Summary Day 1

- Received briefings on GSICS, GEOSS, and WMO Space Program that put our work into perspective
- Reviewed methodologies that have been applied for GEO-LEO inter-calibration
- Assigned three tasks for GRWG-I
Consensus methodology for GEO-LEO IR sensors inter-calibration
- Focus on AIRS initially, expand to other sensors later (IASI, MODIS, AVHRR, HIRS)
- Consider agency priority, opportunity, and operation issues while designing algorithm
- Major components discussed and summarized in later slides

Tools to be generated and shared
- Web site
  - Exchange information
  - Summary of sensor characteristics (Wu, in collaboration with members)
  - Summary of lessons learned
  - Mission statement etc.
- Consensus algorithm
  - Pseudo code
  - AIRS and GEO data for 2 Nov 2006
  - JMA provide re-navigated MTSAT-1R data
  - UW/SSEC provide spectral conversion
  - These should be available by Feb. 23
  - Each GPRC sends results based on the above by April 1
  - One month data (Nov. 2006 or a month in future with IASI, TBD by 1 Apr 2007) for algorithm development

GRWG-II
- In June, in Europe, in conjunction with the first GSICS Data Working Group
- Topics
  - Progress on GEO-LEO IR inter-comparison
  - Expansion to VISNIR spectrum
  - LEO-LEO
Issues to Consider in Algorithm Design

- **What questions do you likely to ask about the GEO-LEO difference?**
  - Are we sure?
  - Why?
  - What to do?
  - ?

- **What results do you expect from the inter-calibration?**
  - **Correct** measurements – Identify one perfect instrument and use it to calibrate the rest
    - There exists one instrument that, if not perfect, is always the best by any means
    - Is there, or will there ever be?
  - **Consistent** measurements – Identify one reference instrument and use it to calibrate the rest
    - Trend is all that matters
    - Is “relative calibration” all we need?
  - **Improved** measurements – Identify which instrument performs better/worse under what circumstances
    - No instrument is perfect, in fact every instrument may contribute some
    - Measurements are increasingly redundant in some way
    - Is there an end for this?
  - Interaction with vendors
Instrument Calibration

- Stabilized
  - Scan mirror emissivity
  - Temperature variation
- Spin-scan
  - Vicarious calibration
- LEO
  - Imaging instruments (AVHRR, MODIS)
  - Sounding instruments (HIRS, AIRS, IASI)
Operational Issues

- Algorithm Maintenance
  - ?

- Benchmark
  - Code (or pseudo-code)
  - Test data
  - Test results

- Content and Format for Data
  - Attributes of Input Data
  - Result
Discussion

❖ Time

▪ Existing
  • Typically larger than LEO-LEO (>5 minutes)
  • Out of control – vary by GEO

▪ Proposed
  • Principle: Collect all and down-select later, to the extend that the data volume is manageable
  • Threshold: 15 min, since refresh rate of most GEO < 30 min

▪ Suggestions
  • Error budget
  • Schedule GOES
  • Cost-Benefit analysis
Discussion

❖ Space
  ▪ Existing
    • Correlation-based correction to navigation error
    • Detailed consideration of MTF/PSF
    • Histogram
    • Average
  ▪ Proposed
    • Principle: Rely solely on spatial homogeneity
    • Threshold: GEO channel $T_b$ stdv < 1K within 50 km
  ▪ Suggestions:
    • Threshold depends on scene $T_b$?
    • Threshold on other channels (e.g., MODIS)?
    • Other measure of homogeneity (e.g., max-min)?
Discussion

- Scene
  - Existing
    - All
    - Separately for clear and cloud
  - Proposed
    - Principle: Collect all and select/analyze later
    - Threshold: None
Discussion

Geometry

- Existing
  - Viewing zenith angles constrained
  - Relative azimuth constrained or not
  - Near nadir

- Proposed
  - $\delta\sec(\theta) < 0.05$
  - Nadir and off-nadir
  - Azimuth angle $\phi$ recorded
Discussion

- **Spectrum**
  - **Existing**
    - Tobin: Requires atm. state parameters & RTM
    - Tahara: Constrained optimization
    - Gunshor: Fill with calculated spectrum
  - **Proposed**
    - Tobin’s method
    - Evaluate his choice of profiles and RTM later
Discussion

❖ Coverage

▍ Existing
  • Not considered for area-to-area comparison
  • Within X of the center of LEO pixel center in pixel-to-pixel comparison

▍ Proposed
  • The distance between the LEO-GEO pixel centers is less than the major half axis of the LEO FOV