CDR IN OPERATIONS

Pathfinder SST (5.2-5.3)

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Outline

- Generation of global, daily SST fields from AVHRR IR observations
- Processing occurs in quarterly or more frequent intervals scheduled by availability of ancillary data fields
- QA through comparison to buoy SST and reference SST fields from analyses or other satellite SST observations
- Applications
- Schedule & Issues

Pathfinder SST CDR Description

Project Goals

1. To provide the longest, most accurate, and highest resolution consistently-reprocessed SST climate data record (CDR) from the AVHRR sensor series
2. To serve as a fundamental input to GHRSST Reanalysis CDRs

Current Status

1. Version 5.2 L3-Collated available for 1981-2012* in GHRSST data format (GDS2)
2. TDS, FTP, HTTP, LAS, OPeNDAP, WCS, WMS, and Geoportal Server
3. 7-day climatology and gap-filled time series in Coral Reef Temperature Anomaly Database (CoRTAD v4)

* 2012-13 imminent

Looking Forward

1. Summer 2013: Daily, 5-day, 7-day, and monthly V5.2 averages and climatologies in GDS2 L3C/L4
2. End of 2013: **V5.3** GDS2 L2P, L3U, L3C (many improvements, see notes)
3. 2014-2015: Version 6 GDS2 L2P, L3U, and L3C, with uncertainties and times, 2000-present

Pathfinder SST CDR Description

Digital Object Identifier published (DOI)

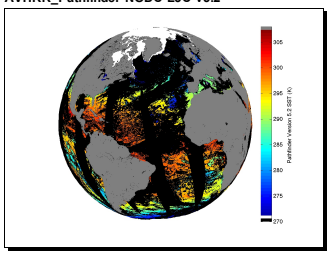
[http://data.nodc.noaa.gov/nodc/archive/metadata/doi/ISO-AVHRR_Pathfinder-NODC-L3C-v5.2.html points to the DOI landing page](http://data.nodc.noaa.gov/nodc/archive/metadata/doi/ISO-AVHRR_Pathfinder-NODC-L3C-v5.2.html)

NOAA NATIONAL OCEANOGRAPHIC DATA CENTER (NODC)
UNITED STATES DEPARTMENT OF COMMERCE

NOAA Satellite and Information Service

AVHRR Pathfinder Version 5.2 Level 3 Collated (L3C) Global 4km Sea Surface Temperature for 1981-2011

AVHRR_Pathfinder-NODC-L3C-v5.2



The AVHRR Pathfinder Version 5.2 Sea Surface Temperature data set (PFV52) is a collection of global, twice-daily 4km sea surface temperature data produced in a partnership by the NOAA National Oceanographic Data Center and the University of Miami's Rosenstiel School of Marine and Atmospheric Science. PFV52 was computed from data from the AVHRR instruments on board NOAA's polar orbiting satellite series using an entirely modernized system based on SeaDAS. This system incorporates several key changes from Versions 5.0 and 5.1 of Pathfinder, including the use of an entirely new land mask, a modified grid, and the inclusion of sea ice, wind speed, and aerosol ancillary data to support the use of the SST data. Importantly, PFV52 data are provided in netCDF-4 (classic model, with internal compression and chunking) and are nearly 100% compliant with the GHRSST Data Specification Version 2.0 for L3C products. These data deviate from that standard only in that sses_bias, sses_standard_deviation, and sst_dtime variables are empty. PFV52 data were collected through the operational periods of the NOAA-7 through NOAA-19 Polar Operational Environmental Satellites (POES), and are available for 1981 through 2011.

Get the Data

Access

download
NODC HTTP server
Navigate to URL: http://data.nodc.noaa.gov/pathfinder/Version5.2/ and begin browsing through the file hierarchy. Clicking on any of the files will prompt you to download that file or will launch any application associated with netCDF files.

download
NODC FTP server
Navigate to URL: ftp://ftp.nodc.noaa.gov/pub/data.nodc/pathfinder/Version5.2/ to download.

download
NODC THREDDS server
Thematic Realtime Environmental Distributed Data Services. Provides various web services for data access, including OPeNDAP, HTTP, Web Coverage Service, Web Mapping Service, as well as NCML and ISO views to the data.

download
NODC LAS server
For data analysis and visualization

Browse graphic
Browse graphic for sample data view

Format(s)

netCDF
Format version: netCDF-4
Compression: Files are compressed internally using netCDF4.

Distributor(s) / Contact Info

DOC/NOAA/NODC > National Oceanographic Data Center, NOAA, U.S. Department of Commerce
Phone/E-mail/letter. NODC provides data free of charge.
(301) 713-3277
9:00 - 5:00 EST

Instructions / Constraints

Fees
For digital delivery, free for all users. For delivery on physical media, users are responsible for the cost of the physical media and production and delivery of the product.

Use Limitation
Cite as: Casey, Kenneth S., Evans, Robert H., Baringer, Warner, Kilpatrick, Katherine A., Podesta, Guillermo P., Walsh, Susan, Williams, Elizabeth, Brandon, Tess B., Byrne, Deirdre A., Foti, Gregg, Li, Yuanjie, Phillips, Sheri A., Zhang, Dexin, and Zhang, Yongsheng (2011): AVHRR Pathfinder Version 5.2 Level 3 Collated (L3C) Global 4km Sea Surface Temperature for 1981-2011. National Oceanographic Data Center, NOAA. Dataset. doi:10.7289/V5WD3XHB [access date]

Legal Constraints
Other

Access Data - Submit Data - Intended Use of the Data? - Online Store - Customer Service

Dept. of Commerce - NOAA - NESDIS - NODC
Offsite Link Notification

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Freedom of Information Act (FOIA)
USA.gov - The U.S. Government's Web Portal

Product Description

Global, daily SST –

Day and Night SST fields based on NOAA-7 through NOAA-19 Infrared observations

Includes GHRSST-mandated ancillary fields:

Ancillary Field	Source
Marine Winds Speed	NCEP/DOE AMIP-II Reanalysis (Reanalysis-2)
Aerosol Depth Indicator	Monthly Pathfinder-Aerosols (AVHRRPF, 1981 to Dec 2000) and weekly Aerosol Optical Thickness (AERO100, Dec 2000 onward)
Sea Ice Concentration	OSI-SAF Global Daily Sea Ice Concentration (1981-2007) and NCDC Daily OI (2007 onward)
Land/sea/lake/river mask	*Physical Shoreline database* from Natural Earth, the *Global Self-consistent Hierarchical High-resolution Shoreline (GSHHS)* from the NOAA National Geophysical Data Center, and the *Global Lakes and Wetlands Database* from the World Wildlife Fund
DT_Analysis	The difference between the SST and the previous day's analysis field, using the NCDC Daily OI

Product Delivery Description

CDR(s)	Period of Record	Temporal Resolution	Update Frequency	Update Lag	Spatial Resolution	Data file distinction criteria	Do you publicly serve the CDR at your institution?
Pathfinder 5.2 SST	1981-2012	Daily, Day & Night	Goal: Quarterly	Goal: Approximately 3 months	4km	Daily Day and Night fields of SST, if multiple satellites are providing data, only the current operational satellite is used.	RSMAS does not distribute data. Data are served by NODC via FTP, HTTP, THREDDS Data Server, and Live Access Server

- Delta SST, Pathfinder SST – reference field SST

Validation & Quality Assurance

- Each daily file compared to reference SST field
- Co-located, contemporaneous buoy and satellite SST compared, comparison is made to *in situ* radiometer observations for validate of skin-SST
- Time series of satellite-buoy SST differences compared for 20 degree wide zonal bands
- Comparison is made to micro-wave based SST retrievals when available, e.g. AMSR & WINDSAT
- Browse graphics generated (confirms file format and content) for every field (SST and ancillary) and visually confirmed
- Rich Inventory generated – min, max, mean, standard deviation, number of obs, etc. – and examined for outliers

Concerns, Risks and Issues

- Describe any algorithm or product errors or problems that have been discovered (by your team or others), issues resolved in Version 5.3
  - Coverage to be provided in sun-glint regions
  - Data to be provided in a 5.3 release with reduced data quality in sun glint regions
  - Version 5.3 will include all quality levels including significantly cloudy regions (user request)
  - Anomalous 'hot-spots' at land-water boundaries identified and flagged

- Describe any technical risks or issues that may jeopardize your sustained provision of the CDR(s) for the next 3 years (assuming funding is covered)
  - Continued availability of AVHRR observations, can transition to MODIS or VIIRS SST produced by the same software suite

Uses & Applications

- Applications and Uses
  - Pathfinder used in wide variety of applications
  - Forms the basis of the Coral Reef Temperature Anomaly Database (CoRTAD), a dataset widely used in Marine Protected Area design and coral reef conservation issues
  - Forms the basis of numerous other climate-oriented products, for example, the NCDC Daily OI, the Japan Meteorological Agency's MGDSST, and the UK MetOffice's OISST Reanalysis
  - Used in the Ocean Health Index (http://www.oceanhealthindex.org/), a comprehensive measure of the state of the ocean in terms of its ability to sustainably deliver a range of benefits to people

- Key Scientific Findings (from yours, or similar CDRs by others)
  - 4190 Papers using Pathfinder SST (Google Scholar)
  - Product Spatial and Temporal resolution is important – Improving spatial resolution from 25 to 4km resulted in proper prediction of storm intensification. Chen, Shuyi S., W. Zhao, J.E. Tenerelli, R.H. Evans, and V. Halliwell (2001). Impact of the AVHRR sea surface temperature on atmospheric forcing in the Japan/East Sea. *Geophysical Research Letters* Vol. **28:** No. **24**, 4539-4542.
  - Resolving diurnal warming improved forecast of Atlantic tropical storm intensification. Marullo, S., R. Santoleri, V. Banzon, R. Evans, M. Gaurracino. Validation and error analysis of O&SI SAF (SEVIRI) SST products over the tropical Atlantic: toward a bias-free diurnal-cycle resolving SST product combining microwave and infrared satellite data. *JGR*, 2010: 2009JC005466R

Schedule

- CDR status
  - NOAA-19 fields processed through mid-2013 and are currently undergoing validation at NODC

- 1-3 Year Planning Horizon
  - Transition to Pathfinder 5.3 (updated data quality tests, SST remain unchanged, will be processed this Fall for entire AVHRR record)
  - Transition to Pathfinder 6.0 LATBAND SST formulation, currently used for MODIS and VIIRS SST processing
  - Pathfinder can transition to MODIS or VIIRS IR observations when needed, AVHRR, MODIS and VIIRS SST utilize same code base.

- Recommend transition to LATBAND SST formulation due to improved SST accuracy (removes seasonal and zonal biases)