

Discussion Item:
Scale Mismatches

**What is it, and
What should we do about it?**

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What is 'Scale Mismatch?'

Time and/or spatial (FOV) sampling differences between

- Instruments and/or
- Their use/comparison (e.g., in climate models)

Can cause

- An 'inconvenience' to intercomparisons
- Wreaks havoc in multi-sensor retrievals
- Paralysis in climate model comparisons

It's an old issue (not just ARM)

Need to get a better handle on it, esp. for CLOUD

- Tenuous clouds --> heterogeneity effects larger
- Radiative footprint sizes per wavelength
 - e.g., Visible scattering Vs. IR Vs. MWR

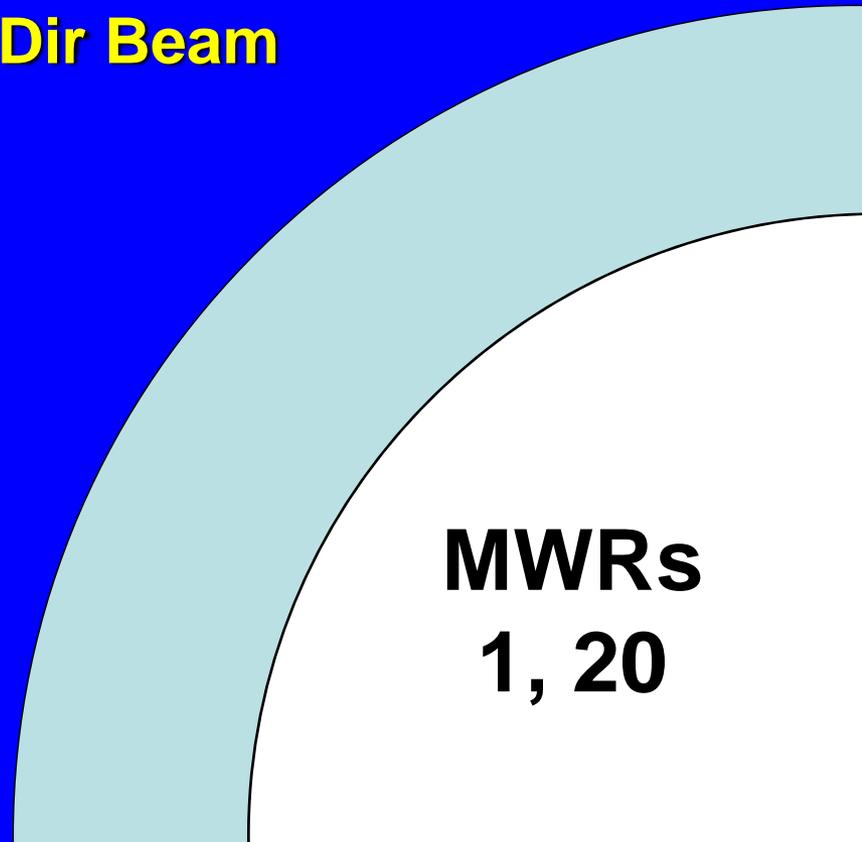
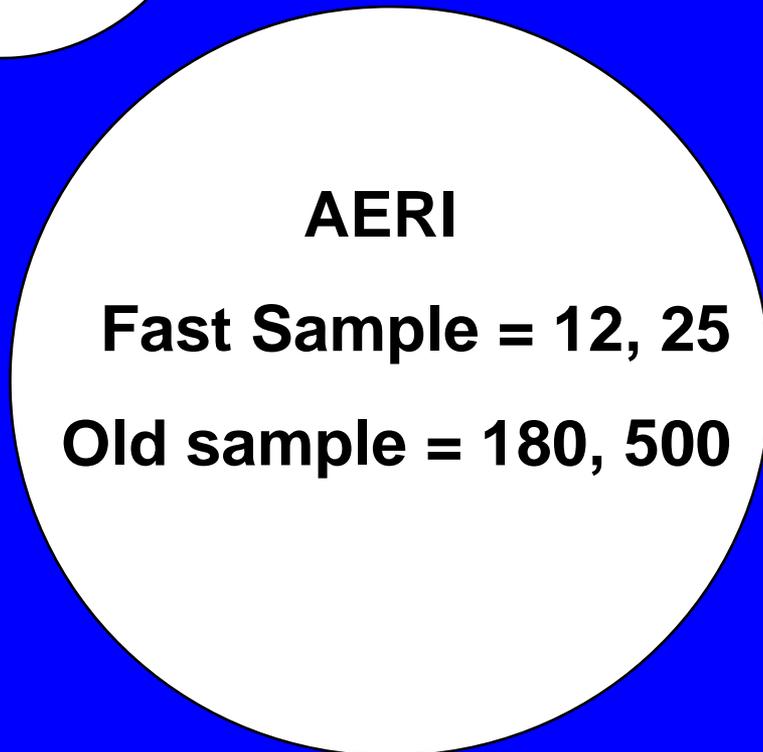
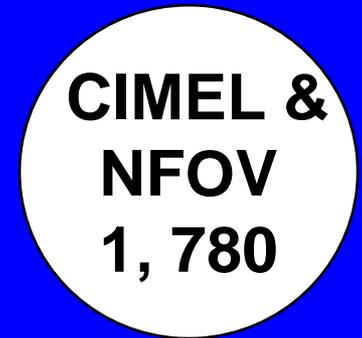
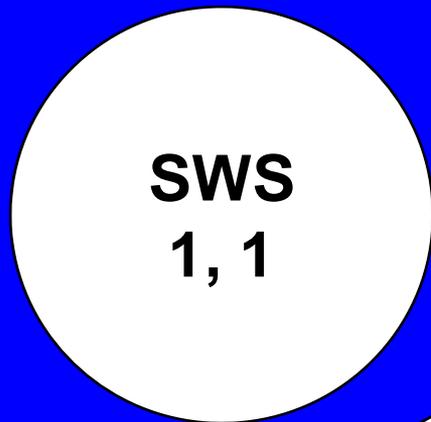
Examples within ARM

(Not just an ARM issue, but ARM must frequently combine different data types)

	FOV	Footprint Diameter at at 2 km (m)	Dwell Time (sec)	Report Frequency (sec)
MMCR	0.31°	11	1 (1.1)	3-4 (BL mode)
	0.19 (SGP)	7	1	3-4 (BL mode)
MWR	4.4, 5.7°	150/200	1	20
AERI	2.6°	90	180	540
			12	20-30s w/ 60-120s (BB gaps=20sec)
NFOV	1.2°	40	1	1
CIMEL	1.2°	40	1 @9s for 1.2m	780-900
SWS	1.4°	50	1 (300 ms)	1
MFRSR	Dir., Hem.	20/3000	1	20
MPL	0.0057°	0.2	30	30
Raman	0.017, 0.115°	0.6, 4.0	9.5	10

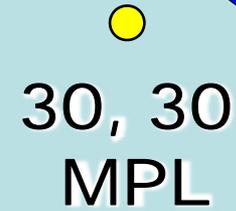
Relative Footprint Sizes at 2 km

Times (in secs): Dwell time, Revisit period



Relative Footprint Sizes at 2 km - RESCALED

Times (in secs): Dwell time, Revisit period



Cloud Paradigms

Sampling time and FOV effects in each

Infinite

& Plane-parallel => 'Single valued'

Overcast

w/ Sub-pixel scale variability

Cloud property PDF

Broken

PDF w/ Cloud fraction

Multi-Layered and/or Broken

??



Cloud Reminders



Different Types of Scale Mismatch

1) Retrievals (Instruments)

- Single instrument
 - Time averaging period relative to phenomena
- Combination of multiple instruments
 - Time matching & time averaging & FOVs

2) Validations (Products)

“Inconvenient” --> Averages and/or PDFs

3) Consumers (Cloud/Climate model validations)

- What do modelers need?
- IF had ‘instantaneous’ retrievals, would that provide additional info on cloud processes?
- Or are PDFs for model validation good enough and all they want?

Questions/Primer for Discussion

Importance to YOU that scale mismatch is to:

Retrievals (Instruments)?

Validation (Products)?

Modelers (Customers)?

What shall we do?

PI-level to some extent, but can we help?

Suggest modifying sampling periods?

Suggest 'standard' procedures of how to handle it?

Thoughts?

Comments?

