Table 4: Verification strategy matrix

		Verification strategy				
		Enhanced Measurement Site		MSC Network	Aircraft	
Product	Description	Remote sensing	In-situ		Remote sensing	In-situ
Calibrated Radar Reflectivities	Radar power with appropriate calibration factors	cloud radar to assess the impact of those clouds missed by the CPR due to sensitivity				
Cloud Geometric Profile	Cloud mask applied to Z profile based on SNR and Spatial and vertical continuity considerations; Convert to cloud top classification using ECMWF pressure and temperatures; assigns MODIS Scene Variability designation	cloud radar for cloud top, cloud thickness and to assess vertical sub pixel variability; Lidar for cloud base, thickness in some cases, vertical sub pixel variability	Temperature and relative humidity from radiosonde		cloud radar for cloud top, cloud thickness and to assess vertical sub pixel variability; Lidar for cloud base, thickness in some cases, vertical sub pixel variability	
Cloud Type	Cloud type is determined using the cloud mask and is based upon empirical relations of Zmax vs temperature for different cloud types height above ground, spatial persistence height of Zmax cloud thickness cloud top temperature	cloud radar for Zmax and spatial persistence	Temperature and relative humidity from radiosonde Surface cloud observations	Surface cloud observations		
Cloud Liquid Water Content	Uses Z profile to estimate LWC and cloud droplet effective radius In daytime portion of orbit, uses Z profile and optical depth to estimate LWC, cloud droplet number density, and cloud droplet effective radius Assumes Rayleigh scattering and lognormal distribution of droplets	cloud radar for differential attenuation measurements to infer presence of LWC Microwave radiometer to get liquid water path Lidar and radar combination to infer LWC amounts			cloud radar for differential attenuation measurements to infer presence of LWC Lidar and radar combination to infer LWC amounts	Direct particle sampling probes
Cloud Ice Water Content	Uses Z profile to estimate IWC and cloud particle effective radius In daytime portion of orbit, uses Z profile and optical depth to estimate IWC, cloud number concentration, and cloud particle effective radius Assumes a modified gamma distribution of ice crystals Accounts for Mie scattering and ice density	cloud radar polarization parameters (Kdp, Zdr) related to infer presence of IWC Lidar and radar combination to infer IWC amounts			Lidar and radar combination to infer IWC amounts	Direct particle sampling probes
Precipitation Occurrence	Zmax in lower radar gate and path integrated attenuation Z max threshold for precipitation (note in polar region it is acknowledged that this does not work effectively)	King City C-band Polarization radar	POSS, video disdrometer Surface Observations	NRP radars, Surface Observations, POSS		Direct particle sampling probes
Precipitation type	Temperature profile in lowest 2 km and existence of bright band	King City C-band Polarization radar	POSS video disdrometer	Surface Obs		Direct particle sampling probes
Rain amount	Z profiles corrected for attenuation, Mie scattering AMSR radiances to give precipitation water path Surface echo strength to give path integrated attenuation constraint	King City C-band Polarization radar	POSS, rain gauges, video disdrometer	NRP radars, rain gauges, POSS		
Snow amount	Z profiles corrected for attenuation, Mie scattering AMSR radiances to give ice water path	King City C-band Polarization radar	POSS, hot plate, video disdrometer	NRP radars		
Cloud phase	Z and lidar profiles, MODIS radiances to discriminate ice, liquid, mixed phase	Cloud Radar Polarization parameters (Kdp, Zdr) Lidar backscatter				Direct particle sampling probes
Cloud Microphysics	Z and lidar profiles, optical depth, MODIS radiances to give droplet size profiles, number concentrations	Lidar and radar combination			Lidar and radar combination	Direct particle sampling probes