

AOS Polar Microwave Radiometer

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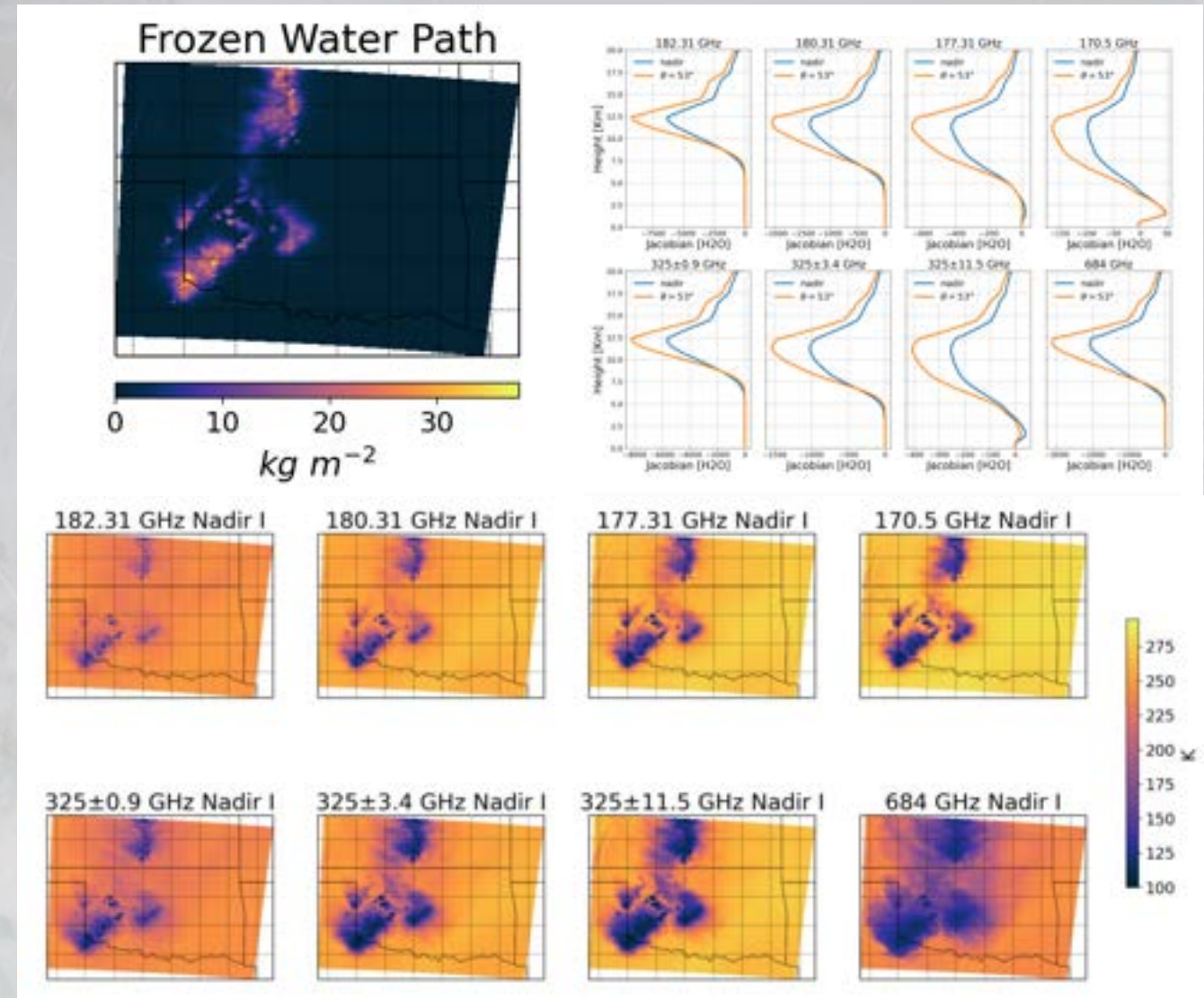
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AOS Reviewed – Not Subject to Export Control

Millimeter- and submillimeter-wave radiances contain significant information related to ice-phase clouds and precipitation

- Ice water path is the driving requirement
 - Baseline: Uncertainty $\leq 100\%$ for IWP $> 80 \text{ g m}^{-2}$
 - Threshold: Uncertainty $\leq 100\%$ for IWP $> 100 \text{ g m}^{-2}$
- Supports precipitation retrievals for radars
 - Additional information for synergistic retrievals
 - Contextual precipitation mapping



Radiometer Traceability



Science Objectives ¹	Geophysical Variable Requirements		Measurements			Instrument (Pending RFP Award)	
	Geophysical Variable	Conditions	Observables	Requirements	Projected Performance	Parameter	Expected Specification
O2. High Clouds: Relate the vertical structure, horizontal extent, ice water path, and microphysical properties of convectively generated high clouds to convective vertical transport and large-scale high clouds to environmental factors.	Ice Water Path (IWP) O2, O3, O4	Range: $>0.08 \text{ kg m}^{-2}$ $[>0.1 \text{ kg m}^{-2}]$ Uncertainty: 100% Effective resolution: $\leq 10 \text{ km}$ $[\leq 20 \text{ km}]$ Swath: $\geq 750 \text{ km}$	Equivalent Blackbody Brightness Temperatures	Horizontal $\leq 20 \text{ km}$ $\leq 20 \text{ km}$	Center Frequencies $89\text{-}113 \text{ GHz} \times 1+$ $183.31 \text{ GHz} \times 3+$ $\text{offset } 1\text{-}11 \text{ GHz}^2$ $325.15 \text{ GHz} \times 3+$ $\text{offset } 1\text{-}11 \text{ GHz}^2$ $640\text{-}700 \text{ GHz} \times 2^3$	NEAT TBD	
				Sampling Nyquist, $\leq 10 \text{ km}$ $\leq 10 \text{ km}$			
Swath $\geq 750 \text{ km}$ 750 km							
O3. Convective Processes: Relate vertical motion within convective storms to their a) cloud and precipitation structures, b) microphysical properties, c) local environment thermodynamic and kinematic factors such as temperature, humidity, and large-scale vertical motion, and d) ambient aerosol loading.	Precipitation Rate Profile (PR.z) O2, O3, O4	Range: $0.1\text{-}10 \text{ mm hr}^{-1}$ (nadir) $1\text{-}15 \text{ mm hr}^{-1}$ (swath) $[0.1\text{-}5 \text{ mm hr}^{-1}]$ Uncertainty (sfc): $<100\% \text{ @ } 1 \text{ mm hr}^{-1}$, $<50\% \text{ @ } 10 \text{ mm hr}^{-1}$ Resolution: $\leq 2 \text{ km}$ [$\leq 2.5 \text{ km}$] horiz. $\leq 300 \text{ m}$ (500 m) below (above) 2.5 km vert. Swath: $>12 \text{ km}$		Scan type Cross-track Cross-track	Bands and Radiometric Uncertainty $89/113 \text{ GHz: } 1 \text{ K}$ $183 \text{ GHz: } 1.0 \text{ K}$ $325 \text{ GHz: } 2 \text{ K}^4$ Dual-polarized $640+ \text{ GHz: } 2 \text{ K}^4$	$89\text{-}113: < 1\text{K}$ $183.31: < 1\text{K}$ $325.15: < 2\text{K}$ $640\text{-}700: < 2\text{K}$	Calibration Stability TBD
				Bands and Radiometric Uncertainty			