

Discussion on White Paper
Contributions:
Societal Needs & Applications

White Paper

- Ideally align terminology
 - e.g. Generic SI-Traceable Satellite Instrument
 - Where possible – follow FIDUCEO vocabulary
- White paper editors to attempt to align contributions' terminology
 - And propose changes to authors
- Will write overviews to make cohesive
- How to implement Fiduceo approach from beginning with SITSATs
- Solicit endorsement of white paper from NWP (and associated analyses communities) too

Instrument characterisation

- Pre-launch test-as-you-fly
 - Expensive – application to small-sat?
 - How can on-orbit inter-calibration complement it? Replace it??
 - Not all is lost when you launch – how to quantify?
- Importance of (low) polarisation sensitivity & well-characterised
- Need to stimulate technological development?

Inter-Calibration

- The better an instrument is initially known (characterized), the better inter-calibrations can be applied
- Indirect inter-calibrations: Via science results (GRACE, IceSat, SST)
 - Such approaches may obviate need for redundant, identical sensors
- Calibration stability may be key to applicability of vicarious/inter-calibration – e.g. to small satellites
- Longevity, assuming stability, benefits inter-calibrations, even in absence of absolute accuracy
- Empirical correction by inter-calibration v re-calibration by modifying measurement model
 - “Corrections” vs. Measurement Equation calibration changes
- Ways to ensure traceability?
- Sam Hunt’s Error Correlation chart (and importance of systematic and harmonization uncertainties)
- What historical series would benefit most from improved future measurements?

NWP Weather Forecasting + Climate Re-Analysis

- Importance of uncertainties in radiance assimilation
 - Random/Systematic - Constraining Bias Correction – residual uncertainties?
 - Obs – Variational Bias Correction
 - Model – weak-constraint method
 - Importance of anchor observations – GRUAN, SITSAT
- How to accelerate the process of convergence in understanding of uncertainties – between NWP and Observation communities?
 - Cooperation on specifying and validating uncertainties on different scales:
 - Random – Structured - Systematic

Discussion Notes - NWP

- Need to make vocabulary consistent [Dave]: Create a thesaurus/dictionary between groups, building on website that already exists. Some words are already defined (i.e. “uncertainty”); others are used slightly differently among different communities.
- Variational bias error [Bill]: instrument vs. forward-model error; some will be helped by improved instrument accuracies

Discussion Notes – Instrument Characterization

- GRACE: Possible to create a ground-based calibration site (known soil moisture, etc.)?
- SmallSat: Make good calibrations on ground and do good design; make results valuable; change process (CSIM), use NIST and other national labs for calibrations; S/C smallSat companies are meeting big-Sat pointing, power, etc.
- Stability vs. accuracy [Tom Pagano]: address needs in White Paper; what are we trying to measure? Where is each issue relevant (i.e. polarization)?
- Polarization (HVRR) [WebEx]: Comparison of sensors where polarization has not been accounted for
- Understand traceability and where errors come from; not all is lost at launch

Discussion Notes – Inter-Calibration

- Much of this is “best practice”
- Inter-“characterization” or inter-“comparison”
- Inter-comparisons via science results is a “vicarious calibration” using results (involving climatology community). This is necessary but not sufficient; but consistency is comforting when from multiple independent approaches
- Add an adjective: We don’t have a “sufficiently-rigorous” climate-observing system
- Feedback system: Identify needed corrections; iterate with instrument teams to determine physical causes in Measurement Equation