



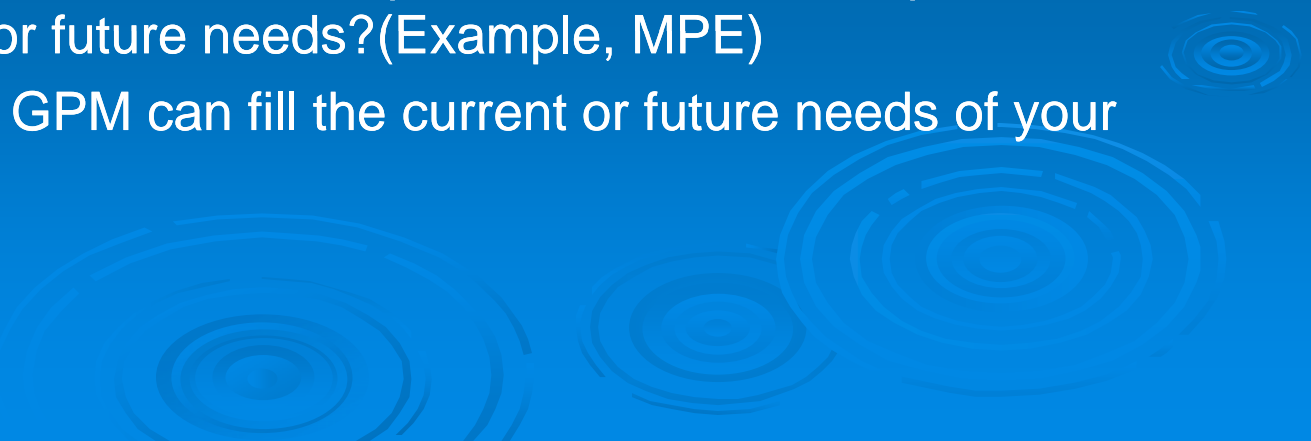
# Observational Requirements and Gaps: Working Group Discussion Report

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# Observational Requirements and Gaps Discussion

- Title of the requirement – Is this requirement part of any NOAA Goal Program requirements listed in CORL. If not, why?
    - Please work with one of the programs to include in CORL
    - Have you identified the key attributes that are important to this requirement?
  - List current capabilities and their attribute values
    - What are the limitations of the current capabilities?
  - List the future capabilities and their attribute values
  - Are there any multi-sensor techniques that are in development to meet the current or future needs?(Example, MPE)
  - How do you think GPM can fill the current or future needs of your program?
- 



# NOAA Programs with Precipitation-related Requirements (From NOAA's Cons. Obs. Req. List (CORL))

<b>Precipitation Amount</b>	<b>EC – Coastal and Marine Resources</b>	<b>1</b>
	<b>WW – Integrated Water Forecasting</b>	<b>1</b>
	<b>WW – Local Forecasts &amp; Warning</b>	<b>1</b>
	<b>WW - Coasts, Estuaries &amp; Oceans</b>	<b>2</b>
	<b>WW - Weather, Water Sci &amp; Tech Infusion</b>	<b>R</b>
<b>Precipitation Rate</b>	<b>CL – Climate Observation &amp; Monitoring</b>	<b>1</b>
	<b>CT – Aviation Weather</b>	<b>1</b>
	<b>CT – Surface Weather</b>	<b>1</b>
	<b>WW – Integrated Water Forecasting</b>	<b>1</b>
	<b>WW – Local Forecasts &amp; Warning</b>	<b>1</b>
	<b>WW - Coasts, Estuaries &amp; Oceans</b>	<b>2</b>
<b>Precipitation Type</b>	<b>WW – Weather, water Sci&amp; Tech Infusion</b>	<b>R</b>
	<b>CL – Climate Observation &amp; Monitoring</b>	<b>1</b>
	<b>CT – Aviation Weather</b>	<b>1</b>
	<b>CT – Surface Weather</b>	<b>1</b>
	<b>WW – Integrated Water Forecasting</b>	<b>1</b>
	<b>WW – Local Forecasts &amp; Warning</b>	<b>1</b>
	<b>WW – Coasts, Estuaries &amp; Oceans</b>	<b>2</b>
<b>Radiance: Microwave</b>	<b>WW – Weather, Water Sci &amp; Tech Infusion</b>	<b>R</b>
	<b>MS – Environmental Modeling</b>	<b>1</b>
<b>Precipitable Water: Total</b>	<b>CL - Climate Observations &amp; Monitoring</b>	<b>1</b>
	<b>WW - Local Forecasts and Warning</b>	<b>1</b>

**9 out of 18 NOAA Programs have PPT. related Requirements**

# Observational Requirements and Gaps Discussion

**Q1. Title of the requirement – Is this requirement part of any NOAA Goal Program requirements listed in CORL. If not, why?**

- **Please work with one of the programs to include in CORL**
- **Have you identified the key attributes that are important to this requirement?**

- Radar Reflectivities
- Precipitation Occurrence
- Products:
  - Ocean Surface Wind Speed – from GMI (NOAA unique product)
  - Regional requirements for IWF (APRFC, CBRFC, WGRFC)
  - Latent heat profiles (prod)
  - Hydrometeor profile (prod)
  - Freezing level

Ancillary information needed to estimate precip. Accurately:

- Total column water vapor and winds at 1km level
- Minimum no. of rain gauges for verification and bias adjustment



# APRFCC Precipitation Requirements



Observation Requirement	T/O	Geographic Coverage	Vertical Resolution		Horizontal Resolution		Measurement Accuracy		Measurement Precision		Sampling Interval		Data Latency	
Alaska-Yukon precip Accumulations	T	Regional	NA		4	km	1	mm/h	1	mm/h	1	hr	1	hr
	O	Regional			1	km	0.25	mm/h	0.25	mm/h	1	hr	0.5	hr
AK-Yukon precip rates	T	Regional	NA		4	km	1	mm/h	1	mm/h	1	hr	1	hr
	O	Regional			1	km	0.25	mm/h	0.25	mm/h	1	hr	0.5	hr

Comments:  
 Latency reduction is of prime importance  
 There will be issues with snow/frozen ground



# GOALS Precipitation Requirements



Observation Requirement	T/O	Geographic Coverage	Vertical Resolution		Horizontal Resolution		Measurement Accuracy		Measurement Precision		Sampling Interval		Data Latency	
Precip. Accumulation	T	Regional		NA	4	km	1	mm/h	1	mm/h	1	hr	0.5	hr
	O	Regional		NA	1	km	0.5	mm/h	0.25	mm/h	5	min	0.25	hr
Precip occurrence $\geq 0.25\text{mm}$	T	Regional		NA	4	km	10	%	5	%	3	hr	1	hr
	O	Regional		NA	1	km	5	%	1	%	1	hr	0.25	hr
Snow Accumulation	T	Regional		NA	4	Km	2.5	mm SWE	2.5	mm SWE	24	Hr	1	Hr
	O	Regional		NA	1	Km	2.5	mm SWE	2.5	mm SWE	1	Hr	1	Hr

## Comments:

Latency reduction is of prime importance.

Length of record is of important – ability to relate to longer term products will be key.

There will be issues with snow/frozen ground.



# WGRFC Precipitation Requirements



Observation Requirement	T/O	Geographic Coverage	Vertical Resolution		Horizontal Resolution		Measurement Accuracy		Measurement Precision		Sampling Interval		Data Latency	
Precipitation accumulations	T	CONUS+MX	NA		4	km	1	mm/h	1	mm/h	1	hr	10	m
	O	CONUS+MX			1	km	0.25	mm/h	0.25	mm/h	1	hr	5	m
Precipitation accumulations	T	CONUS+MX	NA		4	km	1	mm/h	1		24	hr	30	m
	O	CONUS+MX			1	km	0.25	mm/h	0.25		24	hr	30	m
Precipitation rates	T	CONUS+MX	NA		4	km	1	mm/h	1	mm/h	15	min	10	m
	O	CONUS+MX			1	km	0.25	mm/h	0.25	mm/h	15	min	5	m

Comments:

# Observational Requirements and Gaps Discussion

***Q2. &Q4: List current and future capabilities and their attribute values (Multi-sensor techniques included)***

- Observing Systems: Satellites, Radars and Rain gauges
- IMS: Current – MPE, Hydroestimator, CMORPH and blended TPW
- IMS: Future - Q2, SCaMPR, Neural Network based algorithms, Numerical Models etc

Note: We will send out a request to participants to list current capabilities





# Observational Requirements and Gaps Discussion

## **Q2. *What are the limitations of the current capabilities?***

- Radar: coverage, bright banding, beam blockage, Z-R relationship
- Raingauge: coverage, quality, variable data latencies and temporal sampling
- Satellite:
  - IR: weak relationship between rainrate and brightness temperature, parallax error
  - MW: Passive: temporal sampling, beam filling, estimation over land and complex surfaces (egs. Frozen land), warm rain detection
- MW-active: narrow swath, expensive
- Challenges: Orographic precipitation estimation, high latitude precipitation estimation

# Observational Requirements and Gaps Discussion

## ***Q3. What are the future capabilities***

- Ground based dual-polarimetric radar
- Multi-phased array radar

### Future Needs:

- MW in Geostationary orbit for diurnal variation (concept)
- Precipitation radar in precessing orbit for climate record quality precipitation



# Observational Requirements and Gaps Discussion

***Q5: How do you think GPM can fill the current or future needs of your program?***

- Light and frozen precipitation in mid-lats
- Can account for diurnal variation
- Can give high quality estimates all over the globe: Improvement is significant in high lats over current capability
- Continuity of current climate quality precipitation record
- Anchor calibration for climate quality data record
- Hurricane forecast: Improved spatial and temporal sampling for hurricane track forecasting

