

The VIIRS Climate Raw Data Record: An Easy-to-use Raw Data Set (Level 1b) for the Suomi-NPP Visible Infrared Imaging Radiometer Suite

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What is a Climate Raw Data Record?

- A C-RDR is an intermediate step between a Raw Data Record and a Sensor Data Record
- Raw measurements collected into time series variables, accompanied by the coefficients and tables needed to convert them to science units and calibrate them (NOAA Level 1b)
- Needed for long-term scientific data stewardship and climate science processing

C-RDR Features

- Standards-based Platform Independence
 - netCDF-4
 - Measurements, Processing Coefficients, and LUTs stored as variables (no binary blobs)
- Robust Metadata
 - Each variable annotated with information extracted from the NPP CDFCB-X and MDFCB.
 - Climate and Forecast Conventions (CF)
 - Attribute Convention for Dataset Discovery (ACDD)
 - Includes relevant NPP file-level metadata
- Software developed using the JPSS Application Development Library (ADL)

C-RDR Components

- One C-RDR contains two types of files:
 - Data files (contain raw data from RDRs)
 - Support Data (SD) files (contain PCs and LUTS)
- Storing the data and support data in separate files avoids “instant-obsolescence” problems
- Each SD file is stamped with algorithm version and effectivity date metadata

VIIRS C-RDR Data File

- The files are named following the same convention as NPP RDR files (prefix CVIRS)
- Up to 4 VIIRS granules per file
- File-level metadata includes elements taken from both NPP RDR and SDR file types
- Variables are organized into groups

VIIRS C-RDR Data File Groups

- Measurements are organized in groups
 - Engineering_Data
 - Image_375m
 - Image_750m_DualGain
 - Image_750m_SingleGain
 - Image_DayNight
 - Quality_Measures
 - Spacecraft_Diary

Engineering_Data Group

- 242 variables
- 14-bit signed values converted to 16-bit signed values



Image_750m_DualGain Group

- band(band) = M1 M2 M3 M4 M5 M7 M13
- start_of_data(band, scan)
- scan_terminus(band, scan)
- earthview_band_control_word(band, scan)
- calibview_band_control_word(band, scan)
- earthview(band, line, pixel)
- earthview_gain(band, line, pixel)
- calibview(band, calib_source, line, cal_samples)
- calibview_gain(band, calib_source, line, cal_samples)

Spacecraft_Diary_Group

- bus_critical_packet_time
- adcs_state
- adcs_hk_packet_time
- manuever_done
- fixed_frame_table_target_id
- ephemeris_valid_time
- ephemeris_position
- ephemeris_velocity
- attitude_valid_time
- control_frame_attitude_quaternion

VIIRS C-RDR SD File

- The files are named following the same convention as NPP AUX files (prefix CVIRS-SD)
- File name contains the aggregate effectivity start date/time
- File-level metadata (CF, ACDD, and NPP-specific)
- 39 groups – one for each included AUX file
- Group-level metadata (NPP-specific)
- One variable for each named AUX file data element
- Variable-level attributes taken from the CDFCB-X Vol 8

VIIRS C-RDR SD Groups

VIIRS-SDR-BB-TEMP-COEFFS-LUT	VIIRS-SDR-OBS-TO-PIXELS-LUT
VIIRS-SDR-COEFF-A-LUT	VIIRS-SDR-QA-LUT
VIIRS-SDR-COEFF-B-LUT	VIIRS-SDR-RADIOMETRIC-PARAM-LUT
VIIRS-SDR-DELTA-C-LUT	VIIRS-SDR-REFLECTIVE-LUT
VIIRS-SDR-DG-ANOMALY-DN-LIMITS-LUT	VIIRS-SDR-RSR-LUT
VIIRS-SDR-DNB-C-COEFFS-LUT	VIIRS-SDR-RTA-ER-LUT
VIIRS-SDR-DNB-DNO-LUT	VIIRS-SDR-RVF-LUT
VIIRS-SDR-DNB-FRAME-TO-ZONE-LUT	VIIRS-SDR-SOLAR-IRAD-LUT
VIIRS-SDR-DNB-RVF-LUT	VIIRS-SDR-TELE-COEFFS-LUT
VIIRS-SDR-DNB-STRAY-LIGHT-LUT	VIIRS-SOLAR-DIFF-AGG-LUT
VIIRS-SDR-EBBT-LUT	VIIRS-SOLAR-DIFF-PROC-COEFFS-LUT
VIIRS-SDR-EMISSIVE-LUT	VIIRS-SOLAR-DIFF-REFL-LUT
VIIRS-SDR-F-LUT	VIIRS-SOLAR-DIFF-ROT-MATRIX-LUT
VIIRS-SDR-GAIN-LUT	VIIRS-SOLAR-DIFF-RVF-LUT
VIIRS-SDR-GEO-DNB-PARAM-LUT	VIIRS-SOLAR-DIFF-SDSM-BRDF-LUT
VIIRS-SDR-GEO-IMG-PARAM-LUT	VIIRS-SOLAR-DIFF-SDSM-TIME-LUT
VIIRS-SDR-GEO-MOD-PARAM-LUT	VIIRS-SOLAR-DIFF-SDSM-TRANS-SCREEN-LUT
VIIRS-SDR-HAM-ER-LUT	VIIRS-SOLAR-DIFF-TRANS-SCREEN-LUT
VIIRS-SDR-OBC-ER-LUT	VIIRS-SOLAR-DIFF-VOLT-LUT
VIIRS-SDR-OBC-RR-LUT	



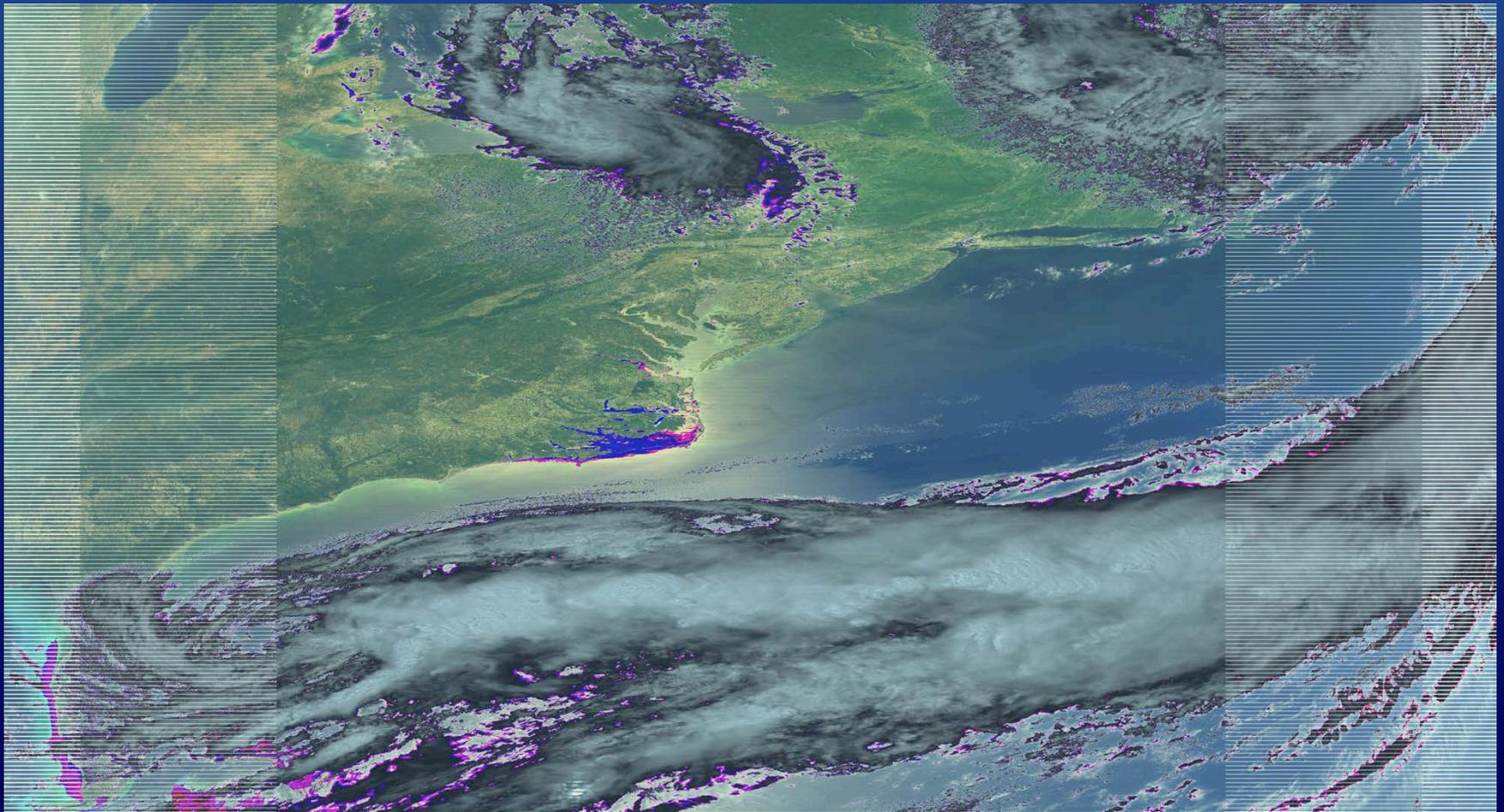
Operational Plan

- Produce VIIRS C-RDR files from beginning of NPP mission
- C-RDR Data files created as RDRs are acquired from CLASS
- C-RDR SD files created as auxiliary files are acquired from CLASS
- VIIRS C-RDR files will be available via the NCDC HDSS Access System (HAS)

Validation Plan

- Must be able to produce identical VIIRS SDRs using RDR and AUX files or using C-RDR files
- Have validation apps that generate VIIRS verified RDRs, spacecraft diary RDRs, and VIIRS AUX files from C-RDR files
- These files are compared with those generated using ADL applications
- Each C-RDR file is validated

Raw VIIRS Image from C-RDR



Sample Files Available

- VIIRS C-RDR Data file
- VIIRS C-RDR SD file
- VIIRS C-RDR Product Specification document

- Files available at
<ftp://ftp.ncdc.noaa.gov/pub/data/ViirsCrdrSample>

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