SNPP VIIRS Climate Raw Data Record Production Software Development	
Task Leader	Jim Biard
Task Code	
NOAA Sponsor	
NOAA Office	
Contribution to CICS Themes (%)	Theme 1: 100%
Main CICS Research Topic	Climate Data and Information Records and Scientific Data Stewardship
Contribution to NOAA Goals (%)	Goal 5: 100%

Highlight: The VIIRS Climate Raw Data Record production software development and test were completed and operational production began on October 19, 2013.

BACKGROUND

The Climate Raw Data Record (C-RDR) Project is a part of the Climate Data Record Program. The C-RDR Project is responsible for developing a system to acquire, reformat, and enhance the Suomi National Polar-orbiting Partnership (SNPP) Raw Data Records (RDRs) and support data to facilitate the production of Climate Data Records (CDRs).

CDRs are fully calibrated, long-term time series of climate variables that have the consistency and continuity required for the climate research community. The production of CDRs requires the reprocessing of extensive data sets as algorithms are improved and the sensor performance is better understood. To produce CDRs**,** the raw data are required as input for each iteration of the reprocessing.

The goal of the C-RDR system is to provide the SNPP raw data and supporting data in a format that is enhanced for utilization in research, the production of CDRs, and long-term stewardship. There will be a C-RDR for each science instrument on the SNPP satellite. The C-RDRs contain the raw measurements from the RDRs, decoded, and decompressed so they are easily accessible. Each C-RDR file also contains extensive provenance, discovery, and usage metadata. The C-RDR files use the established, platform-independent, community standard netCDF-4 data format.

The C-RDR system produces C-RDR files from SNPP RDR granules on an operational basis, and will do so for the life of the SNPP mission. The C-RDR files are being archived and are available to the user community.

The C-RDR for the Visible Infrared Imaging Radiometer Suite (VIIRS) instrument was the first one chosen for development.

ACCOMPLISHMENTS

Over the last year, the coding of the applications that makes up the VIIRS C-RDR production system was completed. Internal testing, both within CICS-NC computer systems and in the development system within NCDC's 3-Tier Development Environment, was performed and successfully completed. The VIIRS C-RDR production system applications and associated libraries, scripts, and configuration files were then deployed in the test system within the NCDC 3-Tier Development Environment where they underwent and passed an NCDC security review. The system acceptance test was then performed with successful results. Once the VIIRS C-RDR production system had

passed the acceptance test, an Operational Readiness Review was held and stakeholders agreed that the system was ready for production. The NCDC Information Technology Branch (ITB) deployed the production system within the NCDC 3-Tier Development Environment.

The high-level data flow in the core production system is described in *Figure 1*.

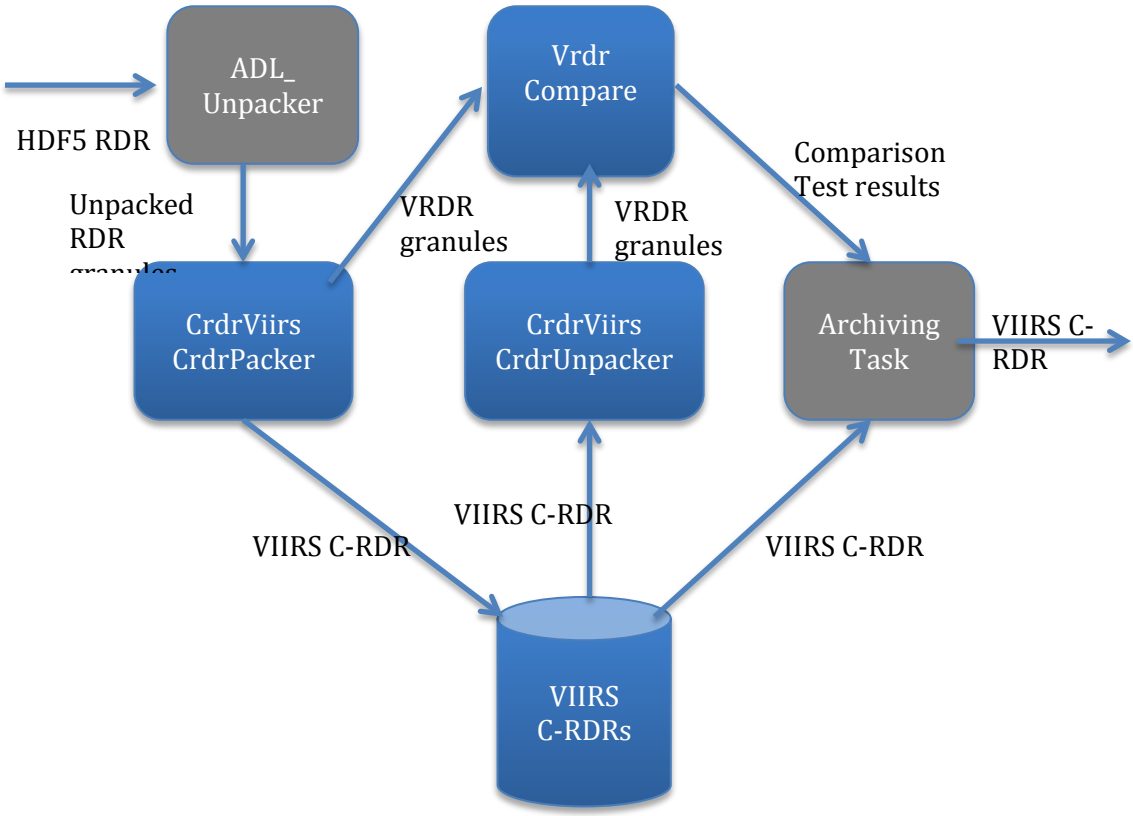

Figure 1: Primary data flow in the VIIRS C-RDR production system

Files containing VIIRS RDR granules, packaged together using the HDF5 format, are retrieved on an ongoing basis from the NOAA Comprehensive Large Array-data Stewardship System (CLASS) and fed into the VIIRS C-RDR production system. The ADL_Unpacker application (provided by the SNPP program) extracts the individual binary RDR granules and their associated metadata, which are passed to the CrdrViirsCrdrPacker application.

The CrdrViirsCrdrPacker application takes the contents of the RDR granules and constructs a C-RDR file. It also constructs Verified RDR (VRDR) granules-one per RDR granule, with metadata, using code provided by the SNPP program. VRDR granules are created as the first step in SNPP operational production of VIIRS Sensor Data Records (SDRs) in the NOAA Interface Data Processing Segment (IDPS). A VRDR is similar to a C-RDR, but it contains a subset of all the data available in an RDR.

Once the CrdrViirsCrdrPacker application has completed its task, the CrdrViirsCrdrUnpacker application is run to create VRDR granules and metadata from the C-RDR file just created. The two

sets of VRDR granules and metadata are then passed to the VrdrCompare application, which checks to see if there are any differences in the two sets, and records the success or failure of the test. If there are no differences found, the archiving task (part of the production system executive) feeds the validated VIIRS C-RDR file out to the NCDC archive ingest system. The archive-ingest system delivers the files to the HDSS Access System (HAS) where they are made available for time-based search and download.

Ongoing production of the VIIRS C-RDR began on October 19, 2013. Since that time, analysis of the processing logs has shown that the error rates are well within the success margins specified for the operational system. Further analysis of the logs uncovered a defect in the CrdrViirsCrdrUnpacker application that was causing it to produce faulty VRDR granules under certain rare conditions, which then cause the validation test of the source C-RDR file to fail. This defect was corrected.

As part of the development effort, procedures for the system acceptance test and procedures for configuring a system were written so that it is ready for development and operation of the VIIRS C-RDR production software (including required 3rd party applications and libraries). Documents are being written to describe the VIIRS C-RDR contents and the software design, as well as a User's Guide for the applications and the system executive.

PLANNED WORK

The two main focuses in the project for the coming year will be monitoring and maintenance of the software and completing the documentation. If processing errors are uncovered through monitoring, the responsible code defects will be corrected and the operational software updated.

Another part of the maintenance task is identifying gaps in the VIIRS C-RDR time coverage relative to the available VIIRS RDR granules and filling in those gaps by ordering the missing RDR granules from CLASS and processing them. This will be done on a low-rate basis to extend the VIIRS C-RDR coverage back to the beginning of the available VIIRS RDR coverage, as well as to recover C-RDR files lost on account of data transmission problems or VIIRS C-RDR production system errors.

Turning to the documentation task, the VIIRS C-RDR Data Product Specification document is in final draft form and should be baselined early in FY2014. The Software Design Description and User's Guide should be completed by the end of the first quarter of FY2014.

DELIVERABLES

- VIIRS C-RDR production system software
- VIIRS C-RDR System Acceptance Test
- VIIRS C-RDR production system configuration procedures

PERFORMANCE METRICS

	FY13
# of new or improved products developed following NOAA guidance	1

# of products or techniques transitioned from research to ops following NOAA guidance	0
# of new or improved products developed without NOAA guidance	0
# of products or techniques transitioned from research to ops without NOAA guidance	0
# of peer reviewed papers	0
# of non-peered reviewed papers	0
# of invited presentations	0
# of graduate students supported by a CICS task	0
# of graduate students formally advised	0
# of undergraduate students mentored during the year	0