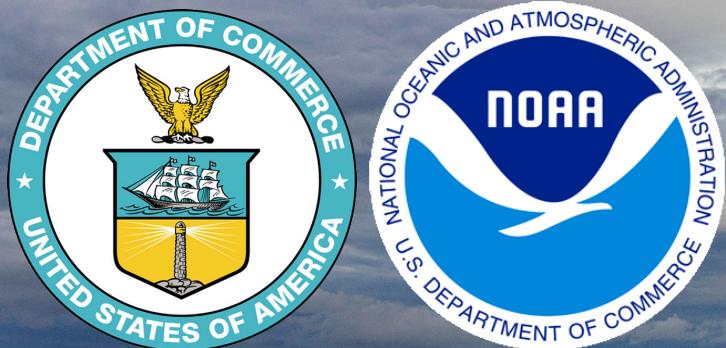


A Climate Perspective on Data Continuity

Presented to the Committee on a Framework for Analyzing the Needs for Continuity of NASA-Sustained Remote Sensing Observations of the Earth from Space



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November 12, 2013

Continuity

- **Different meanings for the climate and weather communities**
 - Weather: data flow without a gap
 - Climate: data flow without a gap plus overlapping data to evaluate and correct any temporal biases introduced by new system, (e.g., CERES, MODIS, VIIRS, Ozone)
 - Requires either
 - Overlap between old and new observing systems
 - Or overlapping independent measurements of the same quantity with equal or better quality
 - Or simultaneous highly correlated measurements
 - **With a well-coordinated verification and validation period**



Identify Methodologies

- **Objective methods to evaluate and correct temporal biases should include signal to noise experiments**
 - Identify requirements for detecting a time rate of change (e.g., a particular signal or trend) of a given magnitude
 - Make use of past data to quantify higher frequency variability
 - Develop probabilities of detecting biases of various overlapping time periods using seeded biases of known form and magnitude, e.g., Monte Carlo simulations
 - If available, use independent measurements in the analysis (e.g., a multivariate simulation) to reduce the time of overlap needed to minimize undetected biases and/or reduce overlap time.



Which measurements should be continued?

- **Priority**
 - Continue measurements that are best measured from space
 - E.g., very few reliable methods to measure top of the atmosphere irradiance
 - Lower priority given to measurements that can be obtained by other means
 - E.g., various ways to derived tropospheric temperature
 - Consideration given to measurements that are obtained from a single instrument (reduces risk)
- **Other Considerations**
 - Length, quality, and metadata for existing climate records

Value judgment with respecting to weighting



What gaps are acceptable?

- **Less egregious when**
 - Other observing systems are measuring physically linked quantities which can drive models (or algorithms) proven to accurately estimate the missing variable
 - E.g., Sea level and tide gauges, SSTs (numerous observing systems)
 - Records are of short duration
 - E.g., single-mission or experimental.

Prioritize relative importance of measurements

$$\text{Importance} = f(I, L, C, V)$$

I = irreproducibility

L = length of record

C = Cost of measurements

**V = value of measurement to society
(a judgment call)**



Questions?

