



SDS Program Evolution

Jeffrey L. Privette

Remote Sensing and Applications Division

National Climatic Data Center (NCDC)

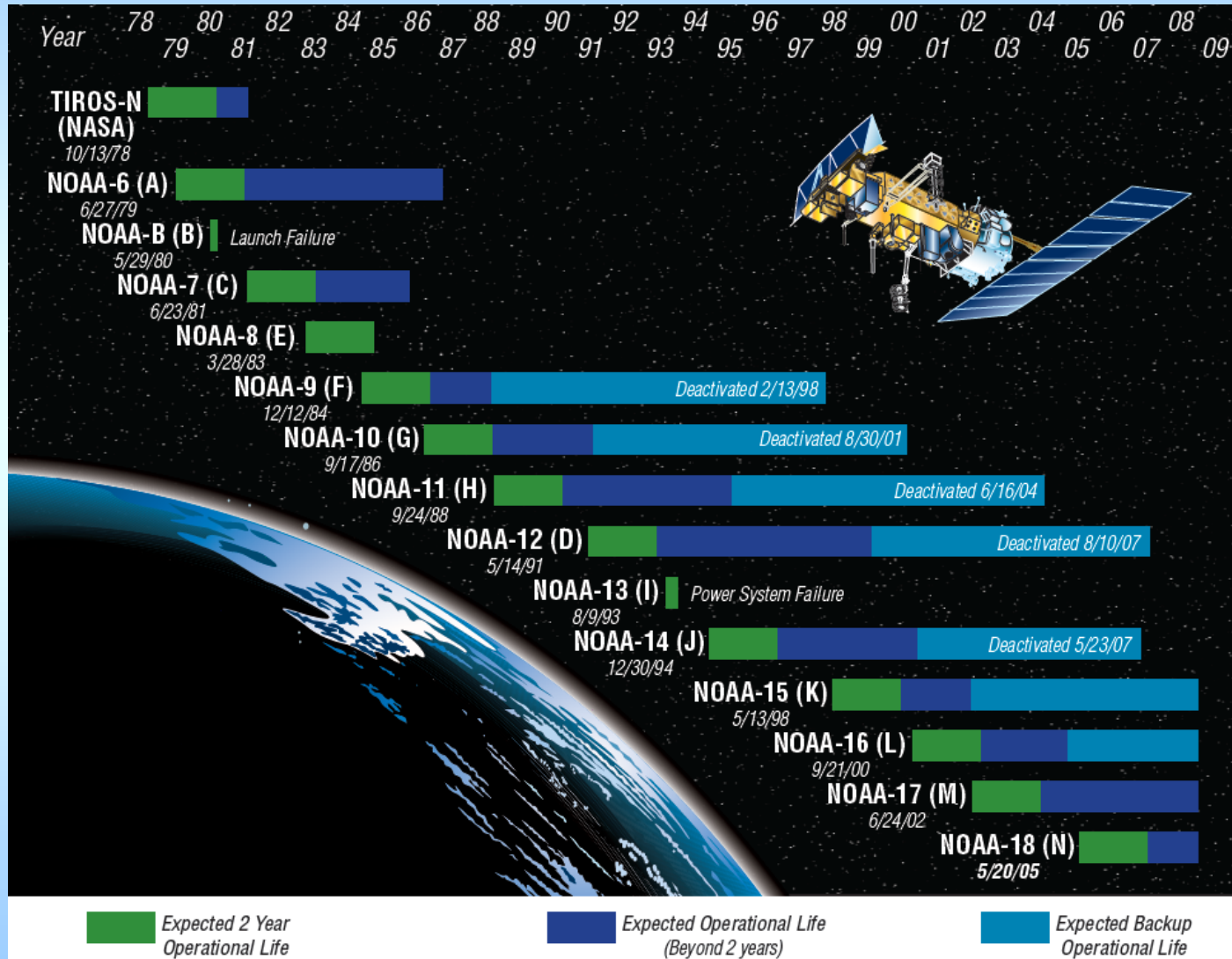
Bill Murray

NOAA's Climate Program Office

Outline

- NOAA's Historical Satellite Archive
- The Scientific Data Stewardship Program
- The Climate Data Record Program
- Relationship to Research Programs

NOAA POES Has Collected Decades of Data using Same or Similar Systems



Where's the Data?

- NCDC originally “deep-archived” all POES and GOES data
- Access/distribution was a major challenge
- John Bates joined NCDC in 2002 to start satellite data science & services
 - Inventoried, filled data gaps, began monitoring satellite health, activated data stewardship activities, prototype CDRs (e.g., global geostationary imager set)

NCDC Begins Satellite CDR Work

- “The Remote Sensing Applications Division provides scientific leadership in the use of NCDC’s satellite and radar data sets and their applications, particularly uses in numerical weather and climate prediction.” (2005)
- NOAA White Paper on CDRs (2003)
- Began dialog with NRC as part of Committee Report “*Climate Data Records from Environmental Satellites*” (NRC, 2004)

NOAA should embrace its new mandate to understand climate variability and change by asserting national leadership for satellite-based Climate Data Record generation, applying new approaches to generate and manage satellite Climate Data Records, developing new community relationships, and ensuring long-term consistency and continuity for a satellite Climate Data Record generation program.

Scientific Data Stewardship

Vision and Mission

- **Vision**

A climate science community empowered with the high-quality satellite and supporting ground based climate data records needed to define global climate applications, variations and change facilitated and coordinated by NOAA

- **Mission**

Generate, validate, analyze, archive, and distribute high quality climate data records from environmental satellites and supporting ground based observations, and facilitate the use of these data in climate applications

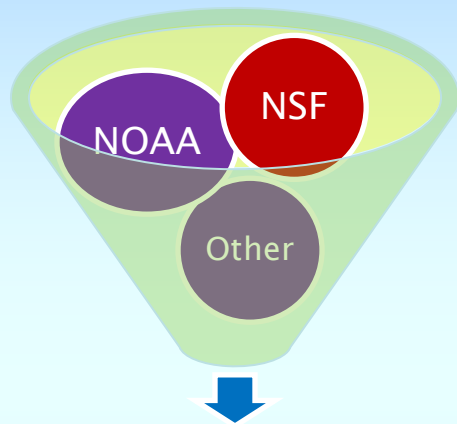
Initial SDS Grants Begin: 2007-2008

- Barkstrom and Privette joined SDS in 2006
- Began SDS Grants Competitions
 - Funding source: internal redirects
 - Competitions/administration through CPO
 - Goals: Develop and acquire Climate Data Records
 - Generate authoritative long-term records
 - Demonstrate quality assurance for production
 - Record context for information preservation
 - Includes satellite data, *in situ* data, and standards/tools
- FY 2007
 - Received 22 proposals
 - 7 Awards
- FY 2008:
 - Received 8 proposals
 - 3 Awards

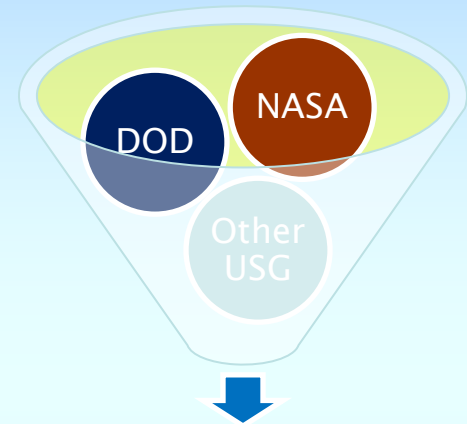
In Parallel: NPOESS Climate Sensor “Remanifestation” Activity

- **Some NPOESS climate capabilities eliminated in June 2006**
- **The White House requested NOAA and NASA provide:**
 - Potential mitigation options and costs
- **Primary goal: Ensure continuity of long- term climate records**
 - Agencies agreed that “recovering climate capabilities” includes space hardware *and* ground processing → CDRs
- **Recovered OMPS- Limb, TSIS, CERES (NPP), ALT (via Jason- 3)**
 - NOAA pursuing gap-filler approach for CMIS via JAXA/AMSR-2;
 - Rescoped MIS selected for C2
 - Jason-3 funding in President’s FY10 budget
- **President’s FY09- 10 Budgets included NOAA CDR language**
 - “SDS Program” evolved into “CDR Program”

Developing CDRs From Satellites Requires a New Collaborative Framework



New Research and Development



New Research and Development



NOAA's Satellite CDR Program Goals

- **Execute an end-to-end program**
 - CDRs *and* Climate Information Records (CIRs)
 - Priorities defined by users and applications
 - Systematic (Engineering project practices)
 - Comprehensive (GCOS variable list)
 - Sustain records, with scientific maturity refresh options
- **Build on past investments and expertise**
 - Interagency and International coordination
 - Compete work -- capture current knowledge
 - Community reviews and oversight

SDS vs. CDR Program Differences

| | SDS | CDR |
|------------------|----------------------------|---------------------------------|
| Data Types | <i>In situ</i> , Satellite | Satellite* |
| Thematic Focus | General | FCDRs; Water/Energy TCDRs |
| Grant Size (\$k) | 75-125 | 175-520 |
| Funding Source | Reprogrammed | Fed. Budget Line |
| Administration | CPO | NCDC |

**In situ* relevant for fused (satellite+*other*) or validation products



Climate Sensor Coverage By FY09 CDR Award

AVHRR (VIIRS)

- Snow/Ice (Key)
- Land/Carbon (Vermote)
- Thermal Calibration (Mittaz)
- VNIR Cal./Clouds (Minnis; FY10)

AMSU (ATMS)

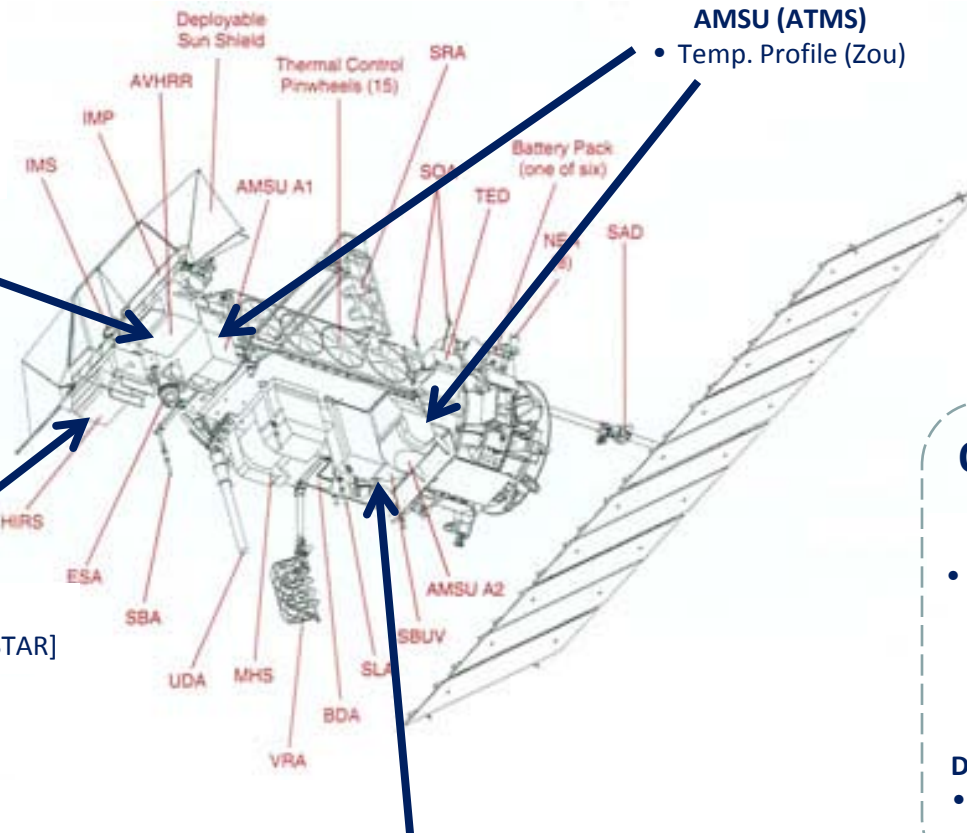
- Temp. Profile (Zou)

HIRS (CrIS)

[Calibration development at STAR]

SBUV (OMPS)

- Ozone (Flynn)



Other Satellites

GOES: Imager (ABI)

- VNIR Cal./Clouds (Minnis)

SORCE, Glory (TSIS)

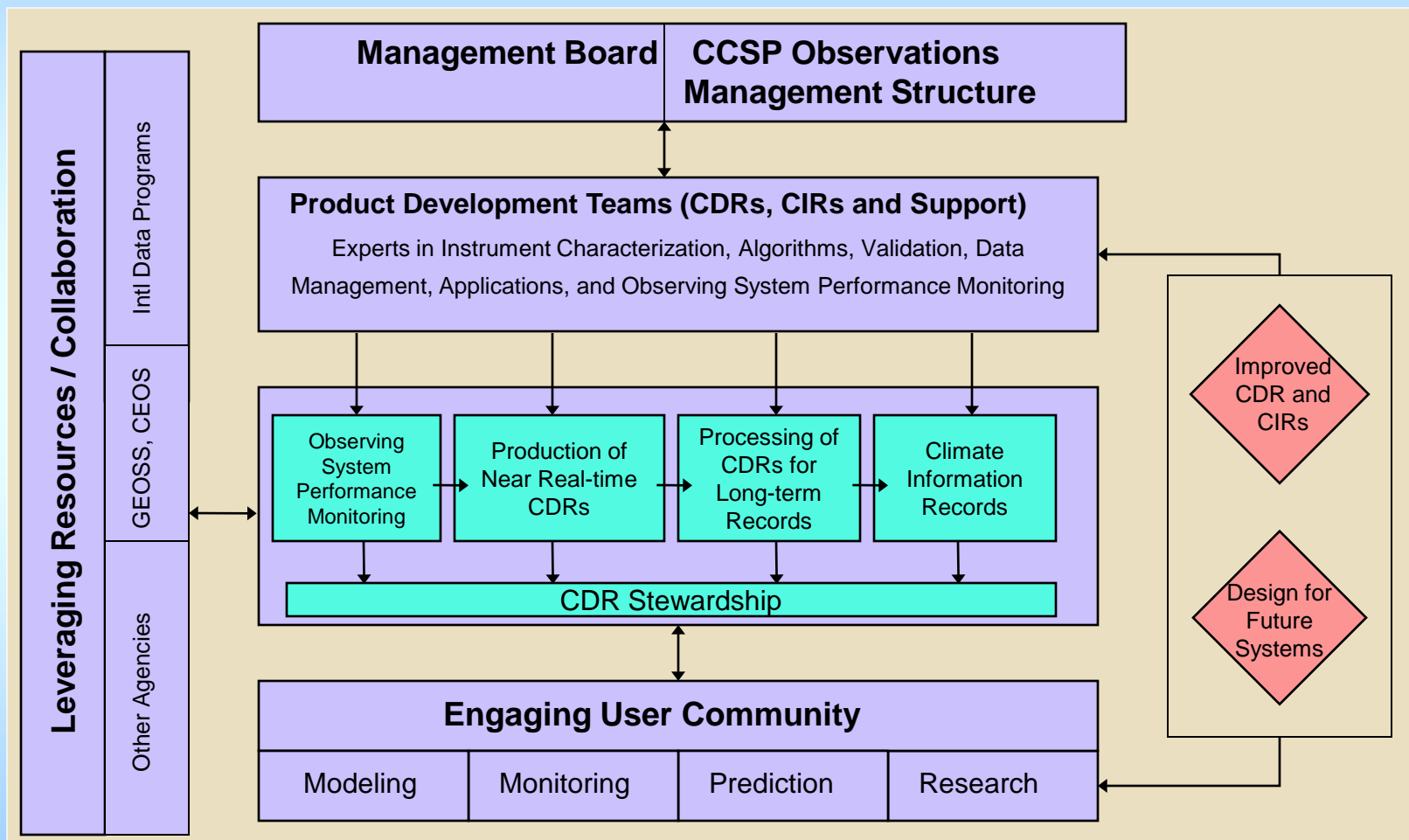
- Solar Irrad. (Pilewskie)

DMSP: SSM/I, SSMIS (MIS)

- Calibration (Kummerow)
- Snow/Ice (Key)

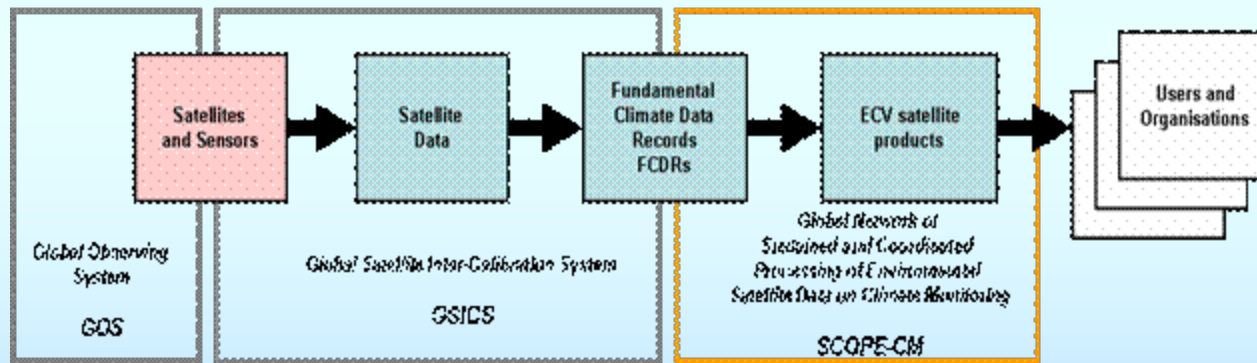
Arrows identify key climate instruments

CDR Project Functional Framework



CDR International Leadership - Sustained, Coordinated Processing of Environmental Satellite Data for Climate Monitoring (SCOPE- CM)

- Sustained, Co-Ordinated Processing of Environmental Satellite Data for Climate Monitoring (SCOPE- CM) will establish a network of facilities ensuring continuous and sustained provision of high-quality satellite products related to the Essential Climate Variables (ECV) responding to the requirements of the Global Climate Observing system (GCOS).



- Bates is Chairman of Executive Panel
- WMO GCOS adopts maturity matrix and will conduct independent review of maturity of SCOPE-CM pilot projects

Thrusts Span Past, Present, Future Needs

1970

1980

1990

2000

2010

2020

2030

POES/GOES

NPP

JASON-3/NPOESS/GOES-R

Uncover climate trend information
buried in four decades of heritage operational data

Provide operations and
products for
“Remanifested” climate
sensors”

Ensure climate quality data from operational systems
and build efficiencies for future climate processing

Web Presence Supports Transparency

Daily Optimum Interpolation Sea Surface Temperature

■ Completed
■ In Process

| Maturity | Sensor Use | Algorithm Stability | Metadata & QA | Documentation | Validation | Public Release | Science & Applications |
|----------|--|---|---|--|---|---|---|
| 1 | Research Mission | Significant changes likely | Incomplete | Draft ATBD | Minimal | Limited data availability to develop familiarity | Little or none |
| 2 | Research Mission | Some changes expected | Research grade (extensive) | ATBD Version 1 | Uncertainty estimated for select locations/times | Data available but of unknown accuracy; caveats required for use. | Limited or ongoing |
| 3 | Research Missions | Minimal changes expected | Research grade (extensive); Meets international standards | Public ATBD; Peer-reviewed algorithm and product descriptions | Uncertainty estimated over widely distribute times/location by multiple investigators; Differences understood. | Data available but of unknown accuracy; caveats required for use. | Provisionally used in applications and assessments demonstrating positive value. |
| 4 | Operational Mission | Minimal changes expected | Stable, Allows provenance tracking and reproducibility; Meets international standards | Public ATBD; Draft Operational Algorithm Description (OAD); Peer-reviewed algorithm and product descriptions | Uncertainty estimated over widely distribute times/location by multiple investigators; Differences understood. | Data available but of unknown accuracy; caveats required for use. | Provisionally used in applications and assessments demonstrating positive value. |
| 5 | All relevant research and operational missions; unified and coherent record demonstrated across different sensors | Stable and reproducible | Stable, Allows provenance tracking and reproducibility; Meeting international standards | Public ATBD, Operational Algorithm Description (OAD) and Validation Plan; Peer-reviewed algorithm, product and validation articles | Consistent uncertainties estimated over most environmental conditions by multiple investigators | Multi-mission record is publicly available with associated uncertainty estimate | Used in various published applications and assessments by different investigators |
| 6 | All relevant research and operational missions; unified and coherent record over complete series; record is considered scientifically irrefutable following extensive scrutiny | Stable and reproducible; homogeneous and published error budget | Stable, Allows provenance tracking and reproducibility; Meeting international standards | Product, algorithm, validation, processing and metadata described in peer-reviewed literature | Observation strategy designed to reveal systematic errors through independent cross-checks, open inspection, and continuous interrogation | Multi-mission record is publicly available from Long-Term archive | Used in various published applications and assessments by different investigators |