

Research WG									
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Action Id	Item	Summary	Lead	What to Do	Expected Completion	Actual Completion	Status (open, in progress, closed)	Status as of December 2019	
A.RWG.2018.1	High Latitude Precipitation	Develop methods to improve high latitude (cold region) precipitation (quantity, phase, PSD, etc.);	A. Behrangi, C. Kummerow, H. Meng, L. Milani, D-B. Shin	<ul style="list-style-type: none"> Explore what exist in Decadal survey Explore what is needed (e.g., combination of multi-frequency radars? CubeSat?) ICE-POP (2018) is now available. Adding a summary of the data sets and a link to the data to IPWG data sets. ICE-POP together with OlympeX Field Campaign, OceanRAIN, and maybe EVS IMPACT needs to be explored. Exploring independent methods (e.g., GRACE, CloudSat, EarthCARE, etc.) Encourage closure of snow between snowfall, SWE, and other water budget components 	2020-06-01		open	<p>ALI BEHRANGI: (1) We compared observed SWE with snowfall accumulation over CONUS and assessed consistency/closure of daily and monthly snow accumulation for snowfall, the results are in the upcoming IPWG special issue. (2) we also published a paper in J climate on using GRACE to revisit gauge undercatch correction methods. CHRIS KUMMEROW: Started by comparing snowfall and SWE from operational AMSR products. Closure is non-existent. A paper is being finalized and will be published before June meeting.</p>	
A.RWG.2018.2	Exploitation of several mature data sets to aid in precipitation research and validation		C. Klepp, A. Behrangi, H. Meng, C. Kummerow	<ul style="list-style-type: none"> Develop common observation data table (under IPWG website) for over ocean precipitation validation and retrievals. Quality control is an important research item Encourage development of snowfall algorithms over ocean, coast, and sea ice to meet user needs Investigate snow over/ near sea ice, encourage cross-program support to advance the state of frozen precipitation (e.g. move away from single sensor thinking) Make an explicit statement to CGMS in support of OceanRAIN Further exploitation of GPM/CloudSat sensors/products 	2020-06-01		open	<p>ALI BEHRANGI: (1) CloudSat is being used to revise GPCP in high latitudes, (2) work is in progress for assessing GPCP, and other precipitation products over sea ice. A poster was presented in PHM. CHRIS KUMMEROW: Continue to wrk with C. Klepp, Brenda Dolan and John Haynes (CloudSat algorithm team) to assess consistency between in-situ DSD from OceanRain and CloudSat products. Plan to use that to establish climatology of high latitude ocean</p>	
A.RWG.2018.3	Orographic and shallow precipitation		Shoichi Shige, Huan Meng, L. Milani, P. Kirstetter	<ul style="list-style-type: none"> Continue developing methods to evaluate the effect of different particle size distributions (PSD) on microwave radiative transfer Exploring physical relations between microwave signatures and each hydrometeor type. Improving microphysical schemes by comparing simulated and observed microwave signatures (collaboration with microphysics experts) 	2020-06-01		open	<p>CHRIS KUMMEROW: re-structuring GPROF database to use Orographic Index (amount of water vapor that condenses if air mass is lifted over terrain) as an ancillary data source by which to partition a-priori database. MILANI: (1) GPM sensors showed that PMW can provide clear signatures of intense shallow convective snowfall events; ongoing research is focusing on identifying and possibly solve algorithms' retrieval issues.</p>	
A.RWG.2018.4	Considering different cloud microphysics in radiative transfer calculation and precipitation estimation		Yeji Choi, Dong-Bin Shin, David Duncan, Ian Adams		2020-06-01		open		
A.RWG.2018.5	Uncertain emissivity and surface backscatter over heterogeneous surfaces remains a problem for over land precipitation retrieval		Joe Turk, Nai-Yu Wang, Sarah Ringerud, Veljko Petkovic	<ul style="list-style-type: none"> Foster new techniques to incorporate non-oceanic surface properties in precipitation retrievals and data assimilation observation operators Encourage algorithm development that handles uncertainty estimation across surface and environmental conditions 	2020-06-01		open	<p>SARAH RINGERUD: Emissivity from GPM retrievals and land surface characteristics are being tested as passive algorithm inputs/constraints over land. Paper to be submitted in early 2020.</p>	
A.RWG.2018.6	Lack of standardized/comprehensive assessment of snowfall		L. Milani, H. Meng, Ryan Gonzalez, C. Kummerow, A. Behrangi, P. Kirstetter	<ul style="list-style-type: none"> Organize a focused IPWG working group (e.g., to report in IPWG-10 in 2020) for snowfall assessment: retrieval, evaluation, (i.e., Lisa?) 	2020-06-01		open	<p>CHRIS KUMMEROW: Our work on snow closure indicates that SWE products such as PRISM, GLOBsnow and CMC, along with analysis from MERRA and ERA are sufficiently superior to current microwave precipitation estimates that they could form a basis for 1st order comparisons for global snowfall. LISA MILANI: (1) The idea of creating a specific WG for snowfall assessment is still valid, many participants to the IPWG-9 "research" WG felt the need to report and discuss snowfall related research open issues and results in a smaller and more focused group.</p>	
A.RWG.2018.7	Exploit high spatiotemporal sampling of multispectral VIS/IR from new generation of Geostationary satellites		Bob Kuligowski, Ali Behrangi, Joe Turk, Nai-Yu Wang, Dong-bin Shin, P. Kirstetter	<ul style="list-style-type: none"> Foster Integration efforts between MW and IR community to advance more physically based precipitation retrievals and understanding of storm dynamics Develop more interaction with ICWG for tying cloud and precipitation properties, focusing on case studies 	2020-06-02		open		