

Session 14

Long satellite records

Chair: *Thomas Popp* / DLR-DFD

Notes: *Gareth Thomas* / RAL

Seed talks:

Rob Levy / NASA-GSFC: Creating AOD climate records from
US-based satellite remote sensing

Huikyo Lee / NASA-JPL: Is climatological AOD averaged over
the last 16 years stable?

Larisa Sogacheva / FMI: How different retrieval approaches effect
AOD from AATSR + European retrievals

GCOS Climate Monitoring Principles

Thus **satellite systems** for climate monitoring should adhere to the following specific principles:

11. Constant sampling within the diurnal cycle (minimizing the effects of orbital decay and orbit drift) should be maintained.
12. A **suitable period of overlap** for new and old satellite systems should be ensured for a period adequate to determine inter-satellite biases and maintain the homogeneity and consistency of time-series observations.
13. Continuity of satellite measurements (i.e. elimination of gaps in the long-term record) through appropriate launch and orbital strategies should be ensured.
14. Rigorous pre-launch instrument characterization and calibration, including radiance confirmation against an international radiance scale provided by a national metrology institute, should be ensured.
15. On-board calibration adequate for climate system observations should be ensured and associated instrument characteristics monitored.
16. Operational production of priority climate products should be sustained and **peer-reviewed new products** should be introduced as appropriate.
17. Data systems needed to **facilitate user access to climate products, metadata** and raw data, including key data for delayed-mode analysis, should be established and maintained.
18. Use of functioning baseline instruments that meet the calibration and stability requirements stated above should be maintained for as long as possible, even when these exist on de-commissioned satellites.
19. **Complementary *in situ* baseline observations** for satellite measurements should be maintained through appropriate activities and cooperation.
20. **Random errors and time-dependent biases** in satellite observations and derived products should be identified.

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Main Issues

1. Consistency of **subsequent instruments**
2. Consistency of **similar but differing instruments**
3. Consistency of **different retrieval algorithms**
4. Consistency of **reference datasets**

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Some solutions

- assess overlapping periods
- tie to reference dataset over a gap; needs highest stability
- pixel-level uncertainties; need to be harmonized
- ensemble approaches
- use selected few long-term stations (how representative?)
- calibrate impact of diurnal cycle with geostationary satellites
- document product limitations to understand sampling differences
- naming conventions + documentation support proper usage

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Seed Questions

Producing Satellite Climate Data Records (CDR)

1. How much do we need to do to produce climate quality?
2. How can we best characterize biases?
3. How can we produce consistent CDRs from different sources?
4. How many different satellite CDRs do we need /want?

Validating Satellite Climate Data Records (CDRs)

1. How can we validate stability with changing ground networks?
2. What can we do to validate early periods (1980s)?