Toward a Broad Scope Assessment of Global Precipitation Products

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Report #1 edited by Z.S. Haddad and R. Roca

The GEWEX Data Assessment Panels (GDAP) program is in the process of planning a round of new assessments. Following discussions from the IPWG-8/ISSWM-5 meeting at Bologna in 2016 and the GEWEX SSG meeting in February 2017, Rémy Roca (GDAP-Chair) took the initiative to start a community consultation on the possibility of conducting a Joint GEWEX-GDAP/CGMS-IPWG precipitation assessment that would start in 2018 and produce a completed assessment by 2021. As this initiative was met with enthusiasm from both communities, Dr. Roca and Ziad Haddad (IPWG co-chair) convened a scope-definition meeting right after the annual NASA Precipitation Measurement Missions (PMM) science team meeting in San Diego, on 21 October 2017. The participants in the meeting were:

Dr. Ali Behrangi, ali.behrangi@jpl.nasa.gov
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Dr. Chris Kidd, chris.kidd@nasa.gov
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Dr. Graeme Stephens, graeme.stephens@jpl.nasa.gov
Dr. F. Joe Turk, joseph.turk@jpl.nasa.gov

Prior to the meeting, Dr. Turk had circulated a copy of the 2008 GEWEX assessment report prepared by A. Gruber and V. Levizzani, as well as the review paper by Tapiador et al, 2012, on methods, datasets and applications for global precipitation measurement. Also prior to the meeting, Dr. Hirohiko Masunaga pointed to the ongoing GDAP precipitation assessment that he and Dr. Chris Kummerow are taking charge of, offering to work closely to coordinate future efforts with the broader-scope assessment proposed here.

At the meeting, each of the participants presented his perspective on the would-be scope and approaches for the assessment. Following a discussion of the specific elements that the proposed assessment could have, a broad framework was agreed, and leads for each of the elements were identified, drawing from the participants present at the meeting as well as those who had expressed an interest but were unable to be present in person. The following listing summarizes the proposed elements and corresponding proposed leads (some of whom have not yet agreed to their role):

1- Standard quality assessment - leads: T. Kubota and H. Masunaga:
   catalogue with summary descriptions; inter-comparisons; regime-sorted statistics; quality + traceability (including WDAC doc+ FIDUCEO);
2- Uncertainty – leads: J. Turk and P. Kirstetter:

uncertainty metrics (detection, estimation); intrinsic uncertainty (sensitivity); algorithm limitations;

3- Consistency – leads: A. Behrangi and Dong-Bin Shin:
water and energy budgets consistency; regional budgets; ancillary datasets (description and assessment for robustness);

4- Evaluation of analysis data from numerical weather models – leads: H.-J. Kim and Gianpaolo Balsamo:
performance metrics; model scales (spatial and temporal);

5- Ground-based data – leads: C. Kidd and Steve Durden:
sources (including weather radar where available); calibration and uncertainty characterization of sources, including polarimetric ground radars;

6- Validation at weather scales in regions without ground measurements – principal lead Ralph Ferraro:
consistency with other remotely sensed data at weather scales; consistency with reanalysis

7- Variability and trends – principal lead: Francisco J. Tapiador:
sub-seasonal, seasonal, annual, inter-annual; extremes and the ability to capture them faithfully; correlation with climate indices;

8- End-user applications – leads: G. Huffman and Z. Haddad:
phenomenological assessment (consistency with agricultural indices, etc); latency issues;

9- Recommendations to providers / algorithm developers – leads: G. Huffman and Z. Haddad:
assessment of assumptions underlying the algorithms, including retrievals from ground measurements (physical validation);

10- Programmatic recommendations – leads: G. Stephens and V. Levizzani:
product sensitivity to satellite constellation configuration; sensitivity to instrument capability and performance, including ground/airborne instruments.

For those elements that are currently with a single lead, the community is encouraged to suggest to Roca and Haddad the name of any colleagues who could serve as co-lead. The expectation is that the leads will be responsible for fleshing out the specific topics in their portion of the assessment, for identifying contributors to the relevant analyses and evaluations, and contributors to the actual writing of the results of their portion of the assessment.

One of the main beneficiaries of this assessment should be the user communities. Indeed, there is a widely expressed opinion that IPWG could do more to characterize the benefits and shortcomings of the various approaches to precipitation estimation, to "facilitate user uptake". With the impressively large number of products from different combinations of sources, produced with different constraints and assumptions, and producing different results, it is particularly difficult for the non-expert user to determine which product would be better suited or even relevant for any specific purpose, either quantitatively or even qualitatively. The proposed assessment will try to perform such a characterization, at least of the most widely used precipitation products.

In the near term, the leads will produce, within six months, three lists pertaining to the assessment elements that they lead:

a) The first list would consist of an inventory of existing analysis results, reports, and peer-reviewed papers, that can be drawn upon for the assessment.
b) The second list would identify gaps that can realistically be addressed over the next three years (i.e. by 2020) by identified volunteer contributors who will conduct the analyses.

c) The third list would identify important gaps for which there is currently no clear contributor – this would then be a listing of opportunities for new voluntary contributions.

The expectation is that the leads would have these lists ready by May 2018, at which time the team can hold a follow-on teleconference to agree on an achievable set of objectives, criteria, and means to achieve the objectives. The main outcome of the teleconference would then be to draw up and circulate a preliminary "Scope Definition Summary" for the assessment, which can then be used to recruit contributors. This preliminary summary document should also be reviewed by the community to allow maximum participation. By October 2018, it should be possible to get the assessment underway in earnest, with a first team meeting to take place during the 9th IPWG meeting, in Seoul, at which time the "Scope Definition" can be adopted by the team.

The proposed assessment clearly depends on the enthusiastic participation of the community. In particular, the scope of the assessment will be largely determined by the participants. Ideally, it would encompass not just an assessment of the ability of today's precipitation products to capture the spatial and temporal scales at which we have time series of the occurrence, column intensity, surface rate, surface accumulation, and duration (by cloud type, if possible), it would also recommend improvements for the near and longer terms. Any member of IPWG who would like to contribute, parts or labor, to either a), b) or c) above, should email Rémy (remy.roca@legos.obs-mip.fr) and Ziad (zhaddad@jifresse.ucla.edu) as soon as possible, with the subject line "GEWEX-IPWG assessment", and a description of their proposed contribution as well as the element(s) to which it is most relevant.

Assessment Milestones:

May 2018: element leads circulate a) preliminary inventory of complete analyses, b) list of proposed analyses with contributors, c) list of proposed analyses in search of contributors – teleconference.

October 2018: first meeting at IPWG-9, to adopt scope summary document prepared from the element lead lists.

October 2020: meeting at IPWG-10 to review the assessment results and recommendations, and start writing the final report.