University and Government Radar Overview

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NSF NCAR Radar Technology Community Workshop

The Goals

- Provide an **overview** of current university and government radar facilities (ground-based, scanning, accessible)

- Create an **inventory** of all currently available facilities and their capabilities

  → A living document! Input requested! ***What are we missing? Who is the primary point of contact? Primary webpage?***

Consider for meeting (and beyond) as a **starting point for conversation**!

- Requestable? Capabilities? Educational opportunities? Software? Guidance for others? Ideas for collaboration? Sharing of resources? Combining available datasets for broader applications?

Methodology / limitations

- Web searches, some genAI tools (ChatGPT, scite.ai), + follow-up emails for clarification
- Limited to the United States
- “University”: managed or owned (possibly administered / maintained by others)
- “Government”: includes federal, state, and local governments
- Primary function: weather observation
- Excluded:
  - Radars decommissioned or inactive more than 5 years ago
  - Data not publicly accessible
  - Not currently CIF or NCAR

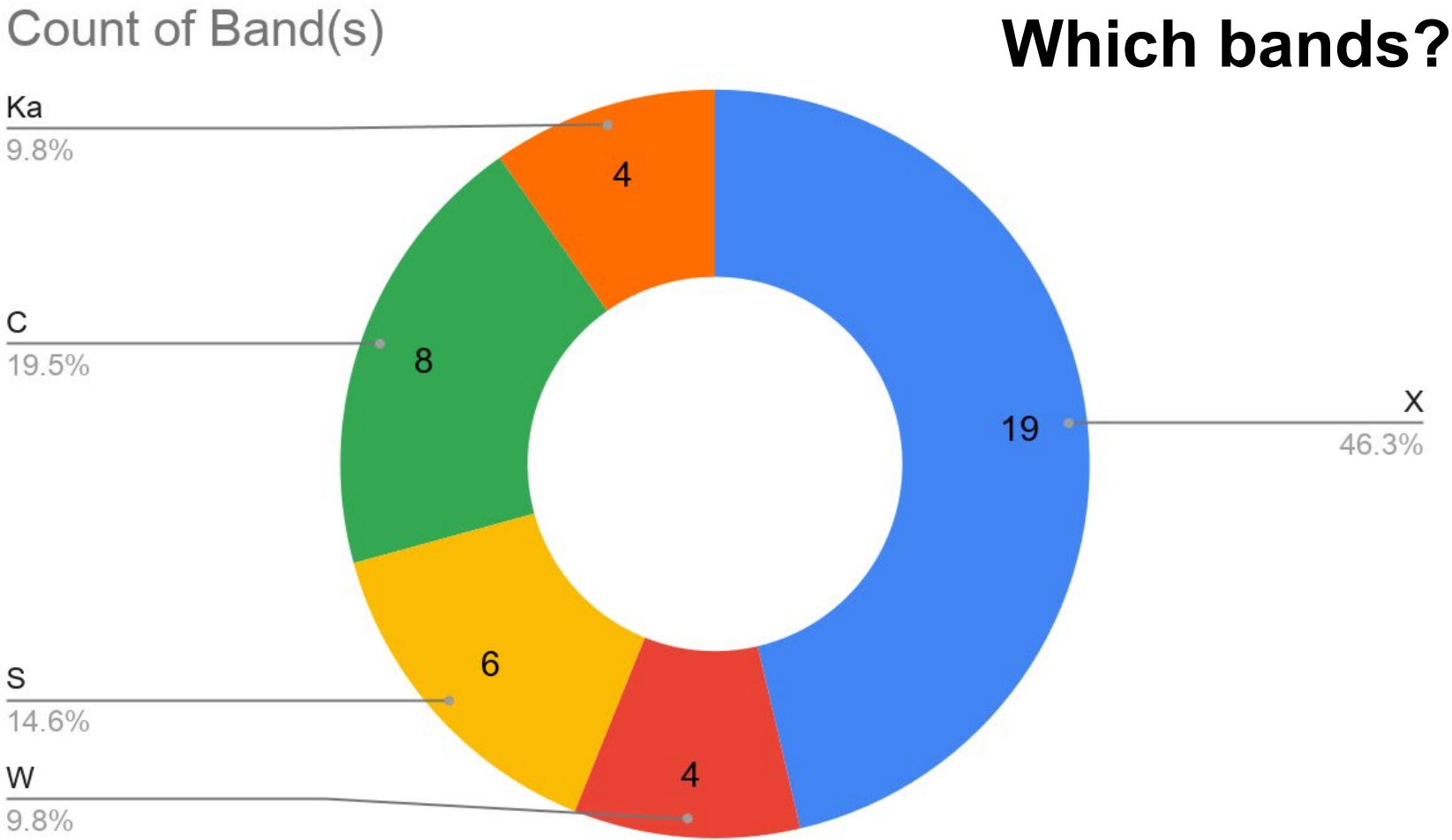
Summary of University radars

Total radars identified: 41

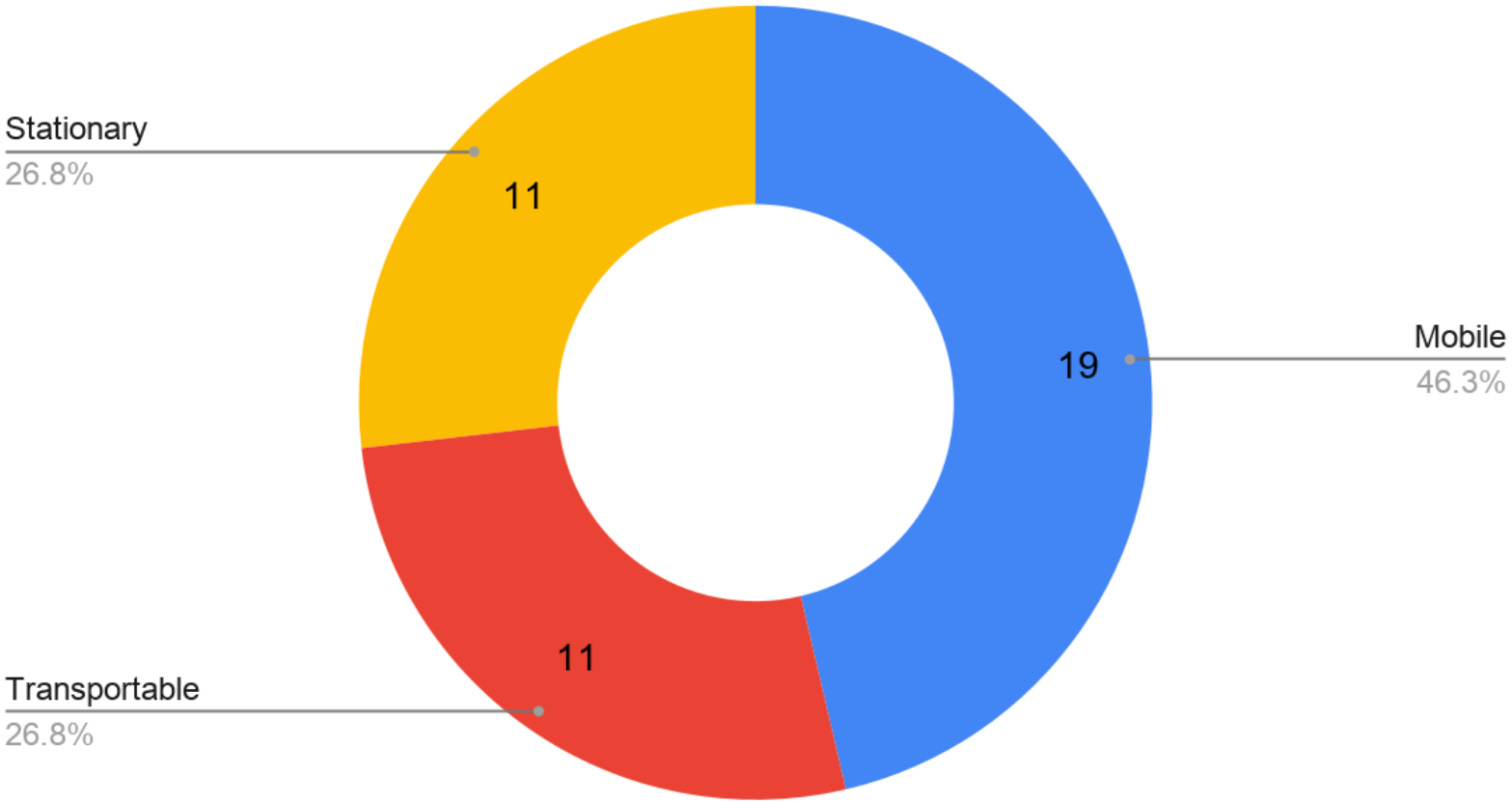
From 14 institutions

- Presently operating: 32
- In development: >= 4 (OU PAIR, KaRVIR x 2, OSU Skyler-III)

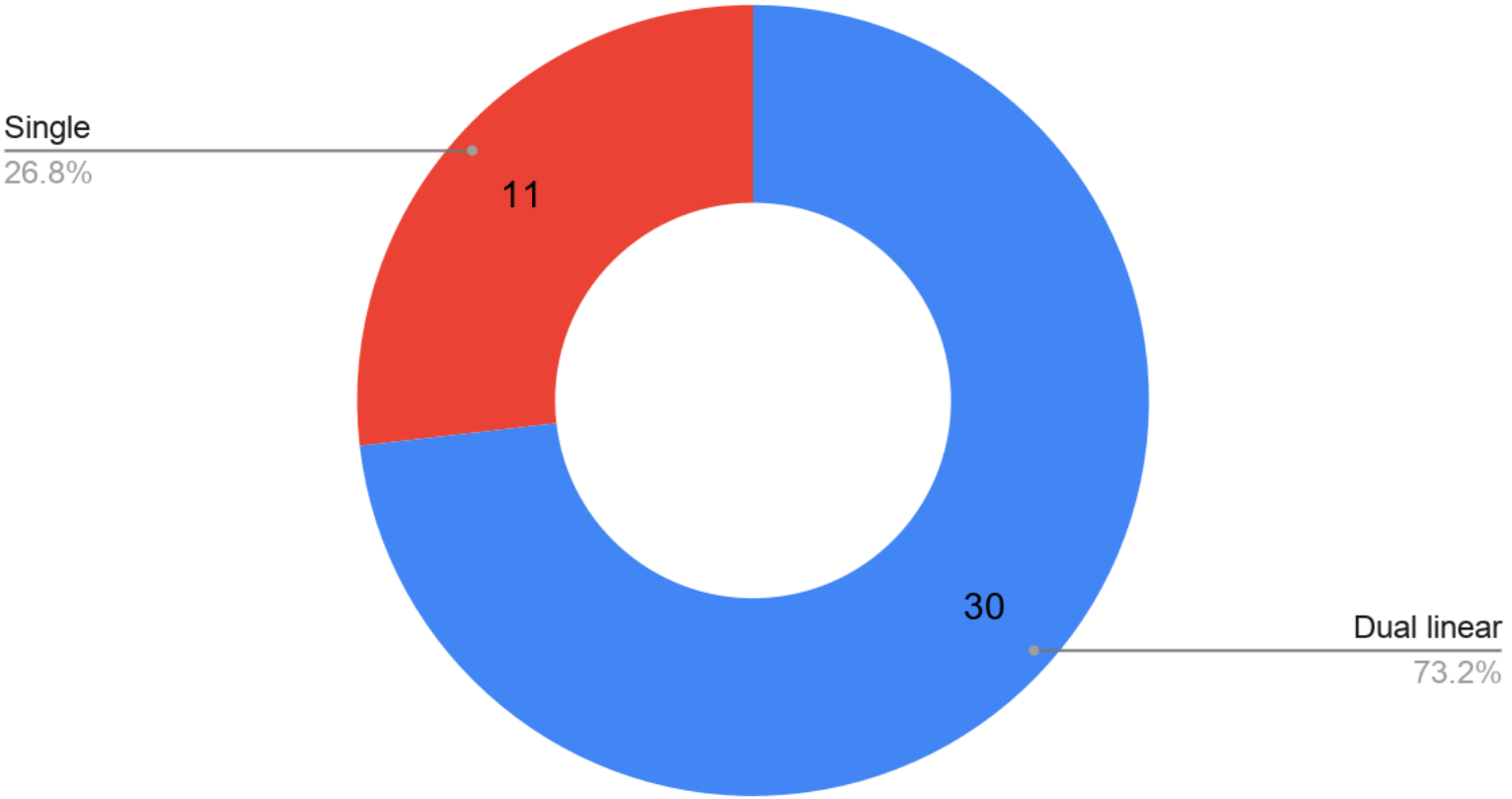
Which bands?



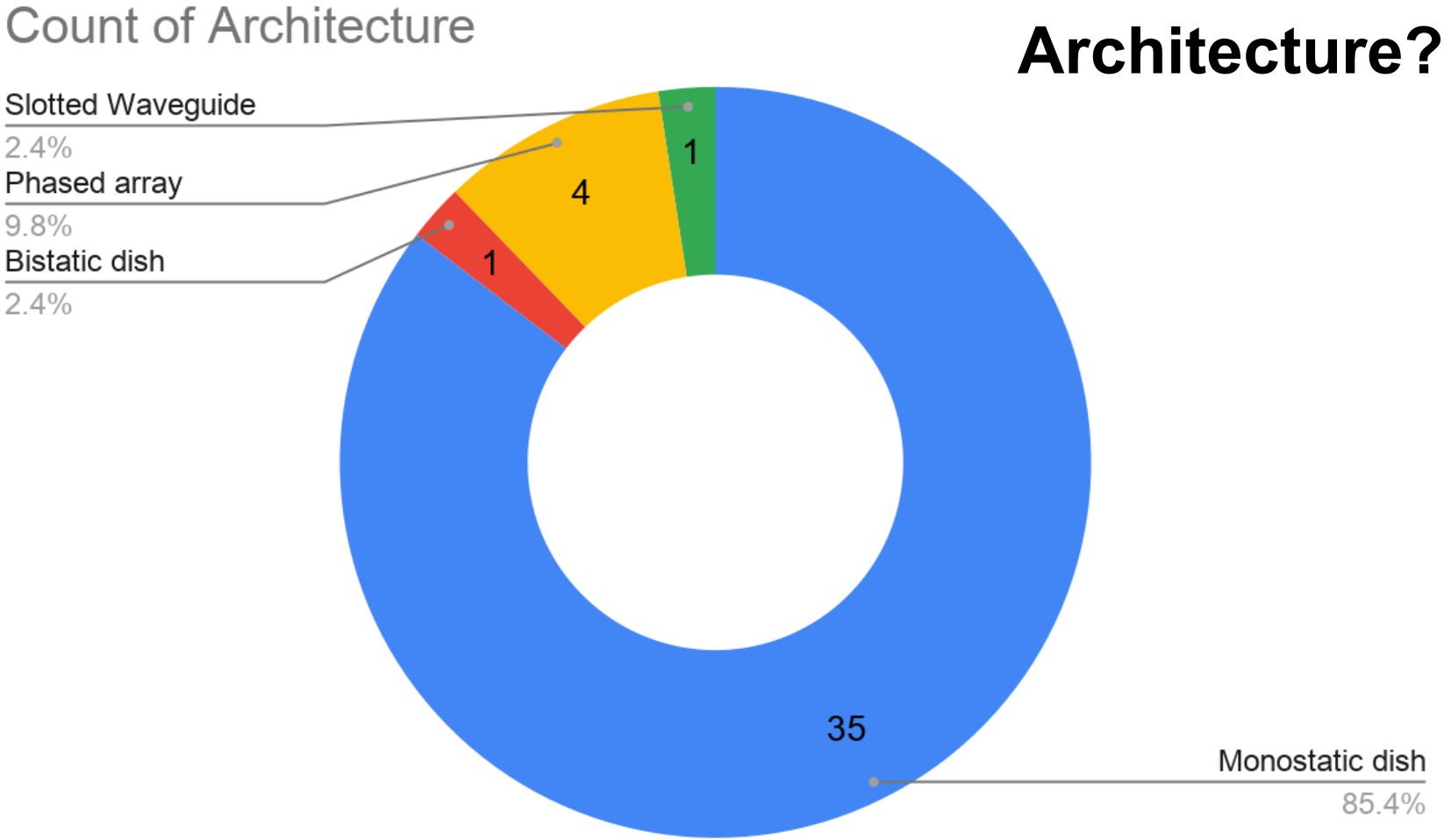
Mobile?


Count of Mobility
Stationary
26.8%
11
Mobile
46.3%
19
Transportable
26.8%
11

Polarimetry?

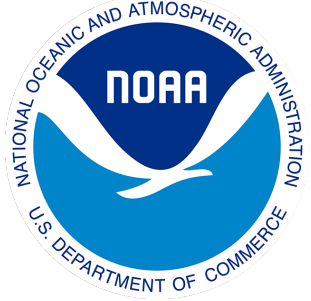


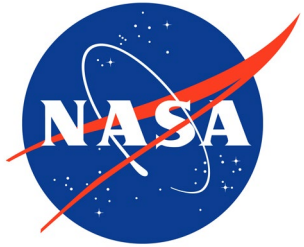
Architecture?



“Government” radars

- **Total models identified: 17**, many with multiple installations (e.g., TDWR has 53)
- Total installations with accessible data identified: 254
- All presently have at least one installation operating
- Many military radars (USFA, USN, Army etc.) not publicly accessible





North Central Texas Council of Governments

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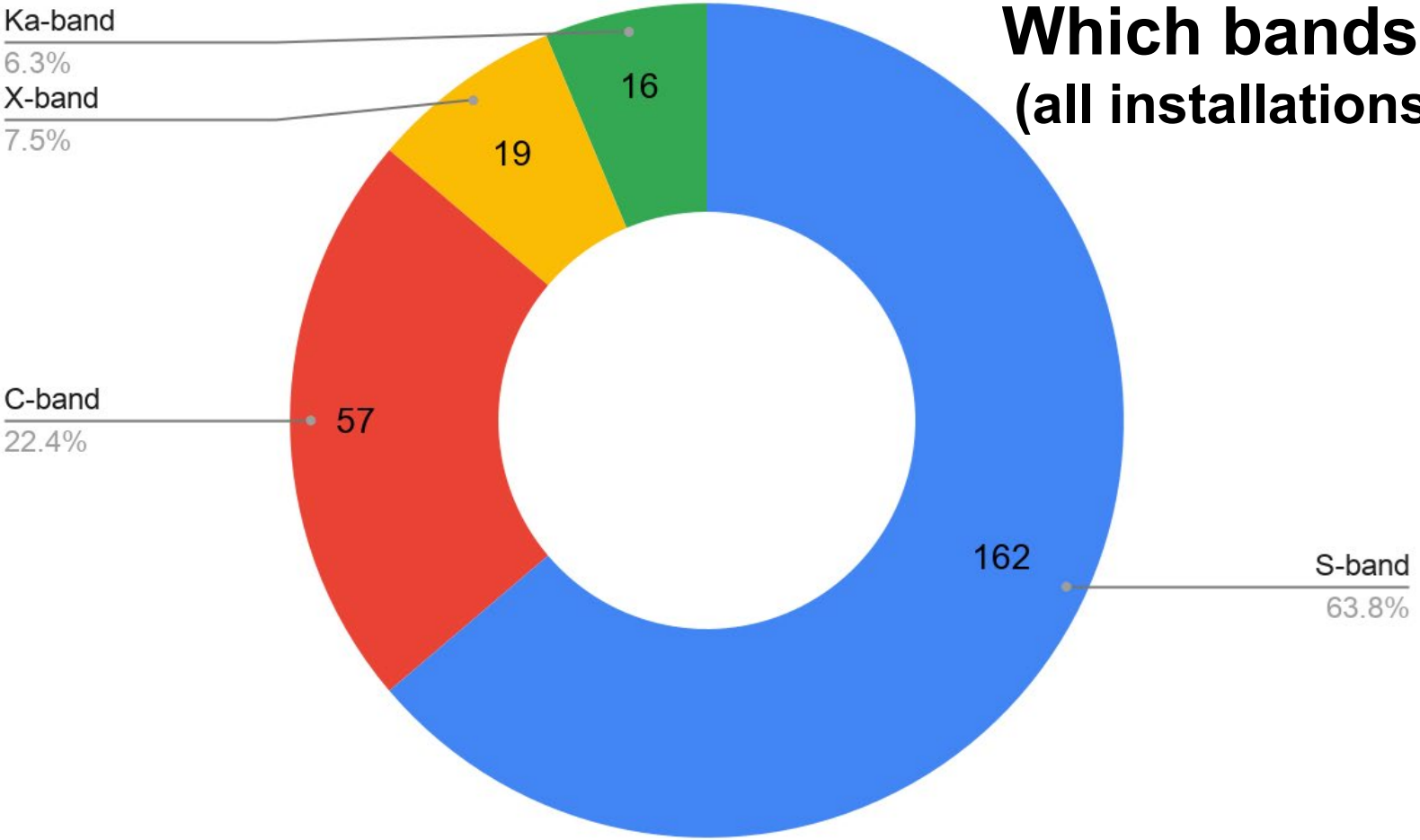
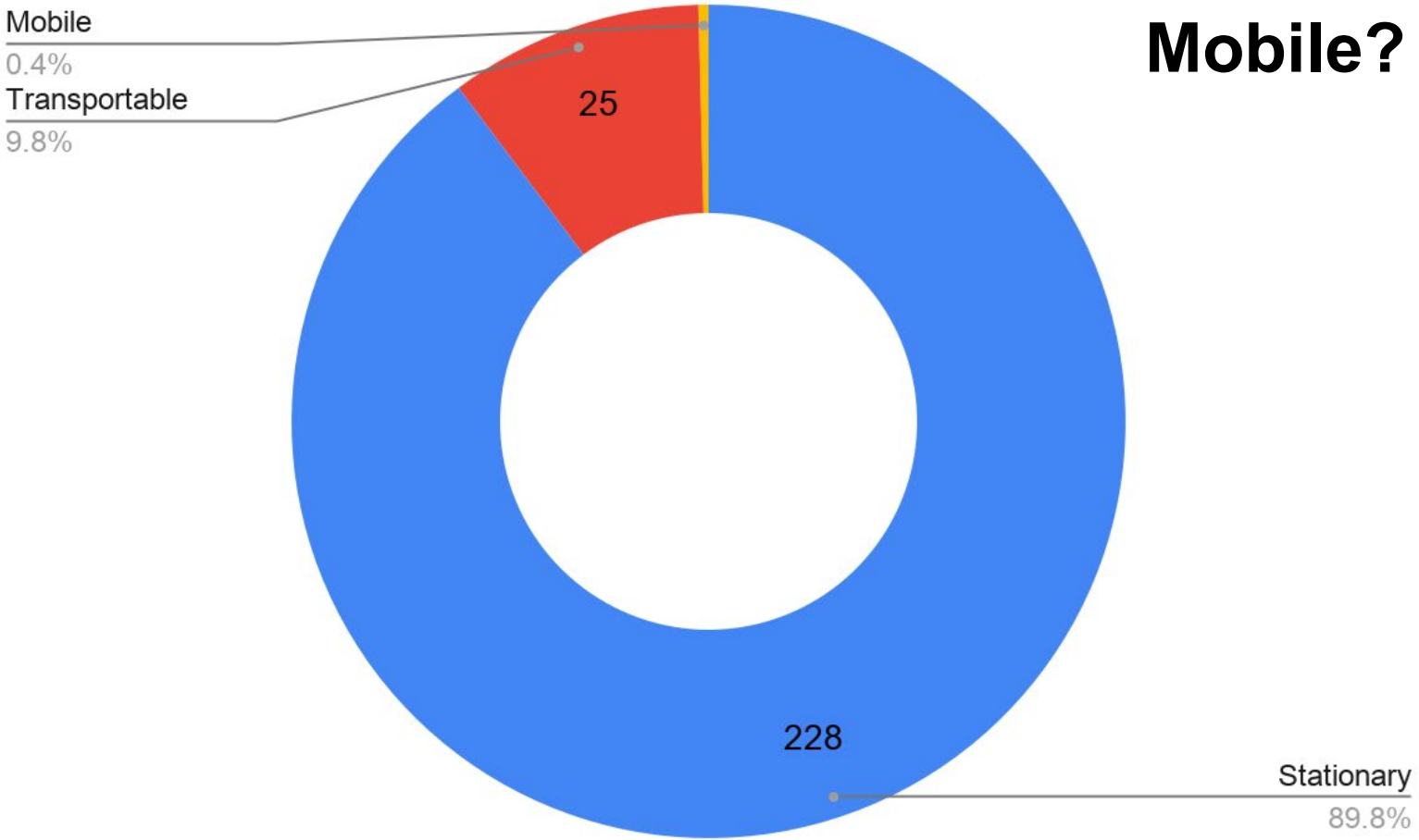
AFRL
AIR FORCE RESEARCH LABORATORY

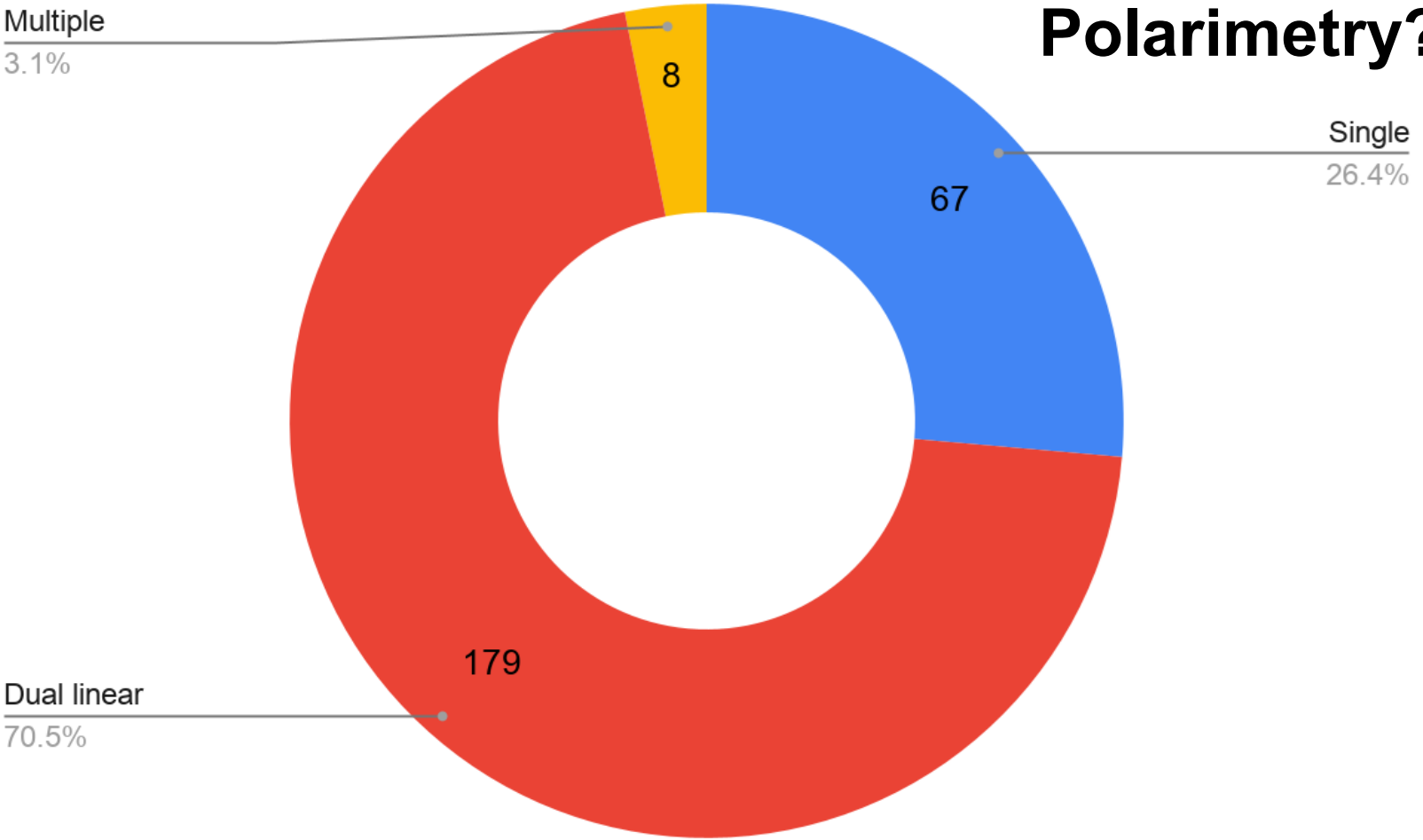
Which bands?
(all installations)



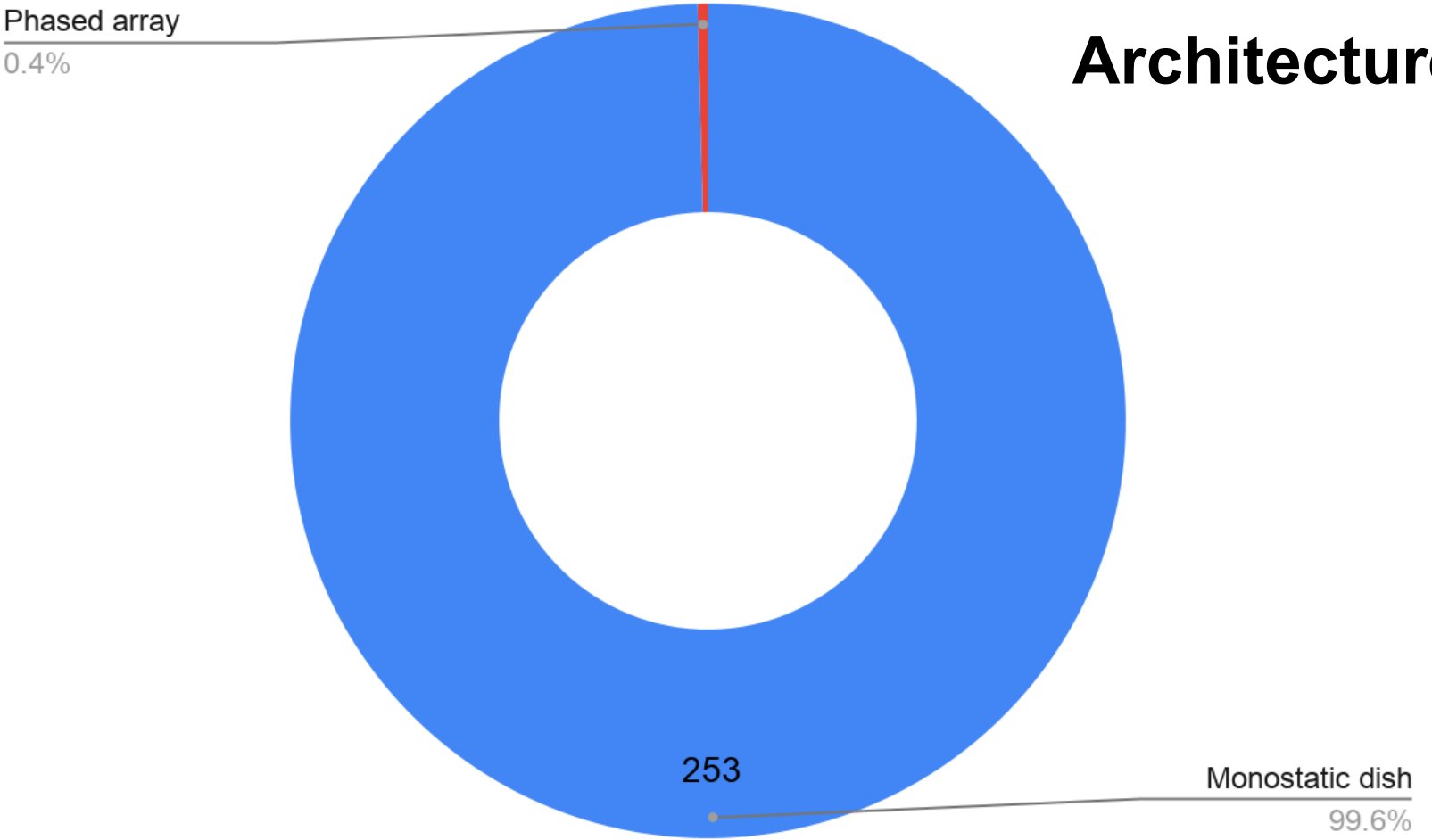
Mobile?



Polarimetry?



Architecture?



DOE ARM: A closer look

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ARM Radar Inventory by Site
(Numbers note frequency in GHz)

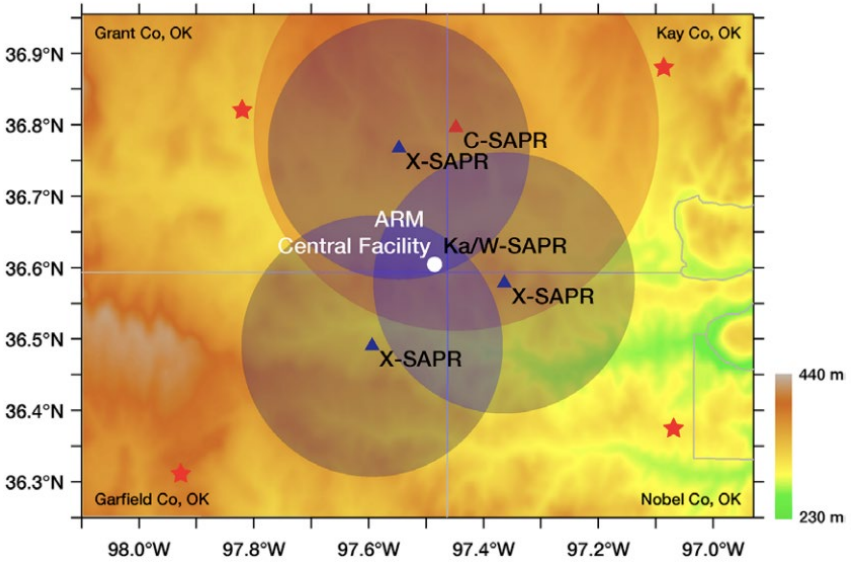
Site	CSAPR	XSAPR	KAZR	Ka/WSACR	Ka/XSACR
SGP	–	9.35	35	–	–
NSA	–	9.35	35	–	–
ENA	–	9.5	35	35.3/94.0*	–
AMF1	5.7	–	35	–	–
AMF2	–	–	35	–	–
AMF3	5.7	–	35	–	35.3/9.71
Spares	–	–	–	35.3/94.0	2 x 35.3/9.71
	–	–	–	35.3/94.0	

* ENA Ka/WSACR to be retired in FY26.

AMF3: Bankhead

Thiesen et al. 2025 FY26 ARM Radar Plan

Transportable
(AMF vs longer-term locales i.e., SGP)



Kollias et al. [2020];
https://doi.org/10.1175/BAMS-D-18-0288.1

DOE: A closer look

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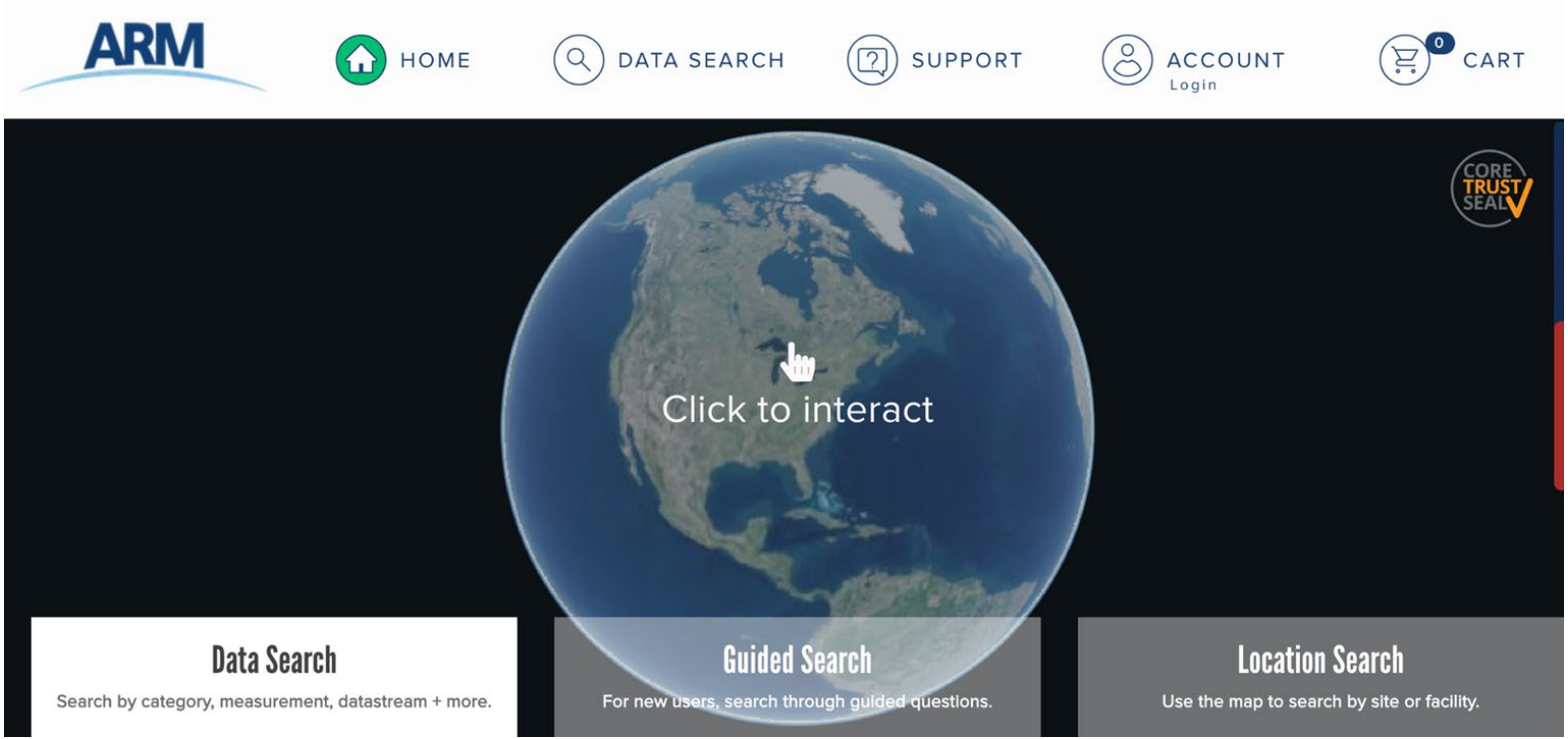
Data Discovery: https://adc.arm.gov/discovery/



NSSL ATD - Proof of Concept

Advanced Technology Demonstrator

S-band, stationary, dual-linear, phased-array since 2019

More from NOAA NSSL:
https://www.nssl.noaa.gov/tools/radar/atd/

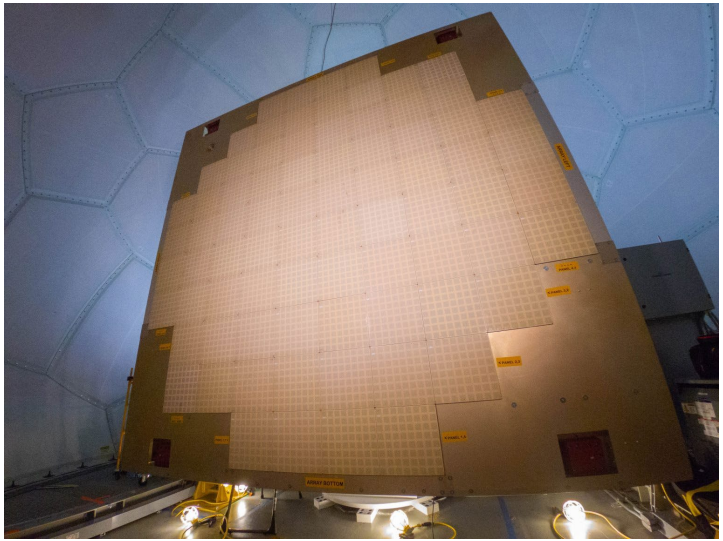
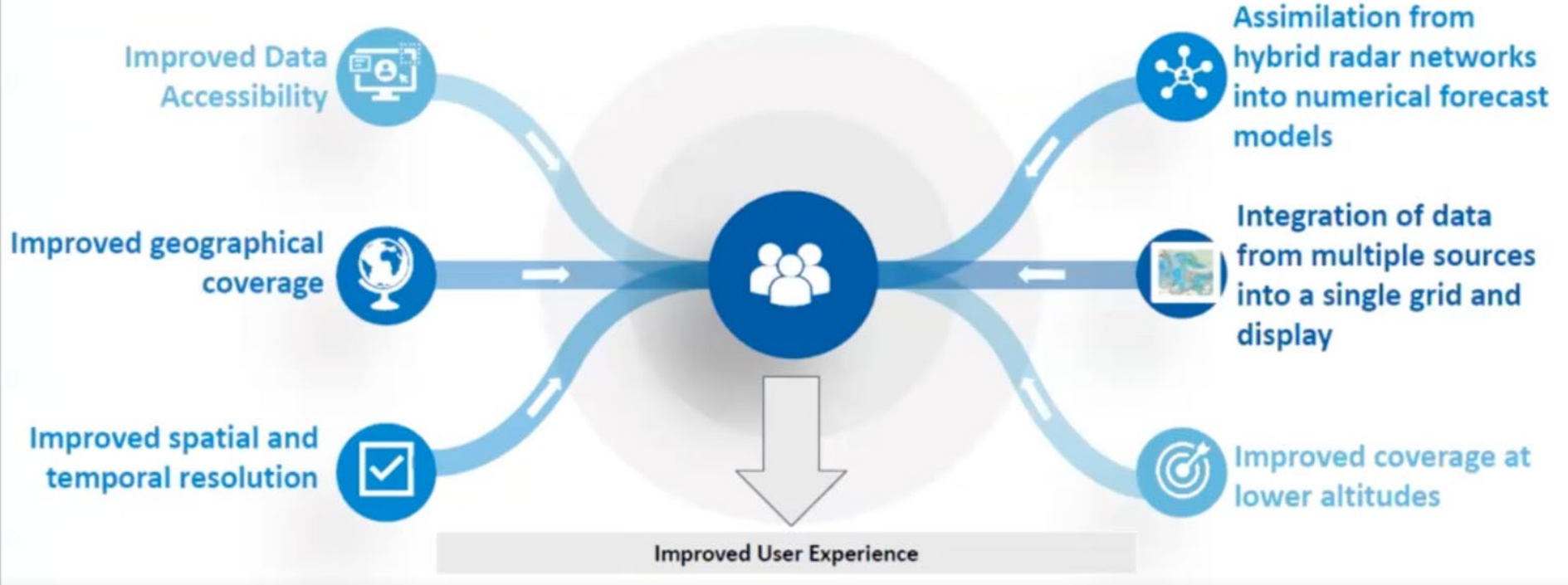


Photo Credit: NOAA NSSL

Radar Next - Paradigm Shift



Radar Next Program's Notional Timeline

Initiation and Planning

2023 - 2028

Define user needs and identify capability gaps, focus on fulfilling needs by refining requirements; identify and analyze alternative solutions

Design and Development

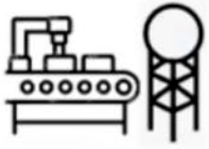
2027 - 2032

Finalize requirements and begin procurement

Production

2032 - 2040

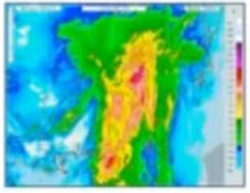
Begin production and achieve initial operational capability



Operations and Maintenance

2035 - Beyond

Achieve full operational capability and operate and maintain the Radar Next System



Note: These dates are notional and subject to change as Program evolves.

Facilities represented with posters (tonight's reception)

- NSF FARE: CSU SEA-POL, NCAR S-Pol, UAH FARM
- Steven's Institute of Technology SHARP
- Stony Brook multi-frequency radars
- U Mass Amherst Skyler-1
- CASA Dallas-Fort Worth
- USDA ARS Mobile radar
- OU RaXPol, KaRVIR, PAIR
- U. Wyoming WCR and KPR

What's next?

- A variety of radars available (transportability, wavelength, architecture, etc.), some coming online soon
- How can we fill in the current inventory, keep it up to date, and improve access?
- What are some low hanging fruit in the collaboration and education spaces?
- How can we better make (re)use of available datasets toward broader scientific applications and training, and how can we build off of discoverable repositories (e.g., NSF NCAR EOL, DOE ARM)?