Correction to Statement Made at Kick-off Meeting

IEEE Synthetic Aperture Radiometry Working Group 2nd Meeting

March 30, 2023

At the kick-off meeting, I made an incorrect statement.

Working Group (WG) Structure & Purpose

- Structure: Membership in WG open to all
  - Voting members must:
    - ~~Be members of IEEE Standards Association~~
    - Have attended at least 2 of last 4 previous meetings of the WG
  - WG Officers
    - Chair: Brian Sequeira
    - Vice-Chair: Corina Nafornita
    - Secretary: Alexandra (Aly) Artusio-Glimpse (temporary)
- Purpose: Develop a document on Synthetic Aperture Radiometry to be published by IEEE as a widely welcomed Recommended Practices product.

In this slide, we address the structure and purpose of the working group (WG).

Membership in the working group is open to all attendees regardless of professional society affiliation. This is in keeping with IEEE-SAS that documents are products of consensus of as large and diverse a community as possible. However, a voting member ~~must be a member of the IEEE Standards Association and~~ must have attended at least two of the last four meetings prior to the one where voting is exercised.

As required by IEEE-SA, each WG must have a chair, vice-chair, and secretary. Brian Sequeira is chair, Corina Nafornita is vice-chair, and Aly is temporarily our secretary. We need a volunteer to serve as secretary for the WG.

The purpose of the WG is to craft for the Synthetic Aperture community at large and the Synthetic Aperture Radiometry community in particular, a Recommended Practices document that is widely welcomed and embraced by both communities. All other considerations are subservient to this stated purpose.

Solicitation of Contributions to Calibration

IEEE Synthetic Aperture Radiometry Working Group 2nd Meeting

March 30, 2023

Here is a solicitation for contributions on calibration topics from members.

Calibration Contribution Solicitation (1 of 2)

- At the kick-off meeting, our vice-chair, Corina Nafornita, gave an excellent presentation about WHAT our Recommended Practices document needs to cover.
- We now consider HOW we arrive at our set of preferred practices that we recommend.
- An important topic to cover is calibration – not only the preferred methods that we recommend, but also the calibrators and other instrumentation that we use to implement those preferred methods.
  - What metrics are we using to justify our preference?
  - Caution: No reference to any vendor of calibrators or instrumentation.

03/30/2023 4

At the kick-off, Corina Nafornita made an excellent presentation on a number of topics that this working group may investigate and include in our Recommended Practices document. The next step is HOW each of those aspects are done in practice and which of the methods we prefer and why.

Calibration is an important topic that we must include in our document, and we must describe not only the processes that we prefer but also the instrumentation (in generic terms) that we use in the preferred process. Here generic terms are for example, Rydberg calibrator, spectrum analyzer, noise-figure meter, without mention of a manufacturer of that equipment.

Calibration Contribution Solicitation (2 of 2)

- Calibration and verification apply to
  - Single radiometer
    - Sequential methods [Hot/Cold loads, Dicke (noise-, duty-factor- & gain modulation)]
    - Simultaneous methods
    - Amplitude & phase balance of polarimetric radiometers
  - Array of radiometers
    - Amplitude, phase & delay balance between radiometers in the array.
    - Clock synchronization among radiometers in the array.
    - Origin, detection & correction/mitigation of spurious correlations
- Questions to be investigated
  - How are any of the above accomplished?
  - How are the post-calibration outcomes verified?
  - Which of the methods do we recommend and why?
  - Will emerging (e.g., quantum?) technologies improve calibration outcomes?

03/30/2023 5

As Corina mentioned at the kick-off, calibration and verification apply to a single radiometer as well as an array of radiometers.

For single radiometers, calibration can be sequential or simultaneous. Examples of sequential methods are calibration by hot & cold loads, and Dicke calibrations in its various forms. These are called sequential because two or more stimuli are sequentially applied on an exclusive basis at the input of a radiometer. Simultaneous methods are those in which multiple stimuli are applied simultaneously to the radiometer's input. Polarimetric radiometers require amplitude & gain imbalance between basis channels to be determined and corrected.

For arrays of radiometers, delay, gain, and phase imbalance among radiometers must be determined and corrected, clocks (timing & sampling) must be determined and corrected, and the origin or spurious correlations must be detected and corrected or else mitigated by other means.

In each manifestation of need for calibration, the questions to be confronted are: HOW are the systematic errors determined? How is correction verified after it is applied? Which of the method(s) do we prefer? Under what circumstances do we prefer them and why? Will emerging technologies improve calibration outcomes?