ARM Radar Network Update

ARM/ASR Joint User Facility/ PI meeting
May 2-6, 2016
ARM radar network

C-Band
(λ~5.3 cm)

Ka-Band
(λ~8.5 mm)

X-Band
(λ~3.1 cm)

W-Band
(λ~3.1 mm)

Radar cross-section of water drops

KAZR
Ka-Band ARM Zenith Radar
@ (SGP, NSA, ENA, AMF2, and AMF3)

MWACR
Marine W-Band ARM Cloud Radar
@ (AMF2)

WACR
W-Band ARM Cloud Radar
@ (AMF1)

Ka/W-SACR
Ka/W-Band Scanning ARM Cloud Radar
@ (SGP, NSA, ENA, AMF1, and AMF3)

X/Ka-SACR
X/Ka-Band Scanning ARM Cloud Radar
@ (SGP and AMF2)

X-SAPR
X-Band Scanning ARM Precipitation Radar
@ (SGP, NSA, and ENA)

C-SAPR
C-Band Scanning ARM Precipitation Radar
@ (SGP and AMF3)
Radar status overview

- updates on radar.arm.gov
  - Currently manually done on a weekly basis
  - Information is only about radar and not about data
Status:
Radar Engineering and Operations

- Integration of AMF2 SACR with Marine pedestal AL-4034 completed
  - ability to deploy SACR on a ship.
  - Ability to deploy in high wind conditions
- Installation and operations of SACR and KAZR in McMurdo station.
  - Radar installation at AWARE was a success.
  - Radars are operational and capturing data.
  - Data has passed ingest, and entered review.
- Calibration Grooming Alignment (CGA) at AMF3 (Oliktok)
  - October 11-24, 2015
  - 7.2 TB of data collected
  - Several opportunities for improvement were identified
Status:
Radar Engineering and Operations

- KAZR2 Baseline mode defined (August 2015)
  - Two modes: High sensitivity (A) and low sensitivity (B)
  - Two pulses: Chirp (~4 \( \mu \)s) and burst (~0.4 \( \mu \)s)
  - Implemented both at ENA and AMF3
  - Reduces the impact of saturation at lower ranges
Status: Radar Engineering and Operations

- XSAPR transmitters in stable operating mode
  - Engineering modifications were done to the transmitter to obtain reliable and stable operations.
  - The modifications were also tested with new magnetrons
- XSAPR control processor upgrade ongoing
  - Analog servo amplifiers upgraded with Ethernet controlled digital servo amplifiers
  - Antenna position recording upgraded to optical absolute encoders from Syncros
  - Control processor to be upgraded with Vaisala RCP8 in summer 2016.

New Ethernet driven servo amplifiers installed at SGP I5
Syncros upgraded with absolute optical encoders for position
Status: Radar Engineering and Operations

- SACR upgrades
  - W-SACR RF front end upgraded on all SACRs. This upgrade increases the sensitivity of WSACR compared to the original design and makes it comparable to KaSACR
  - SACR RF units upgraded to be modular making it easier for maintenance and repairs
- SACR and KAZR software upgraded with newer OS. This allow the use of solid-state hard drives on the radar to increase reliability on a moving platform
- AMF1 setup gets a KAZR. KAZR from TWP site has been integrated into AMF1
- AMF1 SACR repaired and upgraded. Preparations underway to ship the system to Ascension Island.
Status: Radar Engineering and Operations

- Radar Training: on-site training was conducted at SGP for the site operators.
- Watchdog for ARM Radar Network Operations (WARNO) design completed with alpha implementation.
- Communication with PIs and end-users improved with Trello. Trello is facilitating discussions on data quality, data usage and scan strategy.
- CSAPR2 installed at SGP with few remaining acceptance tests.
- XSAPR2 installed at SGP with few remaining acceptance tests.
Radar Workshop

- Radar workshop to discuss the keys areas for radars
- Key
  - Reliable operations of the radars
  - Well characterized data: Calibration and uncertainty of observations
  - In-situ measurements for validation and verification
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Develop a pragmatic plan to achieve the goal

- Need to reallocate resources: time and personnel to specific radars.
- Address radars in phases
- There will be radars which are not assigned key resources during a given phase
- There is a dynamic component to the plan. The plan will be modified depending on the nature of the failure.

Things to consider

- ARM strategic plan
- Climatology and seasons
- Future field campaigns
Draft plan:

- Breakout session on 1:45 PM to 4:00 PM on Thursday (Fairfax)
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Thank you