

THE NATIONAL ACADEMIES

Advisers to the Nation on Science, Engineering, and Medicine

Workshop on Creating Climate Data Records from NOAA Operational Satellites

**August 21 – 22, 2003
Room 100
The Keck Center of The National Academies
500 5th St., NW
Washington, DC 20001**

Participant Information

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Workshop Agenda

Thursday, August 21

- 8:00 – 8:30 Continental Breakfast
8:30 – 8:45 Welcome [[Dave Robinson](#)]
8:45 – 9:30 Plenary talk #1: NOAA Satellite CDR Plan [[Mitch Goldberg](#), [John Bates](#)]
9:30 – 9:45 Comments from Greg Withee
- 10:00 – 12:30 Session #1: Meeting User Needs**
10:00 – 10:35 Plenary Talk: Issues in Climate Data Records from satellite observations [[Kevin Trenberth](#)]
10:35 – 10:50 Plenary Talk: Lessons from the NCEP/NCAR Reanalyses [[Eugenia Kalnay](#)]
11:05 – 12:30 Breakout Sessions
1 – Climate Monitoring
2 – Model validation and development
3 – User Applications
- 12:30 – 1:30 Lunch**
2:00 – 4:30 Session #2: Attributes of successful CDRs
2:00 – 2:30 Plenary Talk: What are the key attributes of successful CDR generation programs?
[[Graeme Stephens](#)]
2:45 – 4:15 Breakout Sessions:
1 – CDR Principles
2 – Data management
3 – Assimilation/integration (w/other satellites, in-situ measurements, multivariate data)
4:30 – 4:45 Day 1 Closing Remarks [[Dave Robinson](#)]

Friday, August 22

- 8:00 – 8:30 Continental Breakfast
8:30 – 9:00 Breakout Session #1 Group Discussion
9:00 – 9:30 Breakout Session #2 Group Discussion
9:30 – 12:30 Session #3: CDR Production Strategies
9:30 – 10:00 Plenary Talk: What are the advantages and disadvantages of different models or strategies for producing CDR's, such as using partnerships among government, academia, and the private sector, different blends of space-based and in-situ data (e.g., all space-based versus some balance), or other approaches? [[Bill Rossow](#)]
10:15 – 11:45 Breakout Sessions:
1 – Biosphere
2 – Hydrosphere
3 – Energy
12:00 – 12:30 Breakout Session #3 Group Discussion
12:30 Closing Remarks ([Dave Robinson](#))

Frequently Asked Questions

What Is a Climate Data Record?

Climate research and monitoring often require the detection of very small changes against a naturally noisy background. For example, sea surface temperatures can change by several Kelvin between daytime and nighttime or from year to year, whereas the climate signal of interest may change only 0.1 K over a decade. Moreover, changes in sensor performance or data processing algorithms often introduce changes greater than the climate signal. In addition to noise, spatial and temporal biases in the measurements confound climate researchers. A climate data record (CDR) is a time series that tries to account for these sources of error and noise, producing a stable, high-quality data record with quantified error characteristics. A CDR is suitable for studying interannual to decadal variability.

A CDR requires considerable refinement of the raw data, generally the blending of multiple data streams. These streams may come from multiple copies of the same sensor, or they may be ancillary data fields that are used to "correct" the primary data stream. Thorough analysis of sensor performance and improved processing algorithms are also required, as are quantitative estimates of spatial and temporal errors.

Source: NRC, 2000: "Ensuring the Climate Record from the NPP and NPOESS Meteorological Satellites", NAP, 71 pp.

Why are the National Academies holding a workshop on creating CDRs from NOAA Operational Satellites?

NOAA/NESDIS is developing a "satellite data utilization plan" to produce CDRs from existing and new instruments aboard NOAA satellites (including NPOESS) as part of a NOAA matrix-managed National Climate Service. NOAA is actively seeking funds to begin the implementation of this plan in 2005, and NOAA/NESDIS has asked The National Academies to provide some advice on the creation of this plan. In particular, NOAA/NESDIS has asked The National Academies to address five specific questions:

- ▶ How does a CDR become a community standard (i.e., established as legitimate)?
- ▶ How can NOAA ensure that the CDRs are responsive to user needs?
- ▶ What are the key attributes of successful CDR generation programs?
- ▶ What are the advantages and disadvantages of different models or strategies for producing CDR's, such as using partnerships among government, academia, and the private sector, different blends of space-based and in-situ data (e.g., all space-based versus some balance), or other approaches?
- ▶ How can NOAA learn from present and past efforts such as the NOAA/NASA Pathfinders, EOSDIS, etc.? What are the successes and failures, and how do we emulate the successes or avoid the pitfalls?

The National Academies' Committee on Creating Climate Data Records from NOAA Operational Satellites has organized this workshop to obtain your thoughts on the above questions. We particularly are interested in **specific** comments that will assist us in suggesting how NOAA can in create successful CDRs [e.g. "NOAA should convene an annual workshop to listen to user concerns" is better than "NOAA needs to listen to user concerns"].

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Should I do anything before the workshop? Should I bring anything to the workshop?

1 – Please write some thoughts on the above questions in a Word document and either a) send them back to Sheldon Drobot [sdrobot@nas.edu], or b) bring them to the Workshop. If you would like to make additional comments about CDRs, the Committee requests that you provide a short (1-2 page) position paper briefly highlighting your research, including pertinent references and/or links to appropriate websites, and pointing out 2 "lessons learned" about climate data records.

2 – The National Academies have written some reports relevant to this workshop. Executive summaries of the previous reports are available free of charge via the web at <http://dels.nas.edu/basc/workshop>

What will I do at the workshop?

As a participant, the Committee wants you to come with your thinking cap on and be prepared to be actively engaged in the breakout sessions. We are looking for a lively discussion, with participants raising questions and bringing to light historical examples of good and bad attempts at creating and using climate data records.

How will the breakout session work?

In the breakout sessions, we plan to spend roughly half of the time in discussion, and the other half writing specific comments that the Committee can use in writing the report for NOAA/NESDIS.

If you have any questions about the workshop, contact Sheldon Drobot (sdrobot@nas.edu). Questions specifically about logistics should be addressed to Rob Greenway (rgreenway@nas.edu).

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Workshop Participant List (not including the NRC Committee)

1. Andrew Heidinger, NOAA/Wisconsin
2. Arnold Gruber, NESDIS/ORA
3. Chet Koblinsky, NASA/ US CCSP
4. Chris Elvidge, NESDIS/NGDC
5. Dan Tarpley, NESDIS/ORA
6. Dave Thompson, Colorado State University
7. Dorothy Hall, NASA
8. Dudley Chelton, Oregon State University
9. Ed Harrison, PMEL
10. Eugenia Kalnay, University of Maryland
11. Forrest Hall, University of Maryland
12. Frank Muller-Karger, University of South Florida
13. George Ohring, NESDIS/ORA
14. Gerald Dittberner, NESDIS/OSD (second day)
15. Graeme Stephens, Colorado State University
16. Herb Kroehl, NESDIS/NGDC
17. Jim Miller, NCEP/CPC
18. Jim Silva, NESDIS
19. John Townshend, University of Maryland
20. John Janowiak, NCEP/CPC
21. Juri Knyazikhin, Boston University
22. Ken Casey, NESDIS/NODC
23. Kent Hughes, NESDIS/ORA
24. Kory Priestley, NASA
25. Lisa Botluk, NESDIS/NOAA Climate Office
26. Marie Colton, NESDIS/ORA (first day – AM)
27. Mary Ann Esfandieri, NASA
28. Mike Haas, NPOESS/IPO
29. Mitch Goldberg, NESDIS/ORA
30. Norm Loeb, NASA
31. Rachel Pinker, University of Maryland
32. Russ Rew, UCAR
33. Shobha Kondragunta, NESDIS/ORA
34. Sky Yang, NCEP/CPC
35. Steve Mango, NPOESS/IPO
36. Todd Mitchell, University of Washington
37. Tony Busalacchi, University of Maryland
38. Watson Gregg, NASA
39. William Rossow, NASA

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COMMITTEE ON CLIMATE DATA RECORDS FROM OPERATIONAL SATELLITES: DEVELOPMENT OF A NOAA SATELLITE DATA UTILIZATION PLAN

Dr. David Robinson (Chair)

Rutgers University

Dr. Roger Barry

University of Colorado

Dr. Janet Campbell

University of New Hampshire

Dr. Ruth DeFries

University of Maryland, College Park

Dr. Bill Emery

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Dr. Milton Halem (ret.)

NASA Goddard Space Flight Center

Dr. James Hurrell

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Dr. Arlene Laing

University of South Florida

Dr. Roberta Balstad Miller

Columbia University/CIESIN

Dr. Ranga Myneni

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COMMITTEE ON CLIMATE DATA RECORDS FROM OPERATIONAL SATELLITES: DEVELOPMENT OF A NOAA SATELLITE DATA UTILIZATION PLAN STATEMENT OF TASK

The ad hoc committee charged to conduct this study will assist the National Oceanic and Atmospheric Administration-National Environmental Satellite, Data, and Information Service (NOAA-NESDIS) as it designs a plan to guide satellite data utilization from existing and new instruments aboard NOAA satellites, including National Polar-orbiting Operational Environmental Satellite System (NPOESS) instruments, for understanding, monitoring, and predicting climate variations and changes. The committee will provide input to the plan by summarizing major needs for and uses of climate data records, examining different approaches and strategies for generating climate data records (CDRs), and identifying key attributes of CDRs that have proven useful. NOAA would then use this information as guidance to develop its plan for producing CDRs from operational satellites. Once the plan is drafted, the committee will review the draft Satellite Data Utilization Plan to ensure that it is sound, comprehensive, and includes mechanisms for continued user involvement, and it will recommend improvements to ensure that CDRs are processed according to established scientific methods and packaged in forms that are useful for real-time assessments and predictions of climate as well as retrospective analyses, re-analyses, and reprocessing efforts.

In phase I, the committee will organize and host a workshop to facilitate discussion of a NOAA white paper that will outline its preliminary ideas on satellite data utilization for climate applications, and it will write an interim report that:

- ▶ Summarizes major needs for and uses of climate data records,
- ▶ Examines different approaches and strategies for generating CDRs, and
- ▶ Identifies key attributes of examples of successful attempts to create high quality CDRs from satellite data.

Questions to be addressed in the workshop and by the committee include:

- ▶ How does a CDR become a community standard (i.e., established as legitimate)?
- ▶ How can NOAA ensure that the CDRs are responsive to user needs?
- ▶ What are the key attributes of successful CDR generation programs?
- ▶ What are the advantages and disadvantages of different models or strategies for producing CDR's, such as using partnerships among government, academia, and the private sector, different blends of space-based and in-situ data (e.g., all space-based versus some balance), or other approaches?
- ▶ How can NOAA learn from present and past efforts such as the NOAA/NASA Pathfinders, EOSDIS, etc.? What are the successes and failures, and how do we emulate the successes or avoid the pitfalls?

Phase 2 will begin when NOAA provides the committee with a draft of its Satellite Data Utilization Plan (estimated to be approximately 3 months after delivery of the interim report).