission to "*quantify the interactions among aerosols, clouds, precipitation, radiation, dynamics, and thermodynamics to improve fundamental process-level understanding, with the ultimate goal to reduce the uncertainty in global and regional climate simulations and projections*."

MAGIC fits squarely within the mission of the ARM Climate Research Facility, whose primary objective is "*improved scientific understanding of the fundamental physics related to interactions between clouds, aerosols, and radiative feedback processes in the atmosphere*."

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Appendix E
Instrument List Example

MAGIC Instrument list, status and proposed deployment locations

- KAZR – Need to determine final container configuration
- AOS
- M-WACR – system being upgraded, likely new/modified collection and ingest, will be mounted on new stabilized platform (ECO-00859)
- MPL – mounted on deck in module
- RWP1290 – proposed location on roof of KAZR van, need beam steering capability implemented (ECO-00747).
- MWR3C – roof of OPS van, need a new mount designed to replace the tripod (ECR needed)
- MWR – roof of OPS van
- MET – new met system, mounted on bridge mast. New collection/ingest required, data will be collected by a new data acquisition program (ECO-00910).
- PRP – combination of PRP and SPN1, combines SKYRAD and MFRSR type measurements into one system. Need new ECR to develop PRP as baseline AMF2 ocean "SKYRAD" system is required.
- SPN1 – currently under evaluation (ECO-00876). An IOPR request will be submitted to operate the SNP1 as a PI instrument for MAGIC. Data collection likely by PRP data system.
- BBSS - KAZR van
- TSI - OPS van
- HSRL – OPS van
- ASSIST – OPS van
- VCEIL – roof of OPS van
- SAS – under review for configuration and installation, on stabilized table on ship deck deck (ECO-00926)
- IRT – zenith pointing, roof of van
- IRT – sea surface temp (SST), new system being designed using two standard ARM IRTs (ECR-00873). Will requires a VAP to derive SST.
- PARSIVEL – video disdrometer, will need to be reviewed and approved as an IOPR add-on. All data likely post-processed.
- CSPHOT – will require an ECR to put it into cloud mode only, no scanning/solar tracking (ECR under review). May require new software, all data will be post-processed.
- BAF – a VAP that uses new MET and other measurements to produce bulk flux data (ECR-00877).
- STABILIZED TABLES - one for WACR, one for other systems (only SAS at present)

Not deployed during MAGIC:
MFRSR
ECOR
WBRG
2DVD
SACR

SKYRAD (no trackers, alternate systems being used)
GNDRAD (alternate measurements being made)

Appendix F
VAP Plan Example

VAPs	Translator	Run at DMF	Run by devel	TCAP	MAGIC
acred	Shaocheng		x		
aerinf	Sally	x		yes	Needs development to use ASSIST; discuss with Dave Turner
aeriprof	Sally	x		need to ask Dave Turner	No, needs development to use ASSIST and to run not at GP
aerosolbe	Connor	x			
aip	Connor	x			
aod	Connor	x		Batch mode by Developer	
baebbr	Shaocheng	x			
bbhrp	Sally		x	Not currently planned, needs RIPBE	Not currently planned, needs RIPBE
beecor	Shaocheng		x		
beflux	Sally	x		No, only relevant at SGP	No, only relevant at SGP
cmbe atm	Shaocheng		x		
cmbe cldrad	Shaocheng		x		
gvrpwv	??	x			
langley	Connor	x		DMF	
lssonde	Sally	x		??	??
mergesonde	Mike	x			
mergesonde2	Mike	x		DMF	
mfrsrcldod	Sally	x		yes, as development product	no MFRSR deployed
microbase	Mike	x			
mplcmask	Sally	x		DMF	maybe, need to consider stabilization issues?
mplpolavg	Connor	x			
mwrret	Sally	x	x	yes, needs several months data to create (	yes, needs several months data to create offsets
qcrad	Sally	x		yes, needs several months data to set para	Need development to apply to PRP data
ripbe	Sally		x	not currently planned, needs microbase, m	not currently planned, needs microbase, mergesonde, surfspecalb
rlprof	Connor	x			
sfcldgrid	Sally	x		No, only relevant at SGP	No, only relevant at SGP
sondeadjust	Mike		x		
surfspecalb	Sally	x		not currently planned, development for nc	not currently planned, development for non-SGP sites under way
swfanal	Sally	x		yes, after qcrad	maybe, need to discuss with Chuck
twmr	sally	x		not relevant	not relevant
varnal	Shaocheng		x		
wacrarscl	Mike		x	By Developer	

VAPs in development					
ccnprof	Sally		x		
microarscl	Mike		x		
mfrsrcip	Connor				
Vertical Velocity	Mike				
Kazr ARSCL	Mike				
PBL	Sally				
interpolatedsonde	Mike		x		
kazrarscl	Mike		x		
mmcg	Scott		x		

DMF Data Flow

ARM Mobile Facility 1 - (TCAP) Cape Cod, Massachusetts - PVC

July 2012 - June 2013

M1 - Start July 1

915RWP
AERI
AOS-CPC
AOS-HTDMA
AOS-PSAP
AOS-NEPH dry
AOS-NEPH wet
AOS-CCN100
AOS-OZONE
AOS-MET
AOS-UHSAS
CSPHOT
DL
ECOR
GNDRAD
IRT
MET *(w/org)*
MFRSR
MPLPOL
MWR
MWRHF
MWRP
NFOV
SACR - Ka
SACR - Ka SPEC
SACR - W
SACR - W SPEC
SAS - He
SAS - Ze
SEBS
SKYRAD
SONDE
TSI
TWRCAM3M
VCEIL
WACR
WACR SPEC

Start (AAF1) July 15, (AAF2) Jan 31

MAOS - PSAP
MAOS - NEPH
MAOS - CCNC
MAOS - AETH
MAOS - ACSM
MAOS - CPC 3772
MAOS - CPC 3776
MAOS - HTDMA
MAOS - PILS
MAOS - SP2
MAOS - UHSAS
MAOS - PASS-3
MAOS - SMPS
MAOS - PTRMS
MAOS - Trace Gas CO
MAOS - Trace Gas O3
MAOS - Trace Gas SO2
MAOS - Trace Gas NOx
SODAR ????
HUMIDIGRAPH ????

ARM Mobile Facility 2 - (MAGIC) Los Angeles, CA and Honolulu, HI - MAG

October 2012 - September 2013

M1
1290RWP
ASSIST
AOS-CPC
AOS-HTDMA
AOS-PSAP
AOS-NEPH dry
AOS-NEPH wet
AOS-CCN100
AOS-OZONE
AOS-MET
AOS-UHSAS
CSPHOT
HSRL
IRT (zp)
IRT (sst)
KAZR
KAZR SPEC
MET
MPLPOL
MWR3C
MWR
PARSIVEL
PRP
SPN1
SAS - He
SAS - Ze
SEANAV
SONDE
TSI
VCEIL
M-WACR
M-WACR SPEC

VAPs	Translator	Can we st	Does it need any updates	Comments
ARSCL/WACR ARSCL/Micro A	Mike Jensen	No		
MWRRET	Sally McFarlane	Yes		Krista said that she will release it and Nicole can run it on November 01, 2011
MERGESONDE	Mike Jensen	Yes	Need MWRRET/ECMWF	
AERIPROF	Sally Mcfarlane	No	Dave Turner has to update for tropical sites	
MPLCOD	Sally McFarlane	No		
MFRSRCLDOD	Sally Mcfarlane	Yes	Few and Langley runs	
QCRAD	Sally Mcfarlane	after initi	60 days of data	
AOD	Connor Flynn	Yes	60 days of data	
MICROBASE	Mike Jensen	Yes	Need MWRRET /MERGESONDE	
MPLCMASK	Sally McFarlane	Yes	Few	
VARANAL	Shaocheng	No		
Radiative Flux Analysis(once	Sally McFarlane	No		
LANGLEY	Connor Flynn	Yes		
MICROARSCL	Mike Jensen	No	Ed Luke will start	

Appendix G
Data System Plan Example

MAGIC Data System Operations Manual

Revision History
Revision v1.6 May 30, 2013
Added section for Verison wireless. Updated switch diagrams to conform with RackTables and actual devices.
Revision v1.5 April 25, 2013
Added Host table and PDU documentation.
Revision v1.4 April 25, 2013
Updated network documentation.
Revision v1.3 November 14, 2012
Added caution to "QUIT" Thunderbird when not in use.
Revision v1.3 October 24, 2012
Corrected setup instructions for operations e-mail client. Added cellular antenna installation instructions.
Revision v1.2 October 22, 2012
Changes to reflect use of different cellular router and different cellular service provider (Sprint)
Revision v1.1 October 5, 2012
Added url for Operations e-mail server
Revision v1.0 September 6, 2012
Initial Version

Abstract

This document presents AMF2 Operations staff with responsibilities and procedures for operation of various data system components during the AMF2 MAGIC deployment.

Table of Contents

1. Internet Communications

There are two independent internet connections for AMF2 during the MAGIC deployment.

While in port, in both LA and Honolulu, the AMF2 internet connection will be through a Sprint data plan. It is anticipated that there will be adequate cellular coverage at both port locations. It is further anticipated that the available bandwidth and time in port will only allow a portion of the data collected during the voyage to be transferred to the DMF. All other data will be shipped to the DMF via USB drives. While in port, AMF2 inbound and outbound internet access will be configured the same as land-based deployments.

While on the ocean, AMF2 internet communications will be through Iridium Pilot. This is a mobile, satellite-based solution. This will provide 128kbps data service with an allowance of 200MB per month.

While in port, ARM infrastructure staff with appropriate SARs in place, as well as data system infrastructure, will have remote internet access to the AMFC2 systems. AMFC2 on-board operations staff will have generally unrestricted access to the internet. Global internet traffic flows through ANL's global internet gateway infrastructure and is treated as traffic originating on ANL's visitor network. It should be assumed that internet traffic is monitored for conformance with ANL use policies.

2. Data System Procedures

This section outlines several data system related procedures to be performed by the AMF2 Operations staff.

2.1. Daily While at Sea

2.1.1. Monitor Iridium satellite Traffic

At least once each day, from the Operator PC, check the status of the Iridium link at: *http://192.168.2.1*.

View the *status* and *counters* pages.

On the *status* page ensure all LEDs are green.

On the *counters* page, note the number of *Total bytes transmitted* and *Total bytes received*. Note the *Total call duration*. Notify AMF2 Operations management of these totals each day that:

- Total bytes transmitted and received since first day of month exceeds 150MB (our monthly limit is 200MB); or
- Total call duration exceeds 80 minutes (our monthly limit is 100 minutes).

2.1.2. Site Transfer Disks

At least once each day, monitor local DSView for notification that site transfer disks need changing. Two different diskswap systems are installed. `Diskswap-amfc2` if for writing 500GB disks. `Bigdiskswap-amfc2` writes 1.5TB disks and is for radar spectra. Follow disk change procedures provided by DMF.

2.1.3. DSView

At least once each day monitor the local DSView to ensure:

- collections are being performed,
- instrumentation are properly time synchronized, and
- that ingests are running properly.

2.1.4. Network Time Server

At least once each day confirm that the GPS time server, `ntp-amfc2`, is synchronized with GPS satellites. The time server front panel provides an indicator or display to confirm satellite synchronization.

2.1.5. Disk Arrays

At least once each day check data system disk arrays to ensure all disks are *green*. If there is a disk failure, the light will be amber. Notify `<sdsops@sgp.arm.gov>` with location of failed disk and description of status indicators. Instructions to correct the situation will be supplied by data system staff.

2.2. While in Port

2.2.1. Cellular Network Communications

While in port, the status of the cellular communication link can be monitored from the Operator PC at *http://192.168.0.1*.

2.2.2. Site Transfer Disks

Using procedures provided by AMF2 management, ship full site transfer disks as follows:

2.2.2.1. Bigdiskswap Disks

```
Karen Gibson
Oak Ridge National Laboratory
Environmental Sciences Division
Building 2040, MS 6290
Bethel Valley Road
Oak Ridge, TN.  37831

Phone: (865) 241-4854
```

2.2.2.2. Diskswap Disks

Until the DMF completes re-location to ORNL, ship the 500GB disks to:

```
Nicole N. Keck
Pacific Northwest National Laboratory
902 Battelle Boulevard
P.O. Box 999, MSIN K7-28
Richland, WA  99352 USA

Phone: (509) 375-6479
```

Nicole Keck will notify MAGIC operations staff when to begin shipping *diskswap* disks to ORNL.

2.2.3. Spare Disks

Notify `<dmfoper@arm.gov>` and `<armarchive@ornl.gov>` if you will be starting an ocean trip with 12 or less empty 1.5TB disks or 4 or less empty 500GB transfer disks.

2.2.4. System Integrity

Check GPS and Iridium antenna grounding cable connections for corrosion and integrity. Clean antennas as necessary. Correct any issues.

Ensure that cellular antenna cable connections remain dry and corrosion free. Ensure antennas are in good condition.

Check integrity of all inter-van network and other communications cables. Correct any issues.

3. Voice Communications

Voice calls can be made from the ship using the ARM Iridium voice phone.

Using the “Captain's Handset” located on top shelf of data system rack, dial:

```
<PIN>country code + local phone number + #
          (For US calls, country code is “1”)
```

The <PIN> is labeled on the Iridium Below Deck Equipment (BDE). This is located on the top shelf of data system rack.

4. Iridium Support

Normally, Support issues with Iridium will be handled by data system operations. The following is provided for emergency situations

```
Vessel Name:  HL Spirit
Voice PIN:    8373
Voice #:      88 167 772 7571
Support:      1 973 889 8990 x207
              <support@telaurus.com>
```

5. E-mail

The on-board MAGIC Operations staff will share a single e-mail account at mail.sgp.arm.gov. Configure the e-mail client as follows:

```
Server:               mail.sgp.arm.gov    Port: 995
Username:             amf2opsmsgs
Reply-to-address:     amf2operator@ops.sgp.arm.gov
Connection Security:  SSL/TLS
Authentication:       Normal Password (provided by AMF2 Ops Manager)

Outgoing Server:      dns-amfc2.amf.arm.gov   Port: 25

Disable: Check for new messages at startup
Disable: Check for new messages every ?? minutes
Enable:  Automatically download new messages


Store sent messages on local system (not on server)
```

```
Store drafts on local system (not on server)

Compose and send messages in plain text mode.  HTML produces large messages

Use a local addressbook

Disable: return receipts and return receipt requests
```

While in port, site operations staff can check e-mail through the web interface at *https://198.124.96.212/*.

The operations staff should *QUIT* Thunderbird when not in use to prevent periodic background checks of Inbox updates.

A. Cellular Internet Connection

1. Primary Cellular Connection

The primary cellular internet connection, while in port, is through Verizon using a Cradle Point MBR1400 LE-VZ router.

The system includes two external antennas. Locate the antennas with multiples of 10 inches separation, but less than 50 inches. Closer is better.

2. Secondary (Backup) Cellular Connection

The backup cellular internet connection is through Sprint using a CradlePoint ARC MBR1400W router. The system includes an external antenna illustrated below.

Cellular PCS/WiMax Antenna

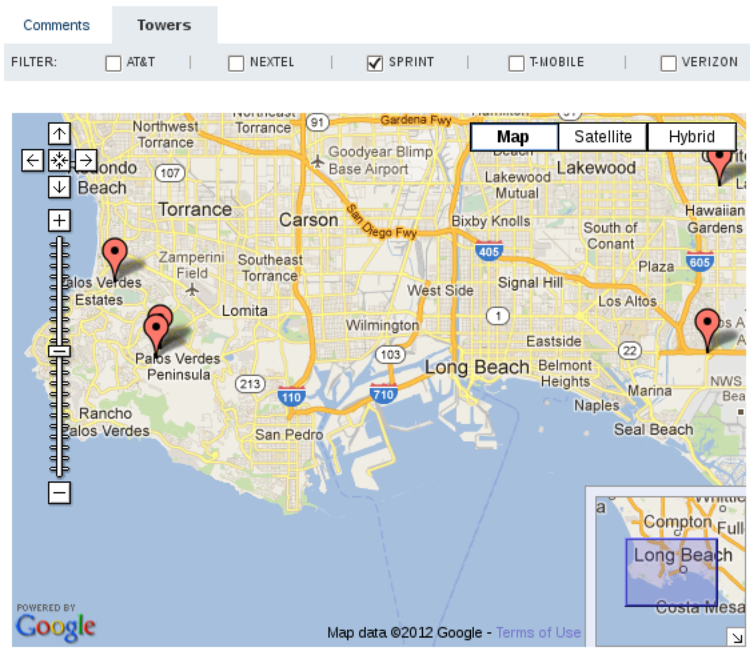
The cellular antenna should be deployed on top of the data system van in a well exposed location. The vendor mounting requirements are as follows:

```
Connectors: Twin connectors to attach to the CradlePoint
            Sprint modem cellular antenna connectors.


Special Instructions:

• The AP-Router-PCS/WiMax antenna must be used
```

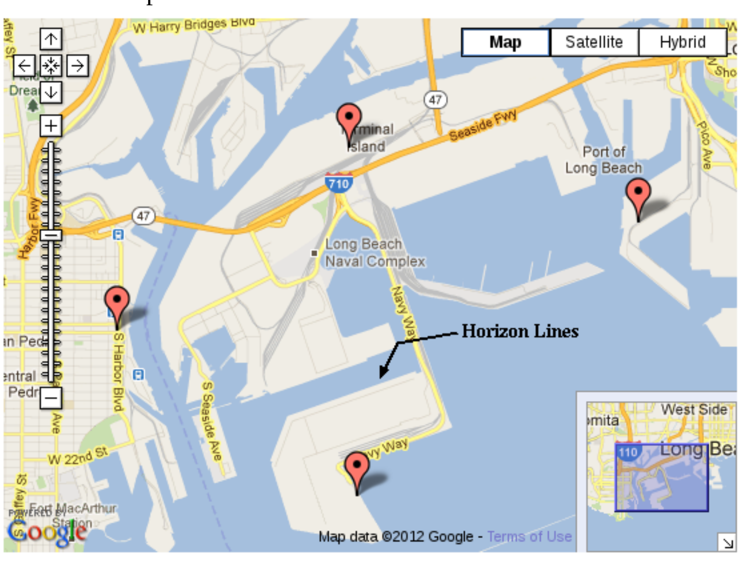
```
  with the provided metal disc for the ground plane.
• The antenna needs to be parallel to the ground.
• The antenna can be placed on a metal surface
  without the supplied disc, so long as there is at
  least 6 inches diameter of metal under the antenna.
```

3. Cell Tower Locations

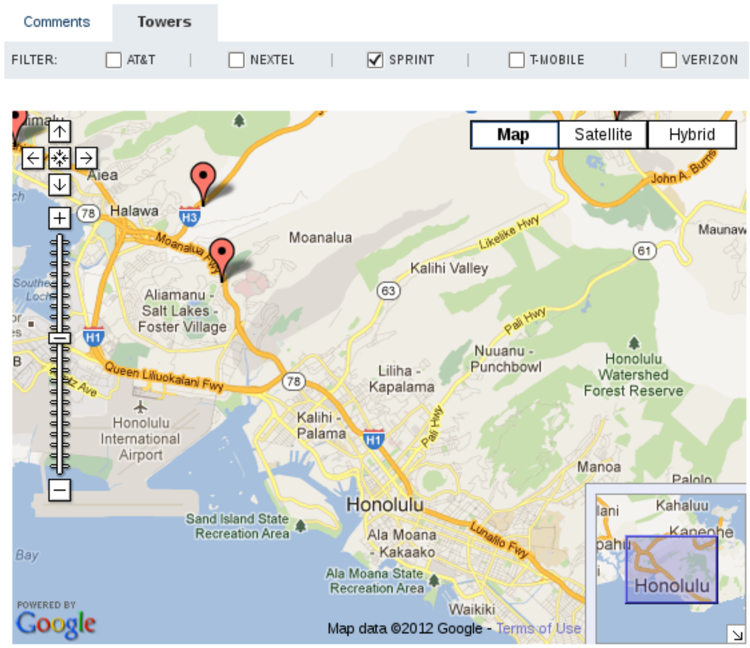
Below are figures which show cellular tower locations near the Horizon docks in LA and Honolulu. There are figures which show towers known to be Sprint and figures for other cell towers. The *other* towers may or may not have Sprint service. The tower locations are not necessarily complete. However, this should provide a guide for location of cellular antennas on the ship.



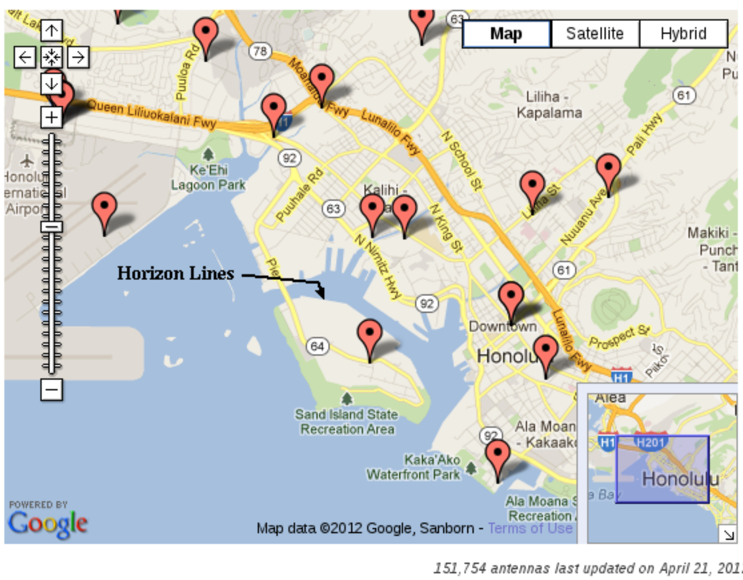
Location of Sprint Cell Towers Near LA Dock



Location of Other Cell Towers Near LA Dock



Location of Sprint Cell Towers Near Honolulu Dock



Location of Cell Other Towers Near Honolulu Dock

4. Cellular Diagnostics

The cellular antennas were setup initially by data system staff. Differences in cellular tower exposure (or line-of-sight) between LA and Honolulu or different docking locations or orientations of the ship may require re-location of the cellular antenna each time in port to achieve a reliable data connection.

Cellular connection information can be monitored from the operator PC at *http://192.168.0.1*.

Below are a description of the indicators on the CradlePoint MBR1400 cellular modem:

```
USB Port 2:
  Green - Active
  Blinking Green - Establishing
  Amber - Not Active
  Blinking Amber - Error
  Blinking Red - Resetting

Signal Indicator:
  1 Bar - Weak
  2 Bars - Okay
  3 Bars - Good
  4 Bars - Strong
```

B. Network Host Table

The network host table, effective the date of this revision, is presented below:

```
# AOS Instrument Network
198.124.101.129  instgw-amfc2a1.amf.arm.gov instgw-amfc2a1
198.124.101.130  aospc-amfc2a1.amf.arm.gov aospc-amfc2a1
198.124.101.131  met-amfc2a1.amf.arm.gov met-amfc2a1  ozone-amfc2a1
198.124.101.132  cnc-amfc2a1.amf.arm.gov cnc-amfc2a1  uhsas-amfc2a1 psap-amfc2a1
198.124.101.133  htdma-amfc2a1.amf.arm.gov htdma-amfc2a1  ccn100-amfc2a1
198.124.101.134  humidigraph-amfc2a1.amf.arm.gov humidigraph-amfc2a1
# AOS Data System Network
198.124.101.161  dsgw-amfc2a1.amf.arm.gov dsgw-amfc2a1
198.124.101.162  sw0-amfc2a1.amf.arm.gov sw0-amfc2a1
# AOS Visitor (IOP) Network
198.124.101.177  iopgw-amfc2a1.amf.arm.gov iopgw-amfc2a1
198.124.101.178  iop178-amfc2a1.amf.arm.gov iop178-amfc2a1
198.124.101.179  iop179-amfc2a1.amf.arm.gov iop179-amfc2a1
198.124.101.180  iop180-amfc2a1.amf.arm.gov iop180-amfc2a1
198.124.101.181  iop181-amfc2a1.amf.arm.gov iop181-amfc2a1
198.124.101.182  iop182-amfc2a1.amf.arm.gov iop182-amfc2a1
198.124.101.183  iop183-amfc2a1.amf.arm.gov iop183-amfc2a1
198.124.101.184  iop184-amfc2a1.amf.arm.gov iop184-amfc2a1
198.124.101.185  iop185-amfc2a1.amf.arm.gov iop185-amfc2a1
198.124.101.186  iop186-amfc2a1.amf.arm.gov iop186-amfc2a1
198.124.101.187  iop187-amfc2a1.amf.arm.gov iop187-amfc2a1
198.124.101.188  iop188-amfc2a1.amf.arm.gov iop188-amfc2a1
198.124.101.189  iop189-amfc2a1.amf.arm.gov iop189-amfc2a1
198.124.101.190  iop190-amfc2a1.amf.arm.gov iop190-amfc2a1
# Instrument Network
198.129.80.1  instgw-amfc2.amf.arm.gov instgw-amfc2
198.129.80.2  kazr-amfc2.amf.arm.gov kazr-amfc2
198.129.80.3  vceil-amfc2.amf.arm.gov vceil-amfc2
198.129.80.4  sst-amfc2.amf.arm.gov sst-amfc2
198.129.80.5  mwr3c-amfc2.amf.arm.gov mwr3c-amfc2
198.129.80.6  mmet-amfc2.amf.arm.gov mmet-amfc2
198.129.80.7  mwr-amfc2.amf.arm.gov mwr-amfc2
```

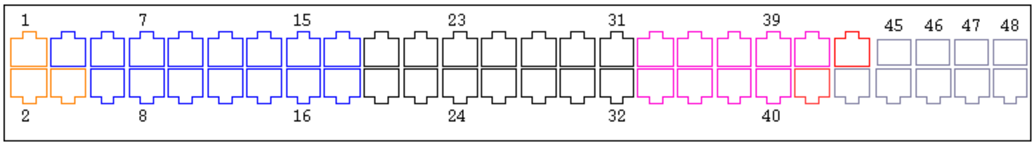
```
198.129.80.8  csphot-amfc2.amf.arm.gov csphot-amfc2
198.129.80.9  tsi-amfc2.amf.arm.gov tsi-amfc2
198.129.80.11  seanav-amfc2.amf.arm.gov seanav-amfc2
198.129.80.12  1290rwp-amfc2.amf.arm.gov 1290rwp-amfc2
198.129.80.13  mwacr-amfc2.amf.arm.gov mwacr-amfc2
198.129.80.17  sasze-amfc2.amf.arm.gov sasze-amfc2
198.129.80.18  rpytable-amfc2.amf.arm.gov rpytable-amfc2
198.129.80.19  rphtable-amfc2.amf.arm.gov rphtable-amfc2
198.129.80.22  bbssups-amfc2.amf.arm.gov bbssups-amfc2
198.129.80.26  assist-amfc2.amf.arm.gov assist-amfc2
198.129.80.30  bbss-amfc2.amf.arm.gov bbss-amfc2
198.129.80.31  bbssgu-amfc2.amf.arm.gov bbssgu-amfc2
198.129.80.37  mplpol-amfc2.amf.arm.gov mplpol-amfc2
198.129.80.44  seanavctl-amfc2.amf.arm.gov seanavctl-amfc2
198.129.80.47  prp-amfc2.amf.arm.gov prp-amfc2
198.129.80.51  rds1-kazr-amfc2.amf.arm.gov rds1-kazr-amfc2
198.129.80.52  spn-amfc2.amf.arm.gov spn-amfc2
198.129.80.60  tsimirror-amfc2.amf.arm.gov tsimirror-amfc2
198.129.80.61  tsicam-amfc2.amf.arm.gov tsicam-amfc2
# Data System Network
198.129.80.65  dsgw-amfc2.amf.arm.gov dsgw-amfc2
198.129.80.66  nfs1-amfc2.amf.arm.gov nfs1-amfc2
198.129.80.67  nfs1lom-amfc2.amf.arm.gov nfs1lom-amfc2
198.129.80.68  collector-amfc2.amf.arm.gov collector-amfc2
198.129.80.69  nfs-amfc2.amf.arm.gov nfs-amfc2
198.129.80.70  nfslom-amfc2.amf.arm.gov nfslom-amfc2
198.129.80.71  lh-amfc2.amf.arm.gov lh-amfc2
198.129.80.72  vmstr-amfc2.amf.arm.gov vmstr-amfc2
198.129.80.73  vmstrlom-amfc2.amf.arm.gov vmstrlom-amfc2
198.129.80.74  ntp-amfc2.amf.arm.gov ntp-amfc2
198.129.80.76  ups0-amfc2.amf.arm.gov ups0-amfc2
198.129.80.77  ups1-amfc2.amf.arm.gov ups1-amfc2
198.129.80.79  sfs-amfc2.amf.arm.gov sfs-amfc2
198.129.80.80  vmh0vmk-amfc2.amf.arm.gov vmh0vmk-amfc2
198.129.80.81  vmh1vmk-amfc2.amf.arm.gov vmh1vmk-amfc2
198.129.80.83  nfs2-amfc2.amf.arm.gov nfs2-amfc2
198.129.80.84  nfs2lom-amfc2.amf.arm.gov nfs2lom-amfc2
198.129.80.85  vmh0-amfc2.amf.arm.gov vmh0-amfc2
198.129.80.86  vmh1-amfc2.amf.arm.gov vmh1-amfc2
198.129.80.90  vmh0lom-amfc2.amf.arm.gov vmh0lom-amfc2
198.129.80.91  vmh1lom-amfc2.amf.arm.gov vmh1lom-amfc2
198.129.80.94  vmhvma-amfc2.amf.arm.gov vmhvma-amfc2
198.129.80.97  dns-amfc2.amf.arm.gov dns-amfc2
198.129.80.100  cs0-amfc2.amf.arm.gov cs0-amfc2
198.129.80.118  pdu0-amfc2.amf.arm.gov pdu0-amfc2
198.129.80.119  pdu1-amfc2.amf.arm.gov pdu1-amfc2
198.129.80.120  pdu2-amfc2.amf.arm.gov pdu2-amfc2
198.129.80.121  pdu3-amfc2.amf.arm.gov pdu3-amfc2
198.129.80.122  backuppc-amfc2.amf.arm.gov backuppc-amfc2
198.129.80.123  kvm-amfc2.amf.arm.gov kvm-amfc2
# Infrastructure Network
198.129.80.129  ifgw-amfc2.amf.arm.gov ifgw-amfc2
198.129.80.130  sw0-amfc2.amf.arm.gov sw0-amfc2
198.129.80.131  sw1-amfc2.amf.arm.gov sw1-amfc2
```

```
198.129.80.132  opssw-amfc2.amf.arm.gov opssw-amfc2
198.129.80.133  sacrsw-amfc2.amf.arm.gov sacrsw-amfc2
# Visitor (IOP) Network
198.129.80.161  iopgw-amfc2.amf.arm.gov iopgw-amfc2
198.129.80.162  iop162-amfc2.amf.arm.gov iop162-amfc2
198.129.80.163  iop163-amfc2.amf.arm.gov iop163-amfc2
198.129.80.164  iop164-amfc2.amf.arm.gov iop164-amfc2
198.129.80.165  iop165-amfc2.amf.arm.gov iop165-amfc2
198.129.80.166  iop166-amfc2.amf.arm.gov iop166-amfc2
198.129.80.167  iop167-amfc2.amf.arm.gov iop167-amfc2
198.129.80.168  iop168-amfc2.amf.arm.gov iop168-amfc2
198.129.80.169  iop169-amfc2.amf.arm.gov iop169-amfc2
198.129.80.170  iop170-amfc2.amf.arm.gov iop170-amfc2
198.129.80.171  iop171-amfc2.amf.arm.gov iop171-amfc2
198.129.80.172  iop172-amfc2.amf.arm.gov iop172-amfc2
198.129.80.173  iop173-amfc2.amf.arm.gov iop173-amfc2
198.129.80.174  iop174-amfc2.amf.arm.gov iop174-amfc2
198.129.80.175  iop175-amfc2.amf.arm.gov iop175-amfc2
198.129.80.176  iop176-amfc2.amf.arm.gov iop176-amfc2
198.129.80.177  iop177-amfc2.amf.arm.gov iop177-amfc2
198.129.80.178  iop178-amfc2.amf.arm.gov iop178-amfc2
198.129.80.179  iop179-amfc2.amf.arm.gov iop179-amfc2
198.129.80.180  iop180-amfc2.amf.arm.gov iop180-amfc2
198.129.80.181  iop181-amfc2.amf.arm.gov iop181-amfc2
198.129.80.182  iop182-amfc2.amf.arm.gov iop182-amfc2
198.129.80.183  iop183-amfc2.amf.arm.gov iop183-amfc2
198.129.80.184  iop184-amfc2.amf.arm.gov iop184-amfc2
198.129.80.185  iop185-amfc2.amf.arm.gov iop185-amfc2  parsivel-amfc2
198.129.80.186  iop186-amfc2.amf.arm.gov iop186-amfc2  parsivel2-amfc2
198.129.80.187  iop187-amfc2.amf.arm.gov iop187-amfc2
198.129.80.188  iop188-amfc2.amf.arm.gov iop188-amfc2
198.129.80.189  operpc0-amfc2.amf.arm.gov operpc0-amfc2
198.129.80.190  operpc1-amfc2.amf.arm.gov operpc1-amfc2
# Mentor Network
198.129.80.193  mentorgw-amfc2.amf.arm.gov mentorgw-amfc2
198.129.80.194  mentor194-amfc2.amf.arm.gov mentor194-amfc2
198.129.80.195  mentor195-amfc2.amf.arm.gov mentor195-amfc2
198.129.80.196  mentor196-amfc2.amf.arm.gov mentor196-amfc2
198.129.80.197  mentor197-amfc2.amf.arm.gov mentor197-amfc2
198.129.80.198  mentor198-amfc2.amf.arm.gov mentor198-amfc2
# Service Network
198.129.80.201  svcgw-amfc2.amf.arm.gov svcgw-amfc2
198.129.80.202  research-amfc2.amf.arm.gov research-amfc2  dsview-amfc2
# Private IP Infrastructure
10.2.0.2  parsivel1sw-amfc2.p.arm.gov parsivel1sw-amfc2
10.2.0.3  parsivel2sw-amfc2.p.arm.gov parsivel2sw-amfc2
10.2.0.4  mmetss-amfc2.p.arm.gov mmetss-amfc2
10.2.0.5  tsisw-amfc2.p.arm.gov tsisw-amfc2
10.2.0.6  prpss-amfc2.p.arm.gov prpss-amfc2
10.2.0.7  isarss-amfc2.p.arm.gov isarss-amfc2
10.2.0.8  instups0-amfc2.p.arm.gov instups0-amfc2
10.2.0.9  instups1-amfc2.p.arm.gov instups1-amfc2
10.2.0.10  instups2-amfc2.p.arm.gov instups2-amfc2
10.2.0.11  instups3-amfc2.p.arm.gov instups3-amfc2
```

```
10.2.0.12  instups4-amfc2.p.arm.gov instups4-amfc2
10.2.0.13  instups5-amfc2.p.arm.gov instups5-amfc2
10.2.0.14  instups6-amfc2.p.arm.gov instups6-amfc2
10.2.0.15  instups7-amfc2.p.arm.gov instups7-amfc2
10.2.0.16  instups8-amfc2.p.arm.gov instups8-amfc2
10.2.0.17  instups9-amfc2.p.arm.gov instups9-amfc2
```

C. Network Switch Port Assignments

This appendix presents the network switch port assignments effective at end of ANL integration and test period.

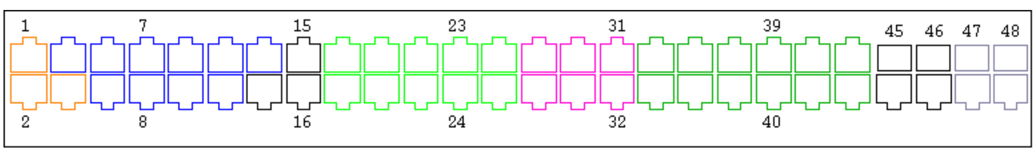


1. vmh0 e1 trunk	9. nfs e4	17. cs0 e0	25.	33. operpc	41.
2. vmh0 e2 trunk	10. nfs2 e3	18. rp e0	26.	34.	42. satellite e0
3. vmh0 lom	11. nfs2 e4	19.	27.	35.	43. cellular e0
4. vmh0 e3 trunk	12. kvm e1	20.	28.	36.	44. (*) gw1-amfc2 e0
5. vmh1 e4	13. ntp e0	21.	29.	37.	45. (*) sacrsw-amfc2
6. vmstr e1	14. pdu0 e0	22.	30.	38.	46. (*) sw0-amf2a1
7. vmstr lom	15. pdu1 e0	23.	31.	39	47. (*) sw1-amfc2 e47
8. nfs e3	16. ups0 e0	24.	32.	40.	48. (*) sw0-amfc2 e48

data-system   instrument   private-instrument   iop   switch trunk   un-assigned

(*) also describes a switch trunk   vmh trunk   isp

sw0-amfc2 (Data System Rack)

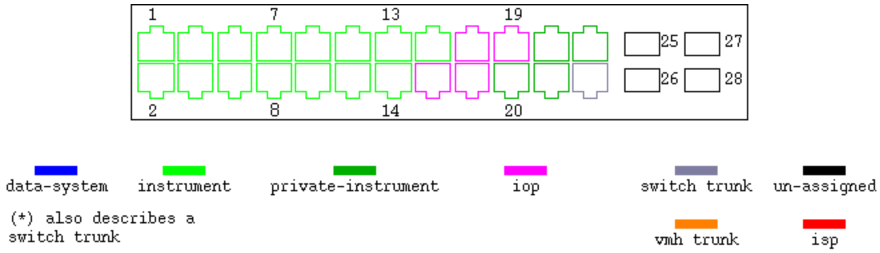


1. (*) vmh1-amfc2 e1	9. nfs2-amfc2 e5	17.	25.	33.	41. instups3
2. (*) vmh1-amfc2 e2	10. nfs2-amfc2 e6	18.	26.	34.	42. instups2
3. vmh1-amfc2 lom	11. ups1-amfc2	19.	27.	35.	43. instups1
4. (*) vmh0-amfc2 e3	12. pdu2-amfc2	20.	28.	36.	44. instups0
5. vmh0-amfc2 e4	13. pdu3-amfc2	21.	29.	37.	45.
6. nfs-amfc2 e1	14.	22.	30.	38.	46.
7. nfs-amfc2 e2	15.	23.	31.	39. tsi moxa	47. (*) sw0-amfc2
8. nfx-amfc2 lom	16.	24.	32.	40. instups4	48. (*) sw0-amfc2

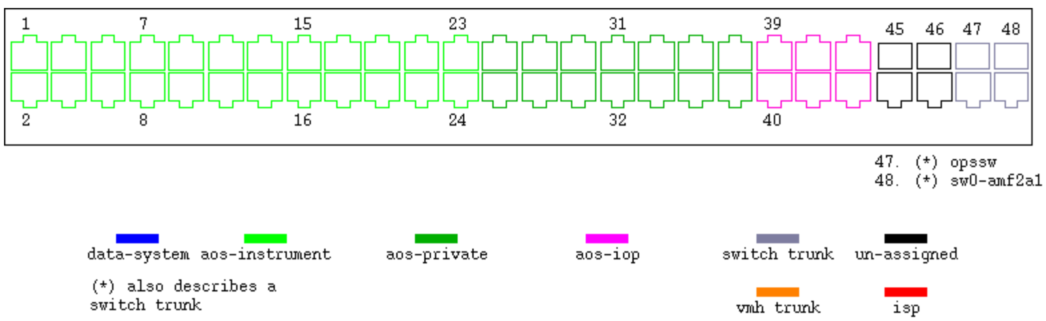
data-system   instrument   private-instrument   iop   switch trunk   un-assigned

(*) also describes a switch trunk   vmh trunk   isp

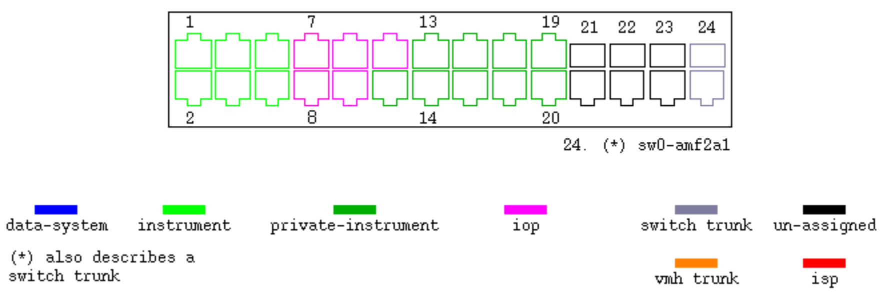
sw1-amfc2 (Data System Rack)



sacrsw-amfc2 (SACR Van, AMFC2 Network)



sw0-amf2a1 (Aerosol Van, AOS Network Devices)



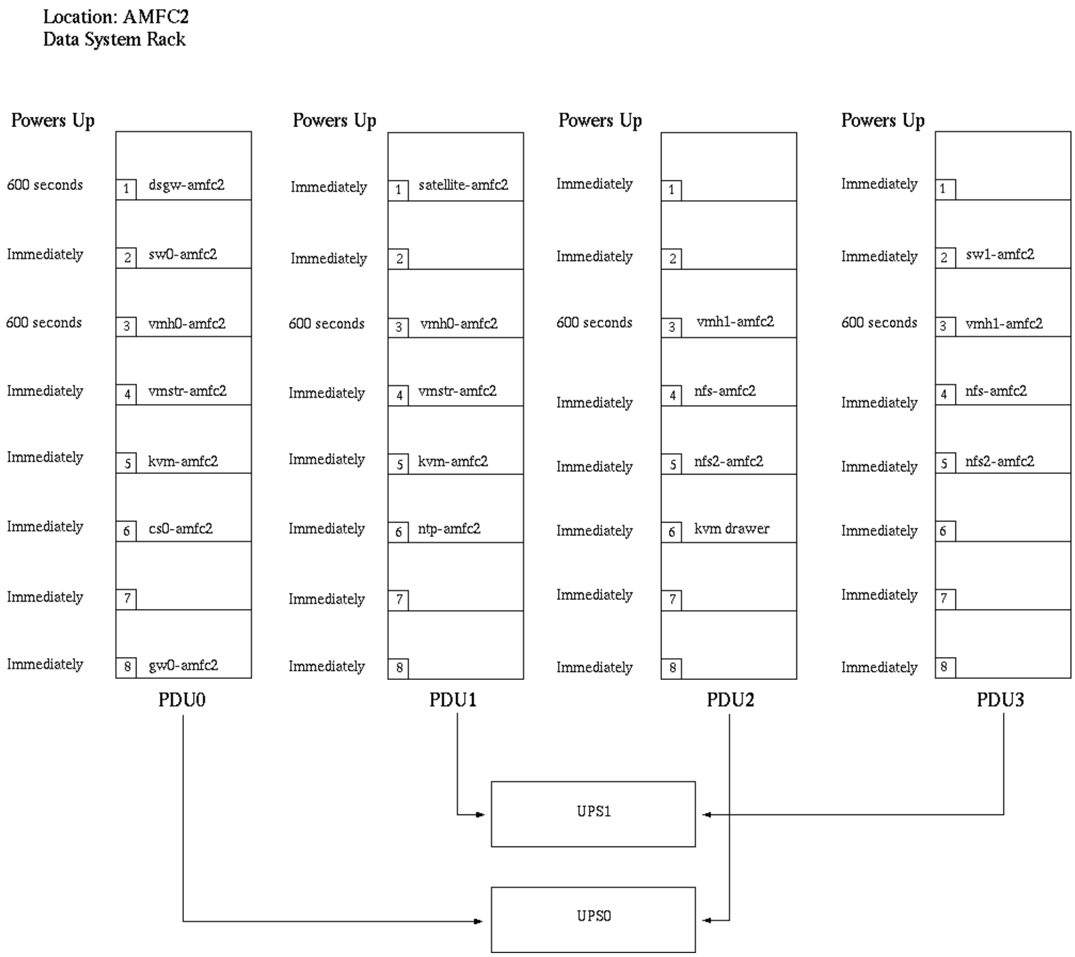
opssw-amfc2 (Aerosol Van, AMFC2 network devices)

D. Data System Configuration

This Appendix presents the data system rack layout and the PDU wiring configuration.

	Front	Interior	Back
31			
30	Shelf Operations Van 1 30		
29	ntp-amfc2.amf.arm.gov		
28	vmh0-amfc2.amf.arm.gov		
27	vmstr-amfc2.amf.arm.gov		
26			
25		sw0-amfc2.amf.arm.gov	
24	kvm-amfc2.amf.arm.gov		pdu0-amfc2.amf.arm.gov
23	cs0-amfc2.amf.arm.gov		pdu1-amfc2.amf.arm.gov
22	KVM Drawer Operations Van 1 22		
21	vmh1-amfc2.amf.arm.gov		
20	nfs-amfc2.amf.arm.gov		
19			
18		sw1-amfc2.amf.arm.gov	
17			pdu2-amfc2.amf.arm.gov
16			pdu3-amfc2.amf.arm.gov
15			
14			
13	nfs2-amfc2.amf.arm.gov		
12			
11			
10			
9			
8			
7			
6			
5			
4	ups1-amfc2.amf.arm.gov		
3			
2	ups0-amfc2.amf.arm.gov		
1			

AMFC2 Data System Rack Layout



AMFC2 Data System PDU Configuration

pdu0-amfc2.amf.arm.gov

summary

Common name:	pdu0-amfc2.amf.arm.gov
Object type:	PDU
Asset tag:	ZA0937000314
HW type:	APC AP7900
Explicit tags:	pdu, apc, amfc2
Implicit tags:	power, sites, vendors, amf

ports and links

Local name	Visible label	Interface	L2 address	Remote object and port		Cable ID
e0/0		1000Base-T		sw0-amfc2.amf.arm.gov	e0/14	
pow0/1		AC-out		dsgw-amfc2.amf.arm.gov	pow0/1	
pow0/2		AC-out		sw0-amfc2.amf.arm.gov	pow0/0	*ups0-amfc2.amf.arm.gov*
pow0/3		AC-out		vmh0-amfc2.amf.arm.gov	pow0/1	*ups0-amfc2.amf.arm.gov*
pow0/4		AC-out		vmstr-amfc2.amf.arm.gov	pow0/1	*ups0-amfc2.amf.arm.gov*
pow0/5		AC-out		kvm-amfc2.amf.arm.gov	pow0/1	*ups0-amfc2.amf.arm.gov*
pow0/6		AC-out		cs0-amfc2.amf.arm.gov	pow0/1	*ups0-amfc2.amf.arm.gov*
pow0/7		AC-out				
pow0/8		AC-out		gw0-amfc2.amf.arm.gov	pow0/1	*ups0-amfc2.amf.arm.gov*
pow1/1		AC-in		ups0-amfc2.amf.arm.gov	pow0/1	

AMFC2 Data System PDU0 Configuration

pdu1-amfc2.amf.arm.gov

summary

Common name:	pdu1-amfc2.amf.arm.gov
Object type:	PDU
Asset tag:	ZA0937000340
HW type:	APC AP7900
Explicit tags:	pdu, apc, amfc2
Implicit tags:	power, sites, vendors, amf

ports and links

Local name	Visible label	Interface	L2 address	Remote object and port		Cable ID
e0/0		1000Base-T		sw0-amfc2.amf.arm.gov	e0/15	
pow0/1		AC-out		satellite-amfc2.amf.arm.gov	pow0/0	
pow0/2		AC-out				
pow0/3		AC-out		vmh0-amfc2.amf.arm.gov	pow0/2	*ups1-amfc2.amf.arm.gov*
pow0/4		AC-out		vmstr-amfc2.amf.arm.gov	pow0/2	*ups1-amfc2.amf.arm.gov*
pow0/5		AC-out		kvm-amfc2.amf.arm.gov	pow0/2	*ups1-amfc2.amf.arm.gov*
pow0/6		AC-out		ntp-amfc2.amf.arm.gov	pow0/0	*ups1-amfc2.amf.arm.gov*
pow0/7		AC-out				
pow0/8		AC-out				
pow1/1		AC-in		ups1-amfc2.amf.arm.gov	pow0/1	

AMFC2 Data System PDU1 Configuration

pdu2-amfc2.amf.arm.gov

summary

Common name:	pdu2-amfc2.amf.arm.gov
Object type:	PDU
Asset tag:	ZA0937000334
HW type:	APC AP7900
Explicit tags:	pdu, apc, amfc2
Implicit tags:	power, sites, vendors, amf

ports and links

Local name	Visible label	Interface	L2 address	Remote object and port		Cable ID
e0/0		1000Base-T		sw1-amfc2.amf.arm.gov	e0/12	
pow0/1		AC-out				
pow0/2		AC-out				
pow0/3		AC-out		vmh1-amfc2.amf.arm.gov	pow0/1	*ups0-amfc2.amf.arm.gov*
pow0/4		AC-out		nfs-amfc2.amf.arm.gov	pow0/1	*ups0-amfc2.amf.arm.gov*
pow0/5		AC-out		nfs2-amfc2.amf.arm.gov	pow0/1	*ups0-amfc2.amf.arm.gov*
pow0/6		AC-out		KVM Drawer Operations Van 1 22	pow0/1	*ups0-amfc2.amf.arm.gov*
pow0/7		AC-out				
pow0/8		AC-out				
p1/1		AC-in		ups0-amfc2.amf.arm.gov	pow0/2	

AMFC2 Data System PDU2 Configuration

pdu3-amfc2.amf.arm.gov

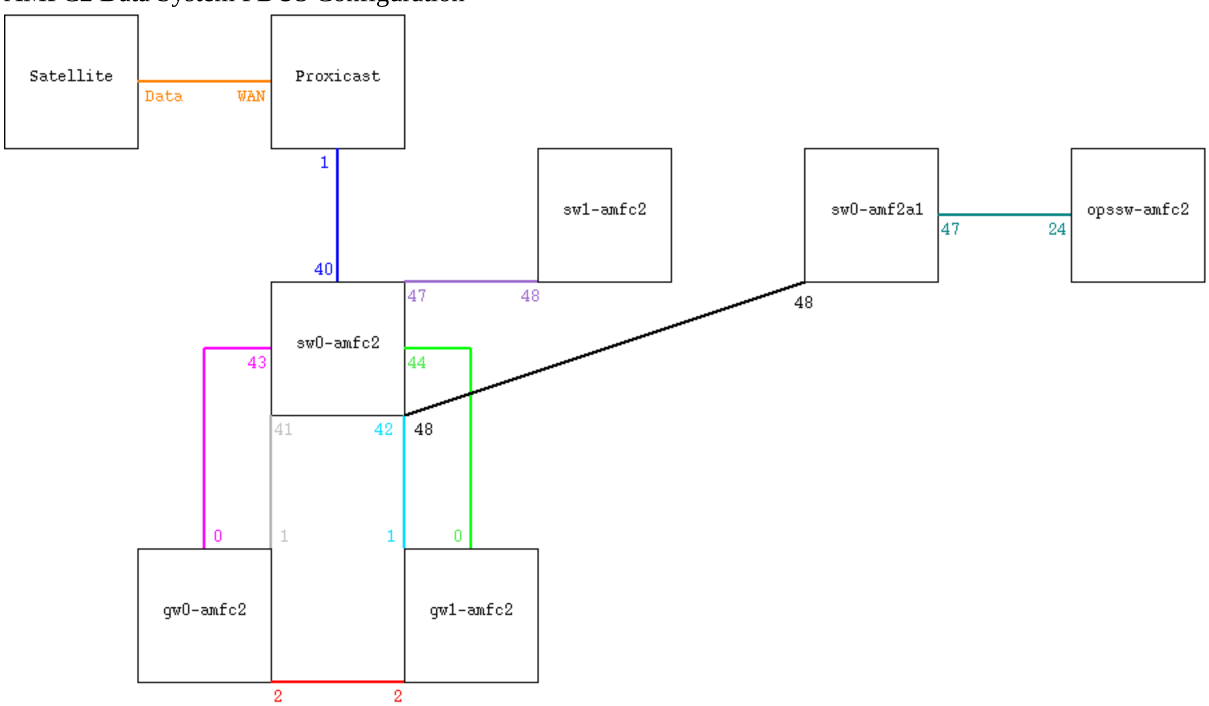
summary

Common name: pdu3-amfc2.amf.arm.gov
Object type: PDU
Asset tag: 5A1016E01408
HW type: APC AP7900
Explicit tags: pdu, apc, amfc2
Implicit tags: power, sites, vendors, amf

ports and links

Local name	Visible label	Interface	L2 address	Remote object and port	Cable ID
e0/0		1000Base-T		sw1-amfc2.amf.arm.gov e0/13	
pow0/1		AC-out			
pow0/2		AC-out		sw1-amfc2.amf.arm.gov pow0/0	*ups1-amfc2.amf.arm.gov*
pow0/3		AC-out		vmh1-amfc2.amf.arm.gov pow0/2	*ups1-amfc2.amf.arm.gov*
pow0/4		AC-out		nfs-amfc2.amf.arm.gov pow0/2	*ups1-amfc2.amf.arm.gov*
pow0/5		AC-out		nfs2-amfc2.amf.arm.gov pow0/2	*ups1-amfc2.amf.arm.gov*
pow0/6		AC-out			
pow0/7		AC-out			
pow0/8		AC-out			
pow1/1		AC-in		ups1-amfc2.amf.arm.gov pow0/2	

AMFC2 Data System PDU3 Configuration

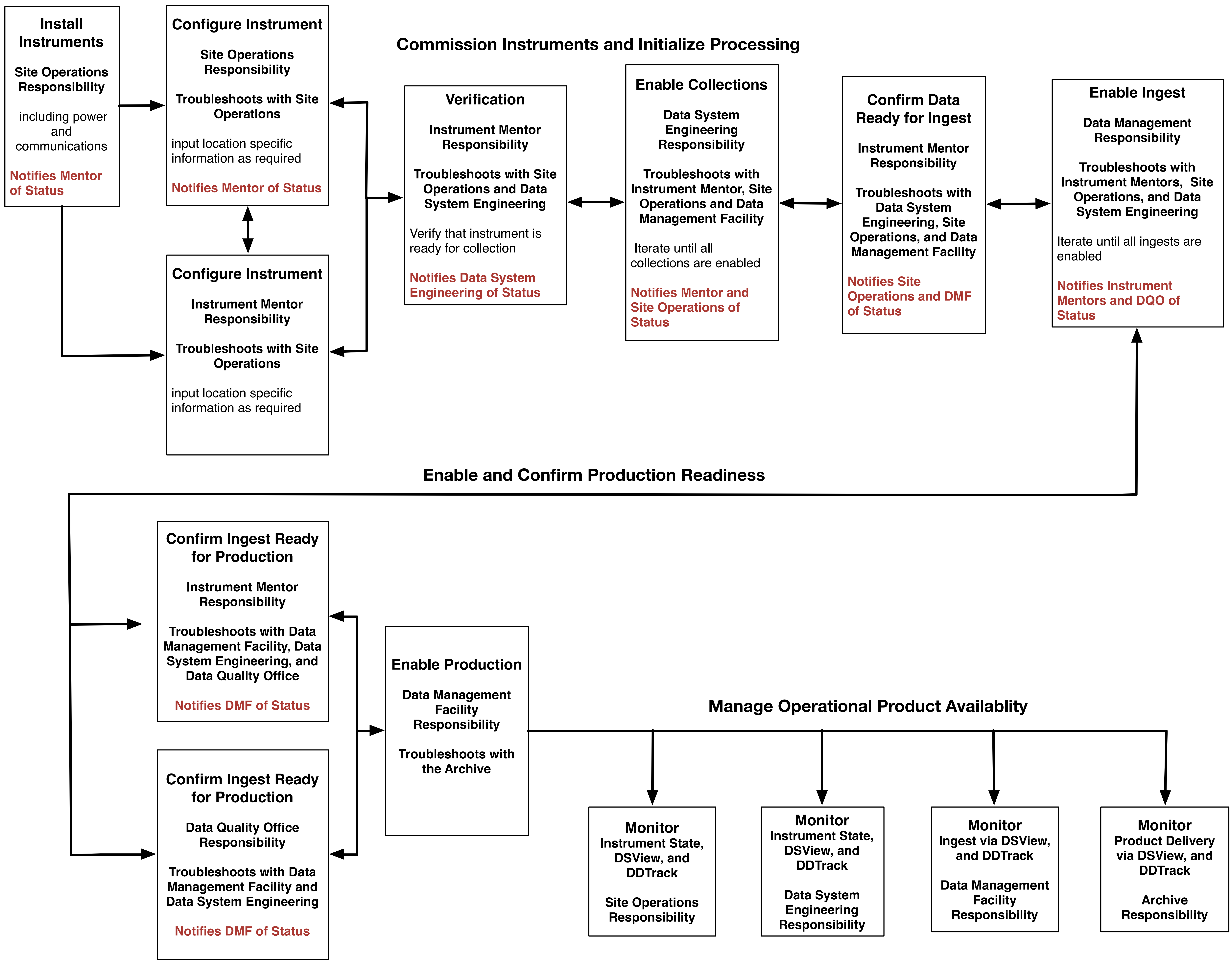


AMFC2 Data System Connections With Port Numbers

Appendix H
Plan and Data Product Delivery Example

Finland (BAECC) Data Flow		Instrument Installed	Data Receivd by DMF	Collection and Ingest Functional	Data Processed by DMF	Data Archived by DMF	Related ECOs/EWOs	Notes	Assigned To	Target Date
TWP.M1							BCR 1988 ECO 981 EWO 15133 EWO 14960			
Instrument Title	Instrument Mentor									
1290BSRWP	Rich Coulter							Vendor updating software. Site Ops may need to measure heading info	DeTect (Matt James)/Site Ops	23-Jan
ASSIST	Connor Flynn							Instrument on and mentor working with vendor for instsall	Albert Mendoza - on site	
CEILPBLHT	Vic Morris									
CSPHOT	Laurie Gregory	Installed						Instrument installed. Need confirmation from DFM on data flow. Believed data going to Aeronet	DMF	23-Jan
GNDRAD	Peter Gotseff	Install active					EWO 14963	Mentors need to review data before tower can be raised. IRT high range setting not staying. Mentor assistance requested	Mentor (Mark, Peter, Vic)	23-Jan
HSRL	Connor Flynn	Install Active						Instrument on and transmitting. Mentor on site.	Albert Mendoza - on site	24-Jan
HSRL(UW)	Connor Flynn	Install Active						Instrument on and transmitting. Mentor on site.	Albert Mendoza - on site	24-Jan
KASACR	Nitin Bharadwaj	Installed						Operational		
KASACRSPEC	Nitin Bharadwaj	Installed						Operational		
MAERI	Jonathan Gero	Troubleshooting						HVAC issues. Can't stay warm engough. Also need to accomplish 3rd blackbody calibrations, but waiting for HVAC to be sorted out first. Mentor contacting vendor.	Jonathan Gero	
MET	Jenni Kyrouac	Install Active PWD reporting ORG troubleshooting					EWO 14961	PWD reporting. T/RH reporting. Barometer reporting. Wind reporting. ORG reporting after sensor replacement but temp -99. Mentor troubleshooting with Site Ops	Site Ops/Jenni Kyrouac	23-Jan
MFRSR	Gary Hodges	Install active Troubleshooting						New Campbell logger code to allow shadowband to operate above 50 degrees. Was planned to be tested outside of lab in Oliktok but that was delayed. Troubleshooting between Site Ops and Mentor ongoing	Site Ops/Mentor (Gary Hodges)	24-Jan
MPLPOLFS	Rich Coulter							IR heater for glass hatch has failed. New heater being hand carried by Nicki.		
MWACR	Kevin Widener							Annette requesting mwacr_conf and mwacr package releases today(22 Jan). Next step installation on production system and review by Robin, DQO, Mentor	Sherman Beus	
MWACRSPEC	Kevin Widener									
MWR	Maria Cadeddu							Waiting for mentor to approve install.		
MWR3C	Maria Cadeddu							Waiting for mentors comments		
RAIN	Mary Jane Bartholomew							Loggernet setup was destroyed during OS upgrade. Jenni Prell working with mentor to re-install.		
SKYRAD	Peter Gotseff						EWO 14962	Site Ops double checking IRT configuration, believed correct. Tracker leveld and tracking sun. Radiometer install 23 Jan	Site Ops	23-Jan
SONDE	Donna Holdridge	Installed						Test launch successful. 88hPa with 5.1 m/s ascent rate. Mentor notified. Observer training next week	DMF confirm data situation	22-Jan
TSI	Vic Morris	Install Active						Some comms issues being resolved	Site Ops/Mentor/SDS	24-Jan
VCEIL25K	Vic Morris									
VDIS	Mary Jane Bartholomew	Troubleshooting						inside warming up for pre-deployment checks and testing to begin on Jan 20. - having comms problem with Clock Generator. Mentor contacting vendor	Mary Jane Bartholomew	None given
XSACR	Nitin Bharadwaj	Installed						Altering mount for compressor pump, will replace. DMF update on data flow	Site Ops	24-Jan
XSACRSPEC	Nitin Bharadwaj	Installed						Altering mount for compressor pump, will replace. DMF update on data flow	Site Ops	24-Jan
TWP.S1										
Instrument Title	Instrument Mentor									
AOSCCN100	Anne Jefferson	Install Scheduled 27-31						AOS Met, PDU, KVM switch, and computers powered on at mentors request. Site Ops troubleshooting comms between AOS and M1	Site Ops/SDS (Matt S)	23-Jan
AOSCPCF	Anne Jefferson	Install Scheduled 27-31						AOS Met, PDU, KVM switch, and computers powered on at mentors request. Site Ops troubleshooting comms between AOS and M1	Site Ops/SDS (Matt S)	23-Jan
AOSHTDMA	Anne Jefferson	Install Scheduled 27-31						AOS Met, PDU, KVM switch, and computers powered on at mentors request. Site Ops troubleshooting comms between AOS and M1	Site Ops/SDS (Matt S)	23-Jan
AOSHUMIDGR	Anne Jefferson	Install Scheduled 27-31						AOS Met, PDU, KVM switch, and computers powered on at mentors request. Site Ops troubleshooting comms between AOS and M1	Site Ops/SDS (Matt S)	23-Jan
AOSMET	Anne Jefferson	Install Scheduled 27-31						AOS Met, PDU, KVM switch, and computers powered on at mentors request. Site Ops troubleshooting comms between AOS and M1	Site Ops/SDS (Matt S)	23-Jan
AOSOZONE	Anne Jefferson	Install Scheduled 27-31						AOS Met, PDU, KVM switch, and computers powered on at mentors request. Site Ops troubleshooting comms between AOS and M1	Site Ops/SDS (Matt S)	23-Jan
AOSPSAP3W	Anne Jefferson	Install Scheduled 27-31						AOS Met, PDU, KVM switch, and computers powered on at mentors request. Site Ops troubleshooting comms between AOS and M1	Site Ops/SDS (Matt S)	23-Jan

Appendix I
Product Delivery Workflow



AMF Product Delivery, Final Refinements and Commissioning — Workflow

Jimmy Voyles *Process Logic—Courtesy of Nicki Hickmom*

Appendix J
Teleconference Announcement

From:	Sivaraman, Chitra
To:	Voyles, Jimmy W; Douglas Sisterson; Hickmon, Nicki L.; mtritsche@anl.gov; Stuart, Cory G.; David Swank; Martin, Tonya J; Keck, Nicole N; Adam Theisen; Ermold, Brian D; Koontz, Annette S; Shamblin, Stefanie H.; jonathan.gero@ssec.wisc.edu; srs@bnl.gov; Laurie Gregory; Flynn, Connor J; rlcoulter@anl.gov; Morris, Victor R; Bharadwaj, Nitin; Karen Johnson; jprell@anl.gov; Donna J. Holdridge; Gary.Hodges@noaa.gov; mcadeddu@anl.gov; bartholomew@bnl.gov; Widener, Kevin B
Subject:	Call reminder at 8 AM PST
Date:	Wednesday, January 22, 2014 8:37:47 AM

All,

This is a reminder that we have a data coordination call for Finland AMF tomorrow at **8 AM PST** (not at 7 AM PST)

Phone number to call.
* USA Toll-Free: 866-528-1882
Conference ID:948672

Thank you,
Chitra

TMP Data Coordination Call Meeting Minutes 1/16/2014

Attendees:
Brian, Annette, Adam, Connor, Mary Jane, Nicki, Kevin, Nicole, Jimmy, Cory, David, Doug, Mike, Vic, Donna, Nitin, Stefanie, Tonya and Chitra

Action items:
- Nicole will create a spreadsheet that includes columns for action items and due date. Work with Nicki to determine who has the action and the due date.
- Nicki to send Jimmy a list of data flowing and who is responsible.
- Nicki ask Rich to let Tonya know if it is a mpl or mplpolfs.
- Cory to setup site access for Mary Jane and provide IP address.
- Cory will ask Tim to make the TSI OS upgrade a priority.
- Tonya will request mentor calibration files.
- Annette update the mwacrspec filter.
- Nitin to provide test data to Annette for the sacr ingest update.
- Stefanie adding archive metadata by the end of the week.

Meeting minutes:
TMP installation is going well, on-site staff are bringing up instruments and letting mentors know, check with mentors for last minute updates. Nicki will start reporting a weekly status today.

SDS is enabling collections as the instruments come on-line. TMP has been added to the daily SDS report.

Nicole and Nicki will work together to create a spreadsheet for site startup that includes action items, who is responsible, and due dates.

AMF deployments are not getting Internet access early enough to allow mentors to configure systems.

There will be no internet access on the Ron Brown or Antarctica. Please keep this in mind for configuration after TMP has ended September 13 and we begin prepping for Ron Brown.

Instruments on-line
- sacr -1.9 format, Nitin working on configuration, request collections later today. The sacr ingest for the new format has not been released to production.
- mwacr - collecting
- kazr - collecting
- rain
- mwr11 -collecting
- vceil -collecting
- bsrwp
- mpl -collecting, mplpolfs?

Instruments off-line
- skyrad/gndrad/met - need new ip addresses
- bbss - on-line 1/20-1/21, Donna would like to verify configuration before first launch. Purchased new regulator, getting helium, requires de-icing at night. WMO number assigned, working with Brian on WMO.
- hsrl/assit to be setup 1/18
- maeri - calibrations needed
- aos - end of the month

lat/lon information available in BCR-01988. If your instrument needs specific lat/lon, that will need to be measured. Some instruments require lat/lon on the instrument, some in the ingest.

The TSI computer doesn't appear to be upgraded but VCEIL is. Cory will ask Tim to work on the TSI upgrade.

No firewall or SDS issues.

Some data arriving on the DMF, Tonya request mentor calibrations today.

Ingest developers will process on development before DMF processes data.

Annette has processed kazr, mwacr, mwr. Needs an update to the mwacrspec.

Brian will process vceil data.

Nicole will prepare a spreadsheet.

DQ is ready.

Archive is ready, adding metadata by the end of the week.

A configuration change is required not the ceilometer, Vic may not be able to do the change remotely, may need on-site help.

Mary Jane needs site access, Cory to get site access for Mary Jane and IP address.

We have 4 radars collecting spectra data. Nitin would like to keep an eye on the data volumes.

Chitra

From: <Sivaraman>, "Sivaraman, Chitra" <chitra.sivaraman@pnnl.gov>
Date: Wednesday, January 15, 2014 5:27 PM
To: Jimmy Voyles <jimmy.voyles@pnnl.gov>, Douglas Sisterson <dlsisterson@anl.gov>, "Hickmon, Nicki L." <nhickmon@anl.gov>, "mtritsche@anl.gov" <mtritsche@anl.gov>, "Stuart, Cory G." <cstuart@anl.gov>, David Swank <dswank@ops.sgp.arm.gov>, Tonya Martin <tonya.martin@pnnl.gov>, Nicole Keck <nicole.keck@pnnl.gov>, Adam Theisen <atheisen@ou.edu>, Brian Ermold <Brian.Ermold@pnnl.gov>, Annette Koontz <Annette.Koontz@pnnl.gov>, "Shamblin, Stefanie H." <hallsd@ornl.gov>, "jonathan.gero@ssec.wisc.edu" <jonathan.gero@ssec.wisc.edu>, "srs@bnl.gov" <srs@bnl.gov>, Laurie Gregory <gregory@bnl.gov>, Connor J Flynn <connor.flynn@pnnl.gov>, "rlcoulter@anl.gov" <rlcoulter@anl.gov>, "Morris, Victor R" <Victor.Morris@pnnl.gov>, "Bharadwaj, Nitin" <Nitin.Bharadwaj@pnnl.gov>, Karen Johnson <kjohnson@bnl.gov>, "jprell@anl.gov" <jprell@anl.gov>, "Donna J. Holdridge" <djholdridge@frontier.com>, "Gary.Hodges@noaa.gov" <Gary.Hodges@noaa.gov>, "mcadeddu@anl.gov" <mcadeddu@anl.gov>, "bartholomew@bnl.gov" <bartholomew@bnl.gov>, "Widener, Kevin B" <Kevin.Widener@pnnl.gov>
Subject: Re: Data coordination call for Finland AMF

This is a reminder that we have a data coordination call tomorrow at 7 am PST.

Phone number to call.
* USA Toll-Free: 866-528-1882
Conference ID:948672

Thank you,
Chitra

On Jan 14, 2014, at 2:38 PM, "Sivaraman, Chitra" <Chitra.Sivaraman@pnnl.gov> wrote:

Dear All,
The AMF data from Finland has started to flow to the DMF. After consultation with Jimmy, Jim and Nicki, we have decided to have a data coordination call with the key stakeholders. You are invited to attend this conference call to ensure that the Finland AMF is a success. If you are unable to attend the call, please send a delegate or provide an update ahead of time.

The conference call will start at 7 AM PST on Thursday, January 16, 2014. Please let me know if you have any questions.

Phone number to call.
* USA Toll-Free: 866-528-1882
Conference ID:948672

Thank you,

Chitra Sivaraman
Manager, ARM Data Products
Pacific Northwest National Laboratory (PNNL)

Appendix K
Data Product Tracking Table

Instrument	STATUS	Collections	DMF Ingest	Comments
BSRWP*	Install Active	Enabled	Disabled	Shutdown for repair & pack. BSRWP-online but not connecting. I was told the vendors need to get in to make updates to software. I have seen no progress or indication that this is being done. That doesn't mean it is not, just I have not noticed any changes to running software or displays.
WBRG	Install Active	Enabled	Disabled	Need IP from SDS, OS Upgrade wiped LoggerNet settings, rebuild in progress - Up and collecting data
TSI	Not Installed	Disabled	Disabled	Instrument hardware not in the field yet. Needs reIP Vic has asked for assistance in changing IP's. We are ready to assist as needed. Expectation is TSI will be online week of Jan 20-24.
MFRSR	Install Active	Disabled	Disabled	Confirming correct latitude bracket with mentor -need to install sensor in the field. Tables and mounts are ready. We believe we have all the latitude brackets we need. Expectation is MFRSR will be online week of Jan 20-24.
HSRL	Not Installed	Disabled	Disabled	Mentor flights delayed from Alaska, install delayed 2 days
MET		Disabled	Disabled	Met module PDU issues. Site Ops troubleshooting with Mentor and SDS system is installed on tower and ready but module is down. Expectation is MET will be online week of Jan 20-24
Tracker	Install Active			No power or comm
2DVD	Not Installed			No power or comm
CSPHOT				Running new power cable & installing 12V power supply in OPS Van
SONDE	Not Installed	Disabled	Disabled	
MWR3C	Not Installed	Disabled	Disabled	Waiting go from mentor
MAERI	Install Active			Install tests scheduled is having HVAC issues. It cannot seem to stay warm enough. We also need to ccomplish 3rd blackbody calibrations. That is on hold until the HVAC issue is resolved.
ASSIST	Not Installed	Disabled	Disabled	Mentor flights delayed from Alaska, install delayed 2 days

MWR11	Installed, waiting ingest	Enabled	Requested	Mentor has requested the instrument be moved. Issue with 23GHz channel. Site Ops will move Feb 21 Finland day.
VCEIL	Installed, waiting collections	Requested/ Enabled?	Disabled	Waiting confirmation of collections
SKYRAD	Install Active	Disabled	Disabled	Working with SDS on IP, PDU issues. New system to technicians - training sent pre-deployment characterization file to mentor. Waiting approval to install radiometers. New IRT blower and mount will need to be installed and new cables built. Expectation is SKYRAD will be online week of Jan 20-24.
GNDRAD	Install Active	Disabled	Disabled	Working with SDS on IP, PDU issues. New system to technicians - training Began pre-deployment characterization but PDU in MET module shut down. We were unable to connect to it locally after SDS re-IP'd all systems. Working with SDS to resolve issue. There is an issue with PIR Case readings that needs to be resolved. Expectation is that GNDRAD will be online week of Jan 20-24.
KAZR*	Installed and running	Enabled	Enabled	
KAZR SPEC**	Installed and running	Enabled	Enabled	
AOS CCN100*	Not Installed	Disabled	Disabled	Install begins Jan 27 due to IOP conflicts
AOS MET*	Not Installed	Disabled	Disabled	Install begins Jan 27 due to IOP conflicts
AOS Humidgr*	Not Installed	Disabled	Disabled	Install begins Jan 27 due to IOP conflicts
AOS Ozone*	Not Installed	Disabled	Disabled	Install begins Jan 27 due to IOP conflicts
AOS Psap3w*	Not Installed	Disabled	Disabled	Install begins Jan 27 due to IOP conflicts
AOS HTDMA	Not Installed	Disabled	Disabled	Install begins Jan 27 due to IOP conflicts
AOS UHSAS	Not Installed	Disabled	Disabled	Install begins Jan 27 due to IOP conflicts
AOS CPCF*	Not Installed	Disabled	Disabled	Install begins Jan 27 due to IOP conflicts
Disdrometers	Not Installed	Disabled	Disabled	Not originally included, mentor indicates will be sent to AMF2 after calibration work
MPLPOLFS*	Install, waiting ingest	Enabled	Requested	DMF waiting confirmation from mentor on FS datastream
MWACR*	Installed and running	Enabled	Enabled	
MWACR SPEC**	Installed and running	Enabled	Enabled	

KA SACR	Installed and running	Enabled	Enabled	
X SACR	Installed and running	Enabled	Enabled	

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