

**Clouds and the Earth's Radiant Energy System  
(CERES)**

**Data Management System**

**CERES Cloud Retrieval and Convolution  
Subsystems 4.1 through 4.4**

**Release 5 Test Plan  
Version 15**

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## Document Revision Record

The Document Revision Record contains information pertaining to approved document changes. The table lists the date the Software Configuration Change Request (SCCR) was approved, the Release and Version Number, the SCCR number, a short description of the revision, and the revised sections. The document authors are listed on the cover. The Head of the CERES Data Management Team approves or disapproves the requested changes based on recommendations of the Configuration Control Board.

### Document Revision Record

SCCR Approval Date	Release/Version Number	SCCR Number	Description of Revision	Section(s) Affected
05/24/01	R3V4	262	<ul style="list-style-type: none"> <li>Added new subdirectory under the data Subdirectory chart in Appendix B.</li> <li>Updated Table C.6-1.</li> <li>Added instructions for copying the Instrument and MOA input files for the Cloud test cases to the instrument and sarb directories.</li> <li>Updated the test summaries to accurately reflect run time for each test case.</li> <li>For each test case, added reference to the text file which lists the expected output for each PGE.</li> <li>Updated format to comply with standards</li> </ul>	App. B  App. C All  All  All  All
07/06/01	R3V5	273	<ul style="list-style-type: none"> <li>Added PGE CER4.1-4.1P2.</li> <li>Updated format to comply with standards.</li> </ul>	Sec. 5.0 All
08/07/01	R3V6	284	<ul style="list-style-type: none"> <li>Added instructions for copying the Instrument and MOA input files to the instrument and sarb directories for PGE CER4.1-4.1P2.</li> <li>Updated format to comply with standards.</li> </ul>	Sec. 5.0  All
10/02/01	R3V7	300	<ul style="list-style-type: none"> <li>Added an instruction for preparing VIRS files for processing.</li> <li>Removed PGE CER4.1-4.4P1.</li> <li>Updated format to comply with standards.</li> </ul>	Sec. 5.0  Sec. 8.0 All
03/21/02	R3V8	318	<ul style="list-style-type: none"> <li>Changed test date for processing PGE CER4.1-4.1P2.</li> <li>Updated Appendix B to include new directory for SSFA.</li> <li>Updated file listings in Appendix C.</li> <li>Updated format to comply with standards.</li> </ul>	Sec. 5.0  App. B  App. C All

## Document Revision Record

SCCR Approval Date	Release/Version Number	SCCR Number	Description of Revision	Section(s) Affected
06/03/02	R3V9	351	<ul style="list-style-type: none"> <li>Added PGE CER4.1-4.2P2.</li> <li>Updated Appendix B to include new directory structure for PGE CER4.1-4.2P2 and for SnowIce Maps.</li> <li>Updated Appendix C File Description.</li> <li>Updated format to comply with standards.</li> </ul>	Sec. 7.0 App. B  App. C All
01/29/03	R3V10	421	<ul style="list-style-type: none"> <li>Added PGE CER4.1-4.1P3.</li> <li>Updated Appendix B to include new directory structure for PGE CER4.1-4.1P3.</li> <li>Updated Appendix C File Description.</li> <li>Updated format to comply with standards.</li> </ul>	Sec. 6.0 App. B  App. C All
05/21/03	R3V11	439	<ul style="list-style-type: none"> <li>Updated compile sections to handle PGEs independently.</li> <li>Changed test date for processing PGE CER4.1-4.1P2.</li> <li>Updated format to comply with standards.</li> </ul>	Sec. 2.2  Sec. 5.0  All
09/05/03	R3V12	467	<ul style="list-style-type: none"> <li>Updated Testing Date.</li> <li>Updated format to comply with standards.</li> </ul>	All  All
12/22/03	R3V13	490	<ul style="list-style-type: none"> <li>Updated Testing Date.</li> <li>Updated format to comply with standards.</li> </ul>	Secs. 6.0, 7.0, & 9.0  All
06/04/04	R4V1	536	<ul style="list-style-type: none"> <li>Update Testing Date.</li> <li>Update Executable names for Aqua.</li> <li>Updated format to comply with standards.</li> </ul>	Secs. 6.0, 7.0, & 9.0  App. C All
05/30/07	R4V2	654	<ul style="list-style-type: none"> <li>Updated Testing Date.</li> <li>Added Testing Procedures for Collection 005 PGEs (CER4.1-4.1P4, CER4.1-4.1P5, CER4.1-4.2P3, &amp; CER4.1-4.3P2).</li> <li>Run times were updated for PGEs CER 4.1-4.1P4, 4.1-4.1P5, &amp; 4.1-4.2P3.</li> <li>Added Collection 005 information.</li> </ul>	Sec. 10.0  Secs. 7.0, 8.0, 11.0, & 13.0  Secs. 7.1.3, 8.1.3, & 11.1.3  Apps. B & C
01/23/08	R4V3	658	<ul style="list-style-type: none"> <li>Testing and Compilation Procedures added for four new PGEs (CER4.1-4.1P6, CER4.1-4.2P4, CER4.1-4.2P5, &amp; CER4.1-4.3P23).</li> </ul>	Secs. 2.0, 9.0, 13.0, 14.0, 17.0, Apps. B, & C

## Document Revision Record

SCCR Approval Date	Release/Version Number	SCCR Number	Description of Revision	Section(s) Affected
01/22/09	R5V1	693	• Added new PGE CER4.1-4.0P2 for processing both 8th MESH and 16th MESH Snow and Ice map.	All
			• Updated delivered PGEs to be compatible with the new directory structure and processing on magneto.	All
			• Validation scripts converted to PERL.	All
07/28/09	R5V2	719	• Updated PGEs CER4.1-4.1P6, CER4.1-4.2P4, CER4.1-4.2P5, and CER4.1-4.3P3 to reflect new directory structure.	Secs. 2.2, 10.0, 14.0, 15.0, & 18.0
04/15/10	R5V3	779	• Updated PGEs CER4.1-4.1P4 & CER4.1-4.1P5 to extend the range for surface pressure search.	Secs. 8.0 & 9.0
10/13/10	R5V4	809	• Added input/output directory environment variables.	Sec. 2.0
			• Added CPUTYPE environment variable and used it in executable file names.	Sec. 2.0 & App. C
			• Updated CRH file names to reflect SnowFree/SnowCovered channels.	Sec. 2.0 & App. C
			• Added new cleanup method and PCF checking procedure to PGEs CER4.1-4.1P6, CER4.1-4.2P4, CER4.1-4.2P5, and CER4.1-4.3P3.	Secs. 10.0, 15.0, 16.0, & 19.0
			• Added SGE execution and validation instructions for PGEs CER4.1-4.1P6, CER4.1-4.2P4, CER4.1-4.2P5, and CER4.1-4.3P3.	Secs. 10.0, 15.0, 16.0, & 19.0
			• Added new section for instructions on using CER4.1-4.1P6/CER4.1-4.2P5 2-day and month processing.	Sec. 11.0
			• Added SGE to Acronyms and Abbreviations List.	App. A
			• Removed PCF ASCII Input file for CER4.1-4.1P6, CER4.1-4.2P4, CER4.1-4.2P5, CER4.1-4.3P3.	Table C.1-1
			• Added Terra calibration file to Ancillary Input.	Table C.6-1
			• Replaced hard-coded values with available environment variable's names.	Secs. 10.1.1, 11.1.1, 15.1.1, 16.1.1, 19.1.1

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SCCR Approval Date	Release/Version Number	SCCR Number	Description of Revision	Section(s) Affected
10/13/10 (Cont'd)	R5V4	809	<ul style="list-style-type: none"> <li>Included information on SGE summary files.</li> <li>Modifications made in text.</li> </ul>	Secs. 10.1.1, 15.1.1, 16.1.1, 19.1.1 Sec. 11.2.3
07/25/12	R5V5	918	<ul style="list-style-type: none"> <li>Added Ancillary table for CER4.1-4.0P2.</li> <li>Modified 4.1-4.0P2 compilation procedure for <i>AMI</i>.</li> <li>Updated 4.1-4.0P2 test cases for <i>AMI</i>.</li> <li>Updated compilation steps for 4.1-4.0P2.</li> <li>Updated testing and validation for 4.1-4.0P2.</li> <li>Changed test date for 4.1-4.0P2 Class_Mesh8 case. (12/13/2012)</li> <li>Modified some formatting in the document for easier testing. (12/14/2012)</li> </ul>	Table C.6-2 Sec. 2.2.2  Sec. 4.0 Sec. 2.2.2 Secs. 4.1.1, 4.2.3, & 4.3 Sec. 4.1.1  All
01/02/13	R5V6	943	<ul style="list-style-type: none"> <li>Updated 4.1-4.0P2 and added 4.1-4.0P3 Subsystem Overviews.</li> <li>Added 4.1-4.0P3 Compilation instructions.</li> <li>Added 4.1-4.0P3 Test and Evaluation section.</li> </ul>	Secs. 1.1.2 & 1.1.3 Sec. 2.2.3 Sec. 5.0
02/06/13	R5V7	947	<ul style="list-style-type: none"> <li>Removed manual commands testing.</li> </ul>	Secs. 11.1.1, 11.2.3, 11.3, 16.1.1, 16.2.3, 16.3, 17.1.1, 17.2.3, 17.3, 20.1.1, 20.2.3, & 20.3
07/25/12	R5V8	919	<ul style="list-style-type: none"> <li>Updated PGEs CER4.1-4.1P4, CER4.1-4.1P5, CER4.1-4.2P2, CER4.1-4.2P3, and CER4.1-4.3P2 compilation procedures.</li> <li>Updated PGE CER4.1-4.1P4 execution, evaluation, and cleanup procedures.</li> <li>Added PGE CER4.1-4.1P4/CER4.1-4.2P2 two-day execution section.</li> <li>Updated PGE CER4.1-4.1P5 execution, evaluation, and cleanup procedures.</li> </ul>	Secs. 2.2.5, 2.2.8, 2.2.9, & 2.2.13 Sec. 9.0 Sec. 10.0 Sec. 11.0

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SCCR Approval Date	Release/Version Number	SCCR Number	Description of Revision	Section(s) Affected
07/25/12 (Cont'd)	R5V8	919	<ul style="list-style-type: none"> <li>Added PGE CER4.1-4.1P5/CER4.1-4.2P2 two-day execution section.</li> <li>Updated PGE CER4.1-4.2P2 execution, evaluation, and cleanup procedures.</li> <li>Updated PGE CER4.1-4.2P3 execution, evaluation, and cleanup procedures.</li> <li>Updated PGE CER4.1-4.3P2 execution, evaluation, and cleanup procedures.</li> <li>Updated PGEs CER4.1-4.1P4/CER4.1-4.1P5 script names. (01/09/2014)</li> <li>Updated testing commands. (01/09/2014)</li> </ul>	Sec. 12.0  Sec. 16.0  Sec. 17.0  Sec. 21.0  Secs. 9.1.1 & 11.1.1  Secs. 9.2.3, 9.3, 10.2.3, 10.3, 11.2.3, 11.3, 12.2.3, 12.3, 16.2.3, 16.3, 17.2.3, 17.3, 21.2.3, & 21.3
03/21/13	R5V9	960	<ul style="list-style-type: none"> <li>Added testing plan for new PGEs CER4.1-4.1P7, CER4.1-4.2P6, CER4.1-4.2P7, and CER4.1-4.3P4.</li> <li>Added overviews for new PGEs.</li> </ul>	Secs. 2.2, 15.0, 16.0, 22.0, 23.0, & 27.0  Sec. 1.1
01/05/15	R5V10	1047	<ul style="list-style-type: none"> <li>Added directions to run for whole month only.</li> </ul>	Sec. 16.1.1
01/04/17	R5V11	1205	<ul style="list-style-type: none"> <li>Removed 2-Day testing.</li> <li>Made test dates environment variables rather than hard coded.</li> <li>Updated compilation instructions.</li> </ul>	Sec. 14.0  Secs. 13.0, 19.0, 20.0, & 25.0  Secs. 2.2.6, 2.2.11, 2.2.12, & 2.2.17
10/25/17	R5V12	1291	<ul style="list-style-type: none"> <li>Updated validation command line to work with updated test_suites/bin scripts.</li> </ul>	Sec. 5.2.3
12/20/17	R5V13	1309	<ul style="list-style-type: none"> <li>Updated compile instructions for x86 only.</li> <li>Updated run instructions for x86 only.</li> <li>Updated validation instructions.</li> </ul>	Secs. 2.2.2, 2.2.3, & 2.2.6  Secs. 4.1.1 & 5.1.1  Secs. 4.2.3 & 5.2.3

## Document Revision Record

SCCR Approval Date	Release/Version Number	SCCR Number	Description of Revision	Section(s) Affected
12/20/17 (Cont'd)	R5V13	1309	<ul style="list-style-type: none"> <li>Updated cleanup instructions.</li> </ul>	Secs. 4.3 & 5.3
01/31/18	R5V14	1328	<ul style="list-style-type: none"> <li>Added Collection 6 MODIS calibration files.</li> </ul>	Table C.6-1
05/09/18	R5V15	1368	<ul style="list-style-type: none"> <li>Added new Calibration files.</li> </ul>	Table C.6.1
			<ul style="list-style-type: none"> <li>Removed PGEs and any references to the following PGEs CER4.1-4.1P4, CER4.1-4.1P5, CER4.1-4.2P2, CER4.1-4.2P3, CER4.1-4.3P2, CER4.1-4.0P1, CER4.1-4.1P1, CER4.1-4.1P2, CER4.1-4.1P3, CER4.1-4.2P1, and CER4.1-4.3P1. (03/21/2019)</li> <li>Removed Appendices B and C as they are no longer relevant. Left Appendix D in the document and it became Appendix B. (04/02/2019)</li> </ul>	<p>All</p> <p>Apps. B &amp; C</p>

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## 1.0 Introduction

CERES is a key component of EOS and NPP. The first CERES instrument (PFM) flew on TRMM, four instruments are currently operating on the EOS Terra (FM1 and FM2) and Aqua (FM3 and FM4) platforms, and NPP (FM5) platform. CERES measures radiances in three broadband channels: a shortwave channel (0.3 - 5  $\mu\text{m}$ ), a total channel (0.3 - 200  $\mu\text{m}$ ), and an infrared window channel (8 - 12  $\mu\text{m}$ ). The last data processed from the PFM instrument aboard TRMM was March 2000; no additional data are expected. Until June 2005, one instrument on each EOS platform operated in a fixed azimuth scanning mode and the other operated in a rotating azimuth scanning mode; now all are typically operating in the fixed azimuth scanning mode. The NPP platform carries the FM5 instrument, which operates in the fixed azimuth scanning mode though it has the capability to operate in a rotating azimuth scanning mode.

CERES climate data records involve an unprecedented level of data fusion: CERES measurements are combined with imager data (e.g., MODIS on Terra and Aqua, VIIRS on NPP), 4-D weather assimilation data, microwave sea-ice observations, and measurements from five geostationary satellites to produce climate-quality radiative fluxes at the top-of-atmosphere, within the atmosphere and at the surface, together with the associated cloud and aerosol properties.

The CERES project management and implementation responsibility is at NASA Langley. The CERES Science Team is responsible for the instrument design and the derivation and validation of the scientific algorithms used to produce the data products distributed to the atmospheric sciences community. The CERES DMT is responsible for the development and maintenance of the software that implements the science team's algorithms in the production environment to produce CERES data products. The Langley ASDC is responsible for the production environment, data ingest, and the processing, archival, and distribution of the CERES data products.

### 1.1 Document Overview

This document, [CERES Cloud Retrieval and Convolution Subsystems 4.1 through 4.4 Release 5 Test Plan](#), is part of the CERES Subsystems 4.1 through 4.4 Release 5 delivery package provided to the Atmospheric Science Data Center (ASDC). It provides a description of the CERES Cloud Retrieval (4.1-4.3) and Convolution of Imager Cloud Properties with CERES Footprint Point Spread Function Subsystem (4.4) Release 5 software; supporting data files; and explains the procedures for installing, executing, and testing the software. A section is also included on validating the software results. A description of acronyms and abbreviations is provided in [Appendix A](#) and an evaluation of the comparison software output is contained in [Appendix B](#).

This document is organized as follows:

- Section [1.0](#) - Introduction
- Section [2.0](#) - Software and Data File Installation Procedures
- Section [3.0](#) - Test and Evaluation Procedures - CER4.1-4.0P2 Snow and Ice Processor
- Section [4.0](#) - Test and Evaluation Procedures - CER4.1-4.0P3 Snow and Ice Processor
- Section [5.0](#) - Test and Evaluation Procedures - CER4.1-4.1P6 Aqua and Terra Main Processor

Section 6.0 - Test and Evaluation Procedures - CER4.1-4.1P7 NPP Main Processor  
 Section 7.0 - Test and Evaluation Procedures - CER4.1-4.1P7/CER4.1-4.2P7 2-Day Processor  
 Section 8.0 - Test and Evaluation Procedures - CER4.1-4.2P4 Daily QC Processor  
 Section 9.0 - Test and Evaluation Procedures - CER4.1-4.2P5 Daily QC Processor  
 Section 10.0 - Test and Evaluation Procedures - CER4.1-4.2P6 Daily QC Processor  
 Section 11.0 - Test and Evaluation Procedures - CER4.1-4.2P7 Daily QC Processor  
 Section 12.0 - Test and Evaluation Procedures - CER4.1-4.3P3 Monthly QC Processor  
 Section 13.0 - Test and Evaluation Procedures - CER4.1-4.3P4 Monthly QC Processor  
[Appendix A](#) - Acronyms and Abbreviations  
[Appendix B](#) - Evaluation of Comparison Software Output

## 1.1 Subsystem Overview

### 1.1.1 CER4.1-4.0P2 - Snow and Ice Processor

The Snow and Ice Preprocessor reads available NSIDC and NESDIS Snow and Ice data sets for a given day and reprojects the data onto a 10-minute grid for use in Clouds Processing.

The primary input data set for the Snow and Ice Processor is the National Snow and Ice Data Center's Snow and either National Environmental Satellite, Data & Information Services' Snow and Ice Maps or Comprehensive Large Array-Data Stewardship System's Snow and Ice Maps. The primary output consists of individual 10-minute snow and ice maps.

### 1.1.2 CER4.1-4.0P3 - Snow and Ice Processor

The Snow and Ice Preprocessor reads available NSIDC and AFWA Snow and Ice data sets for a given day and reprojects the data onto a 10-minute grid for use in Clouds Processing.

The primary input data set for the Snow and Ice Processor is the National Snow and Ice Data Center's Snow and Ice Map and Air Force Weather Agency's 16<sup>th</sup> Mesh Snow and Ice Maps. The primary output consists of individual 10-minute snow and ice maps.

### 1.1.3 CER4.1-4.1P6 - Main Processor

CER4.1-4.1P6 consists of two executables. The initial one is Cloud Retrieval Subsystem that produces a set of imager pixel clouds properties. It is followed by Convolution Subsystem that averages cloud microphysical and optical properties from imager pixels that are within the field of view of the CERES footprints.

The objective of the Cloud Retrieval Subsystem is to use high spectral and spatial resolution cloud imager data to determine cloud microphysical and optical properties. The major Cloud Retrieval science requirements include:

1. Prepare a "chunk" of pixels (multiple scan lines of imager data): Attach the imager radiometric data and various ancillary data to each imager pixel within the chunk. Classify each pixel as clear, cloudy, or uncertain. The pixel classification process uses various tests on the imager radiometric data and ancillary data to determine a cloud mask.
2. Determine cloud macrophysical properties (cloud layer and cloud top pressure) for cloudy pixels.



3. Determine cloud microphysical and optical properties (cloud base, effective radiating center, temperature, pressure, particle phase, particle size, optical depth at 0.65 micron, water/ice path, emittance at 10.8 micron, etc.) for cloudy pixels.

The primary input data sets for the Release 3 Cloud Retrieval Subsystem are:

1. Cloud Imager Data (CID): The CID product contains time code, pixel location, viewing geometry, and radiance data. The Release 3 test data are Visible Infrared Scanner, VIRS, and Moderate Resolution Imager Spectroradiometer, MODIS, imager data from the TRMM and Terra spacecraft, respectively.
2. SURFace MAP (SURFMAP): The SURFMAP data product is a set of maps for elevation, water content, scene ID, ecosystem, snow depth, ice coverage, and a terrain map on a 10-minute equal-angle grid.
3. Meteorological, Ozone, and Aerosol (MOA): The MOA data product contains meteorological data on the 1.0 x 1.0-degree European Center for Medium-range Weather Prediction (primary) or the 2.0 x 2.5-degree Data Assimilation Office (DAO) grid. (Surface temperature, surface pressure, atmospheric temperature, humidity, ozone and wind velocity profiles, precipitable water, column ozone and aerosols.)
4. Clear Radiance History (CRH): The Release 3 CRH data product contains albedo, brightness temperature, and the cosine of the solar zenith angle on a 10-minute equal-angle grid.

The primary output products of the Cloud Retrieval Subsystem are:

1. Cookiedough: The pixel-based cloud properties, input to Subsystem 4.4
2. CloudVis and Subset CloudVis: Visualization products
3. A binary Quality Control (QC) report
4. CRH\_Update: Contains CRH values for all clear pixels in the hour

The objective of the Convolution Subsystem is to average the higher spectral and spatial resolution cloud imager data derived cloud microphysical and optical properties within the larger CERES footprint weighted by the CERES instruments point spread function. This provides a set of cloud properties optimally designed for studies of the role of clouds in the Earth's radiation budget, and enables the cloud physical properties to be tied to the cloud broadband radiative properties in a consistent manner. This initial estimate of cloud properties is modified in Subsystem 5 to obtain consistency in cloud properties and Top-of-the-Atmosphere (TOA) broadband radiative fluxes.

The major objectives of this Subsystem include:

1. Locate imager pixels within a CERES footprint by calculating the value of the Point Spread Function (PSF) for each pixel with respect to the centroid of the CERES field of view (FOV). If the PSF value exceeds a specified threshold value, the pixel is included in the footprint.
2. Accumulate statistics of cloud properties for all imager pixels within the CERES footprint and write the footprint records to the intermediate Single Scanner Footprint TOA and Surface Fluxes Clouds (SSF) output file.

3. Write diagnostic and statistical information from each run to the Quality Control (QC) report files.

The primary input data sets for the Convolution Subsystem are:

1. The CERES Instrument Earth Scans (IES) data product contains time of observation, geolocation data, and filtered radiances for each footprint in spatial order. The CERES footprint effective diameter is 10 km for Tropical Rainfall Measuring Mission (TRMM) spacecraft and 20 km for EOS AM and PM spacecraft. IES file from both TRMM and Terra are used as the test data sets for Release 3.
2. The cloud imager data from Advanced Very High Resolution Radiometer (AVHRR), Visible Infrared Scanner (VIRS), or Moderate-Resolution Imaging Spectroradiometer (MODIS) are processed by Subsystems 4.1 - 4.3 and passed to convolution via the Imager Pixel Data file, commonly designated "Cookiedough." This file represents a two-dimensional array (N scanlines by M pixels per scanline) with a data structure associated with each pixel containing pixel location, viewing geometry, observation time, multispectral radiance data, scene type, and cloud properties as determined in Subsystems 4.1 through 4.3.

The output science product is the intermediate SSF product (SSFI). The intermediate SSF is subsequently processed and completed by Subsystem 4.5-4.6, and the resulting final SSF is an hourly CERES archival product that contains footprint geometry, radiance information, and the statistics for full footprint, clear footprint, cloudy footprint and overlap footprint areas. The secondary output products are the quality control reports. The quality control reports contain processing information, informative messages, and statistics. In Release 3, Subsystem 4.4 creates both a formatted (ASCII) report file (FQC) and a binary report file (FQCI) which is intended to be postprocessed by one or more of a variety of flexible programs for browsing, display, or data extraction.

#### **1.1.4 CER4.1-4.1P7 - Main Processor**

CER4.1-4.1P7 consists of two executables. The initial one is Cloud Retrieval Subsystem that produces a set of imager pixel clouds properties. It is followed by Convolution Subsystem that averages cloud microphysical and optical properties from imager pixels that are within the field of view of the CERES footprints.

The objective of the Cloud Retrieval Subsystem is to use high spectral and spatial resolution cloud imager data to determine cloud microphysical and optical properties. The major Cloud Retrieval science requirements include:

1. Prepare a "chunk" of pixels (multiple scan lines of imager data): Attach the imager radiometric data and various ancillary data to each imager pixel within the chunk. Classify each pixel as clear, cloudy, or uncertain. The pixel classification process uses various tests on the imager radiometric data and ancillary data to determine a cloud mask.
2. Determine cloud macrophysical properties (cloud layer and cloud top pressure) for cloudy pixels.

3. Determine cloud microphysical and optical properties (cloud base, effective radiating center, temperature, pressure, particle phase, particle size, optical depth at 0.65 micron, water/ice path, emittance at 10.8 micron, etc.) for cloudy pixels.

The primary input data sets for the Release 3 Cloud Retrieval Subsystem are:

1. Cloud Imager Data (CID): The CID product contains time code, pixel location, viewing geometry, and radiance data. The Release 3 test data are Visible Infrared Scanner, VIRS, and Moderate Resolution Imager Spectroradiometer, MODIS, imager data from the TRMM and Terra spacecraft, respectively, Visible Infrared Imaging Radiometer Suite, VIIRS.
2. SURFace MAP (SURFMAP): The SURFMAP data product is a set of maps for elevation, water content, scene ID, ecosystem, snow depth, ice coverage, and a terrain map on a 10-minute equal-angle grid.
3. Meteorological, Ozone, and Aerosol (MOA): The MOA data product contains meteorological data on the 1.0 x 1.0-degree European Center for Medium-range Weather Prediction (primary) or the 2.0 x 2.5-degree Data Assimilation Office (DAO) grid. (Surface temperature, surface pressure, atmospheric temperature, humidity, ozone and wind velocity profiles, precipitable water, column ozone and aerosols.)
4. Clear Radiance History (CRH): The Release 3 CRH data product contains albedo, brightness temperature, and the cosine of the solar zenith angle on a 10-minute equal-angle grid.

The primary output products of the Cloud Retrieval Subsystem are:

1. Cookiedough: The pixel-based cloud properties, input to Subsystem 4.4
2. CloudVis and Subset CloudVis: Visualization products
3. A binary Quality Control (QC) report
4. CRH\_Update: Contains CRH values for all clear pixels in the hour

The objective of the Convolution Subsystem is to average the higher spectral and spatial resolution cloud imager data derived cloud microphysical and optical properties within the larger CERES footprint weighted by the CERES instruments point spread function. This provides a set of cloud properties optimally designed for studies of the role of clouds in the Earth's radiation budget, and enables the cloud physical properties to be tied to the cloud broadband radiative properties in a consistent manner. This initial estimate of cloud properties is modified in Subsystem 5 to obtain consistency in cloud properties and Top-of-the-Atmosphere (TOA) broadband radiative fluxes.

The major objectives of this Subsystem include:

1. Locate imager pixels within a CERES footprint by calculating the value of the Point Spread Function (PSF) for each pixel with respect to the centroid of the CERES field of view (FOV). If the PSF value exceeds a specified threshold value, the pixel is included in the footprint.

2. Accumulate statistics of cloud properties for all imager pixels within the CERES footprint and write the footprint records to the intermediate Single Scanner Footprint TOA and Surface Fluxes Clouds (SSF) output file.
3. Write diagnostic and statistical information from each run to the Quality Control (QC) report files.

The primary input data sets for the Convolution Subsystem are:

1. The CERES Instrument Earth Scans (IES) data product contains time of observation, geolocation data, and filtered radiances for each footprint in spatial order. The CERES footprint effective diameter is 10 km for Tropical Rainfall Measuring Mission (TRMM) spacecraft and 20 km for EOS AM and PM spacecraft. IES file from both TRMM and Terra are used as the test data sets for Release 3.
2. The cloud imager data from Advanced Very High Resolution Radiometer (AVHRR), Visible Infrared Scanner (VIRS), Moderate-Resolution Imaging Spectroradiometer (MODIS), or Visible Infrared Imaging Radiometer Suite (VIIRS) are processed by Subsystems 4.1 - 4.3 and passed to convolution via the Imager Pixel Data file, commonly designated "Cookiedough." This file represents a two-dimensional array (N scanlines by M pixels per scanline) with a data structure associated with each pixel containing pixel location, viewing geometry, observation time, multispectral radiance data, scene type, and cloud properties as determined in Subsystems 4.1 through 4.3.

The output science product is the intermediate SSF product (SSFI). The intermediate SSF is subsequently processed and completed by Subsystem 4.5-4.6, and the resulting final SSF is an hourly CERES archival product that contains footprint geometry, radiance information, and the statistics for full footprint, clear footprint, cloudy footprint and overlap footprint areas. The secondary output products are the quality control reports. The quality control reports contain processing information, informative messages, and statistics. In Release 3, Subsystem 4.4 creates both a formatted (ASCII) report file (FQC) and a binary report file (FQCI) which is intended to be postprocessed by one or more of a variety of flexible programs for browsing, display, or data extraction.

#### **1.1.5 CER4.1-4.2P4 - Daily QC Processor**

The Daily QC processor reads all available gridded and binned QC files for a given day and generates the respective daily averaged QC files.

The primary input data sets for the PGE are:

EQCHG: Contains gridded quality control information in a binary format for an hour.

EQCHB: Contains binned quality control information in a binary format for an hour.

The output science products are a new clear-sky reflectance map for the next day, a daily gridded quality control report, and a daily binned quality control report.

#### **1.1.6 CER4.1-4.2P5 - Daily CRH Processor**

The Daily CRH processor reads all available CRH\_Update files for a given day and generates an updated CRH file for the next day's processing.

The primary input data sets for the PGE are:

ECRHU: Contains CRH values for all clear pixels in an hour.

The output science products are a new clear-sky reflectance map for the next day.

#### **1.1.7 CER4.1-4.2P6 - Daily QC Processor**

The Daily QC processor reads all available gridded and binned QC files for a given day and generates the respective daily averaged QC files.

The primary input data sets for the PGE are:

EQCHG: Contains gridded quality control information in a binary format for an hour.

EQCHB: Contains binned quality control information in a binary format for an hour.

The output science products are a new clear-sky reflectance map for the next day, a daily gridded quality control report, and a daily binned quality control report.

#### **1.1.8 CER4.1-4.2P7 - Daily CRH Processor**

The Daily CRH processor reads all available CRH\_Update files for a given day and generates an updated CRH file for the next day's processing.

The primary input data sets for the PGE are:

ECRHU: Contains CRH values for all clear pixels in an hour.

The output science products are a new clear-sky reflectance map for the next day.

#### **1.1.9 CER4.1-4.3P3 - Monthly QC Processor**

The Monthly QC Processor reads all available binned and gridded QC for a given day and generates the respective monthly averaged QC files.

The primary input data sets for the Monthly QC Processor are:

EQCDG: The daily gridded QC file produced by CER4.1-4.2P4.

EQCDB: The daily binned QC file produced by CER4.1-4.2P4.

Note: A file listing of expected output for each PGE can be found in the following directory:

**\$CERESHOME/clouds/data\_exp**

#### **1.1.10 CER4.1-4.3P4 - Monthly QC Processor**

The Monthly QC Processor reads all available binned and gridded QC for a given day and generates the respective monthly averaged QC files.

The primary input data sets for the Monthly QC Processor are:

EQCDG: The daily gridded QC file produced by CER4.1-4.2P6.

EQCDB: The daily binned QC file produced by CER4.1-4.2P6.

Note: A file listing of expected output for each PGE can be found in the following directory:  
**\$CERESHOME/clouds/data\_exp**

## 2.0 Software and Data File Installation Procedures

This section describes how to install the Subsystems 4.1 through 4.4 Cloud Retrieval and Convolution software in preparation for making the necessary test runs at the Langley Atmospheric Science Data Center (ASDC). The installation procedures include instructions for uncompressing and untarring the delivered tar files, properly defining environmental variables, and compiling the Cloud Retrieval and Convolution programs.

### 2.1 Installation

Software/Data File Install Procedure:

1. All Software Installation and Test Procedures **must** be run from a t-shell (tcsh). Running otherwise could potentially produce bizarre results.
2. The scripts, makefiles, and Process Control Files in the Subsystems 4.1 through 4.4 delivery package expect the CERES environment variable, **\$CERESENV**, to point to a file which sets the following environment variables:

<b>CPUTYPE</b>	-	<b>Host machine type (ppc64 or x86 64)</b>
<b>PGSDIR</b>	-	<b>Directory for Toolkit libraries</b>
<b>F90</b>	-	<b>Pointer to the SGI F90 64 bit compiler</b>
<b>InputArchive</b>	-	<b>Top Directory of Archived input files</b>
<b>InputArchiveSS</b>	-	<b>Top Directory of input/output files from current subsystem</b>
<b>InputArchiveInt</b>	-	<b>Top Directory of input files from another subsystem</b>
<b>CERESHOME</b>	-	<b>Top Directory for CERES Software</b>
<b>MOA_Dir</b>	-	<b>Top Directory of input MOA files</b>
<b>PGSMMSG</b>	-	<b>Directory which contains Toolkit and CERES Status Message Files</b>
<b>PGSLIB</b>	-	<b>Directory which contains SGI 64-bit Toolkit library file</b>
<b>F90COMP</b>	-	<b>SGI F90 compiler options</b>
<b>FCOMP</b>	-	<b>SGI F90 compiler options for f77</b>
<b>CFLAGS</b>	-	<b>SGI C compiler options</b>
<b>PGSINC</b>	-	<b>Pointer to the PGS include file directory</b>
<b>HDFDIR</b>	-	<b>Pointer to the HDF home directory</b>
<b>HDFINC</b>	-	<b>Pointer to the HDF include files</b>
<b>HDFEOSDIR</b>	-	<b>Pointer to the HDFEOS Directory</b>
<b>HDFEOSLIB</b>	-	<b>Pointer to the HDFEOS Library</b>

Failing definition of **\$CERESENV**, subsystem analysts source **/CERES/lib/sgi\_lib/ceres-env.csh** on *thunder/lightning* or **/ENG/CERES/lib/ceres-env.csh** on *warlock* in their login scripts.

3. Change directory to the directory where you plan to install the Cloud Retrieval and Convolution Subsystems. (The following instructions assume that the directory will be **\$CERESHOME**.)

```
cd $CERESHOME
```

4. Uncompress and untar all delivered tar files.

The uncompressed files take up almost 4 Gbytes of disk space. Please allow for sufficient space to accommodate them. Certain input files are output from other Subsystems (SS1 and SS12). These include the IES, MOA, and attitude and ephemeris files. For convenience, these files were placed in the appropriate instrument and sarb directories and included in the tar files from those directories.

You must have write permission to the instrument and sarb partitions when untarring the files.

## **2.2 Compilation**

To create the required Product Generation System (PGS) include and message files for Subsystems 4.1 - 4.4 it will be necessary to execute the smfcompile utility on the files **CERES\_25450.t**, **CERES\_25460.t**, and **FOOTPRINT\_25500.t**:

```
cd $CERESHOME/clouds/smf  
$CERESLIB/bin/smfcompile_all.csh
```

Below are the instructions to compile the source code for each PGE as well as any necessary libraries.

### **2.2.1 Compiling PGE CER4.1-4.0P2**

To compile libraries and executables for this PGE, execute the following sequence of commands on an x86 machine:

```
cd $CERESHOME/clouds/CER4.1-4.0P2/src  
source $CERESHOME/clouds/CER4.1-4.0P2/rcf/CER4.1-4.env  
$CERESHOME/clouds/CER4.1-4.0P2/lib/makeall clean  
$CERESHOME/clouds/CER4.1-4.0P2/lib/makeall  
$CERESHOME/clouds/CER4.1-4.0P2/src/makeall clean  
$CERESHOME/clouds/CER4.1-4.0P2/src/makeall
```

Execution of the make script is indicated by a scrolling list of those libraries and executables currently being compiled. Warning messages are allowed. Successful compilation is indicated by:

```
*****  
* Compilation Successful *  
*****
```

Anything else indicates failure.



The following executables should be created in the **\$CERESHOME/clouds/CER4.1-4.0P2/bin** directory:

**CER4.1-4.0P2.SnowIce\_\$CPUTYPE.exe**

### **2.2.2 Compiling PGE CER4.1-4.0P3**

To compile libraries and executables for this PGE, execute the following sequence of commands on an x86 machine:

```
cd $CERESHOME/clouds/CER4.1-4.0P3/src
source $CERESHOME/clouds/CER4.1-4.0P3/rcf/CER4.1-4.env
$CERESHOME/clouds/CER4.1-4.0P3/lib/makeall clean
$CERESHOME/clouds/CER4.1-4.0P3/lib/makeall
$CERESHOME/clouds/CER4.1-4.0P3/src/makeall clean
$CERESHOME/clouds/CER4.1-4.0P3/src/makeall
```

Execution of the make script is indicated by a scrolling list of those libraries and executables currently being compiled. Warning messages are allowed. Successful compilation is indicated by:

```
*****
* Compilation Successful *
*****
```

Anything else indicates failure.

The following executables should be created in the **\$CERESHOME/clouds/CER4.1-4.0P3/bin** directory:

**CER4.1-4.0P3.SnowIce\_\$CPUTYPE.exe**

### **2.2.3 Compiling PGE CER4.1-4.1P6**

To compile libraries and executables for this PGE, execute the following sequence of commands for the appropriate PGE on an x86 machine:

```
cd $CERESHOME/clouds/CER4.1-4.1P6/rcf
source CER4.1-4.env 6
$CERESHOME/clouds/CER4.1-4.1P6/lib/makeall
$CERESHOME/clouds/CER4.1-4.1P6/src/makeall
```

Execution of the make script is indicated by a scrolling list of those libraries and executables currently being compiled. Warning messages are allowed.

If successful, the following libraries should be created in the **\$CERESHOME/clouds/CER4.1-4.1P6/lib/lib** directory:

```
libavhrr_x86_64.a
libCloudsCommon_x86_64.a
libCloudsHDF_x86_64.a
libCloudsNetCDF_x86_64.a
libco2_x86_64.a
libmcrs_x86_64.a
libModisGeoL1B_x86_64.a
libModisRadExtendL1B_x86_64.a
libModisRadSSL1B_x86_64.a
libModisAerosolL2_x86_64.a
libvint_x86_64.a
libvirs_x86_64.a
libwelch_x86_64.a
```

And the following executables should be created in the **\$CERESHOME/clouds/CER4.1-4.1P6/bin** directory:

```
CER4.1-4.1P6.footprint_x86_64.exe
CER4.1-4.1P6.retrieval_x86_64.exe
```

## 2.2.4 Compiling PGE CER4.1-4.1P7

A single make script to compile all libraries and executables covered by this Test Plan is provided in the directory **\$CERESHOME/clouds/src**. To run the make script, execute the following sequence of commands for the appropriate PGE:

```
cd $CERESHOME/clouds/CER4.1-4.1P7/rcf
source CER4.1-4.env
$CERESHOME/clouds/CER4.1-4.1P7/lib/makeall
$CERESHOME/clouds/CER4.1-4.1P7/src/makeall
```

Execution of the make script is indicated by a scrolling list of those libraries and executables currently being compiled. Warning messages are allowed. Successful compilation is indicated by:

```
*****
* Compilation Successful *
*****
```

Anything else indicates failure.

The following executables should be created in the **\$CERESHOME/clouds/CER4.1-4.1P7/bin** directory:

**CER4.1-4.1P7.footprint\_\$CPUTYPE.exe**  
**CER4.1-4.1P7.retrieval\_\$CPUTYPE.exe**

### **2.2.5 Compiling PGE CER4.1-4.2P4**

A single make script to compile all libraries and executables covered by this Test Plan is provided in the directory **\$CERESHOME/clouds/src**. To run the make script, execute the following sequence of commands on an x86 machine:

```
cd $CERESHOME/clouds/CER4.1-4.2P4/rcf  

source CER4.1-4.env 6  

$CERESHOME/clouds/CER4.1-4.1P6/lib/makeall (if libraries not already made)  

$CERESHOME/clouds/CER4.1-4.2P4/src/makeall
```

Execution of the make script is indicated by a scrolling list of those libraries and executables currently being compiled. Warning messages are allowed.

If successful, the following executables should be created in the **\$CERESHOME/clouds/CER4.1-4.2P4/bin** directory:

**CER4.1-4.2P4.DailyBinned\_x86\_64.exe**  
**CER4.1-4.2P4.UpdateQC\_x86\_64.exe**

### **2.2.6 Compiling PGE CER4.1-4.2P5**

A single make script to compile all libraries and executables covered by this Test Plan is provided in the directory **\$CERESHOME/clouds/src**. To run the make script, execute the following sequence of commands on an x86 machine:

```
cd $CERESHOME/clouds/CER4.1-4.2P5/rcf  

source CER4.1-4.env 6  

$CERESHOME/clouds/CER4.1-4.1P6/lib/makeall (if libraries not already made)  

$CERESHOME/clouds/CER4.1-4.2P5/src/makeall
```

Execution of the make script is indicated by a scrolling list of those libraries and executables currently being compiled. Warning messages are allowed

If successful, the following executables should be created in the **\$CERESHOME/clouds/CER4.1-4.2P5/bin** directory:

**CER4.1-4.2P5.UpdateCRH0063SF\_x86\_64.exe**  
**CER4.1-4.2P5.UpdateCRH0063SFSC\_x86\_64.exe**  
**CER4.1-4.2P5.UpdateCRH0160SF\_x86\_64.exe**  
**CER4.1-4.2P5.UpdateCRH0213SF\_x86\_64.exe**  
**CER4.1-4.2P5.UpdateCRH0124SC\_x86\_64.exe**  
**CER4.1-4.2P5.UpdateCRH0124SF\_x86\_64.exe**

### 2.2.7 Compiling PGE CER4.1-4.2P6

A single make script to compile all libraries and executables covered by this Test Plan is provided in the directory **\$CERESHOME/clouds/src**. To run the make script, execute the following sequence of commands:

```
cd $CERESHOME/clouds/CER4.1-4.2P6/rcf
source CER4.1-4.env
$CERESHOME/clouds/CER4.1-4.1P7/lib/makeall
$CERESHOME/clouds/CER4.1-4.2P6/src/makeall
```

Execution of the make script is indicated by a scrolling list of those libraries and executables currently being compiled. Warning messages are allowed. Successful compilation is indicated by:

```
*****
* Compilation Successful *
*****
```

Anything else indicates failure.

The following executables should be created in the **\$CERESHOME/clouds/CER4.1-4.2P6/bin** directory:

```
CER4.1-4.2P6.DailyBinned_$CPUTYPE.exe
CER4.1-4.2P6.ReadQC_$CPUTYPE.exe
CER4.1-4.2P6.UpdateQC_$CPUTYPE.exe
```

### 2.2.8 Compiling PGE CER4.1-4.2P7

A single make script to compile all libraries and executables covered by this Test Plan is provided in the directory **\$CERESHOME/clouds/src**. To run the make script, execute the following sequence of commands:

```
cd $CERESHOME/clouds/CER4.1-4.2P7/rcf
source CER4.1-4.env
$CERESHOME/clouds/CER4.1-4.1P7/lib/makeall
$CERESHOME/clouds/CER4.1-4.2P7/src/makeall
```

Execution of the make script is indicated by a scrolling list of those libraries and executables currently being compiled. Warning messages are allowed. Successful compilation is indicated by:

```
*****
* Compilation Successful *
*****
```

Anything else indicates failure.

The following executables should be created in the **\$CERESHOME/clouds/CER4.1-4.2P7/bin** directory:

```
CER4.1-4.2P7.UpdateCRH0063SF_$CPUTYPE.exe
CER4.1-4.2P7.UpdateCRH0063SFSC_$CPUTYPE.exe
CER4.1-4.2P7.UpdateCRH0160SF_$CPUTYPE.exe
CER4.1-4.2P7.UpdateCRH0160SC_$CPUTYPE.exe
CER4.1-4.2P7.UpdateCRH0213SF_$CPUTYPE.exe
CER4.1-4.2P7.UpdateCRH0124SC_$CPUTYPE.exe
CER4.1-4.2P7.UpdateCRH0124SF_$CPUTYPE.exe
```

### **2.2.9 Compiling PGE CER4.1-4.3P3**

A single make script to compile all libraries and executables covered by this Test Plan is provided in the directory **\$CERESHOME/clouds/src**. To run the make script, execute the following sequence of commands on an x86 machine:

```
cd $CERESHOME/clouds/CER4.1-4.3P3/rcf
source CER4.1-4.env 6
$CERESHOME/clouds/CER4.1-4.1P6/lib/makeall (if libraries not already made)
$CERESHOME/clouds/CER4.1-4.3P3/src/makeall
```

Execution of the make script is indicated by a scrolling list of those libraries and executables currently being compiled. Warning messages are allowed. If successful, the following executable should be created in the **\$CERESHOME/clouds/CER4.1-4.3P3/bin** directory:

```
CER4.1-4.3P3.ProduceMonthlyQC_x86_64.exe
```

### **2.2.10 Compiling PGE CER4.1-4.3P4**

A single make script to compile all libraries and executables covered by this Test Plan is provided in the directory **\$CERESHOME/clouds/src**. To run the make script, execute the following sequence of commands:

```
cd $CERESHOME/clouds/CER4.1-4.3P4/rcf
source CER4.1-4.env
$CERESHOME/clouds/CER4.1-4.1P7/lib/makeall
$CERESHOME/clouds/CER4.1-4.3P4/src/makeall
```

Execution of the make script is indicated by a scrolling list of those libraries and executables currently being compiled. Warning messages are allowed. Successful compilation is indicated by:

```
*****
* Compilation Successful *
*****
```

Anything else indicates failure.

The following executables should be created in the **\$CERESHOME/clouds/CER4.1-4.3P4/bin** directory:

**CER4.1-4.3P4.ProduceMonthlyQC\_\$CPUTYPE.exe**

### 3.0 Test and Evaluation Procedures - CER4.1-4.0P2 Snow and Ice Processor

This section provides information on how to execute PGE CER4.1-4.0P2. It also provides an overview of the test and evaluation procedures. It includes a description of what is being tested and the order in which the tests should be performed.

#### 3.1 Stand Alone Test Procedures

##### 3.1.1 Execution

**For 8th MESH NESDIS testing:**

Command Line Instructions:

```
cd $CERESHOME/clouds/CER4.1-4.0P2/rcf
source CER4.1-4.env 1 1
Run.CER4.1-4.Cleanup.pl $testdate
CER4.1-4.0P2-SGE_Driver.pl -date $testdate
```

The submitted jobs can be monitored with the **qstat** command and by following the content of the SGE log files

```
$CERESHOME/clouds/sge_logs/$PGENAME/$PGENAME\_SSS4_0\_PS4_0\_
$CC4_0P1.$testdate.o*
```

Job submission status can be found in the file:

```
$CERESHOME/clouds/$PGENAME/rcf/pcf/summary/$PGENAME\_SSS4_0\_
PS4_0\_CC4_0P1.$testdate.summary
```

**For 8th MESH CLASS testing:**

Command Line Instructions :

```
cd $CERESHOME/clouds/CER4.1-4.0P2/rcf
source CER4.1-4.env 1 2
Run.CER4.1-4.Cleanup.pl $testdate
CER4.1-4.0P2-SGE_Driver.pl -date $testdate
```

The submitted jobs can be monitored with the **qstat** command and by following the content of the SGE log files

```
$CERESHOME/clouds/sge_logs/$PGENAME/$PGENAME\_SSS4_0\_PS4_0\_C
C4_0P1.$testdate.o*
```

Job submission status and job progress file can be found in the file:

**\$CERESHOME/clouds/\$PGENAME/rcf/pcf/summary/\$PGENAME\\_SSS4\_0\\_PS4\_0\\_CC4\_0P1.\$testdate.summary**

### For 16th NESDIS MESH:

Command Line Instructions :

```
cd $CERESHOME/clouds/CER4.1-4.0P2/rcf
source CER4.1-4.env 2
Run.CER4.1-4.Cleanup.pl $testdate
CER4.1-4.0P2-SGE_Driver.pl -date $testdate
```

The submitted jobs can be monitored with the **qstat** command and by following the content of the SGE log files

**\$CERESHOME/clouds/sge\_logs/\$PGENAME/\$PGENAME\\_SSS4\_0\\_PS4\_0\\_CC4\_0P1.\$testdate.o\***

Job submission status can be found in the file:

**\$CERESHOME/clouds/\$PGENAME/rcf/pcf/summary/\$PGENAME\\_SSS4\_0\\_PS4\_0\\_CC4\_0P1.\$testdate.summary**

Note: A file listing of expected output for each PGE can be found in the following file:

**\$CERESHOME/clouds/data\_exp/out\_description\_CER4.1-4.0P2.txt**

### 3.1.2 Exit Codes

All CER4.1-4.0P2 software terminates using the CERES defined EXIT CODES for the Langley TRMM Information System (LaTIS). Successful completion is indicated by an exit code of 0.

### 3.1.3 Snow and Ice Processor Test Summary

PGE Number	PGE Name	Run Time (mm:ss)	Disk Storage (MB)	Memory (MB)
CER4.1-4.0P2	Snow and Ice Processor	00:03	05	65

## 3.2 Evaluation Procedures

### 3.2.1 Log and Status File Results

The Log and Status files are created by the Toolkit and are located in the directory

**\$CERESHOME/clouds/runlogs** after the PGE has been executed. The comparisons of the Log and status files with their expected outputs are handled in Section [3.2.3](#).



### 3.2.2 Metadata Evaluation

Metadata files for this PGE are created at runtime and are located with their corresponding output files. The comparisons of the metadata files with their expected results are handled in Section [3.2.3](#).

### 3.2.3 Execution of Comparison Software

The evaluation software for this Subsystem will compare the ASDC generated output with the expected output included with this delivery package. To run the comparison software, execute the following command:

**For 8th MESH NESDIS cases:**

```
source $CERESHOME/clouds/CER4.1-4.0P2/rcf/CER4.1-4.env 1 1
$CERESHOME/clouds/test_suites/bin/CER4.1-4.Validate.pl job=$testdate
```

**For 8th MESH CLASS cases:**

```
source $CERESHOME/clouds/CER4.1-4.0P2/rcf/CER4.1-4.env 1 2
$CERESHOME/clouds/test_suites/bin/CER4.1-4.Validate.pl job=$testdate
```

**For 16th MESH cases:**

```
source $CERESHOME/clouds/CER4.1-4.0P2/rcf/CER4.1-4.env 2
$CERESHOME/clouds/test_suites/bin/CER4.1-4.Validate.pl job=$testdate
```

### 3.2.4 Evaluation of Comparison Software Output

See [Appendix B](#) for a description of the output from the Comparison Software.

## 3.3 Solutions to Possible Problems

1. Output files are opened with Status = NEW. If any of these files exist when the generating PGE is executed, the PGE will fail. These files must be removed before any attempt is made to re-run any of the PGEs after the initial run is made. The Toolkit Log files also need to be deleted before each run to be consistent with the expected output. The specific problems can generally be found in the LogReport and/or LogStatus files. NOTE: For testing purposes only, if the test case must be re-run, you must first cleanup the PCF file generated from a previous run as shown below.

**For 8th MESH NESDIS cases:**

```
source $CERESHOME/clouds/CER4.1-4.0P2/rcf/CER4.1-4.env 1 1
$CERESHOME/clouds/CER4.1-4.0P2/rcf/Run.CER4.1-4.Cleanup.pl
$testdate
```

**For 8th MESH CLASS cases:**

```
source $CERESHOME/clouds/CER4.1-4.0P2/rcf/CER4.1-4.env 1 2
$CERESHOME/clouds/CER4.1-4.0P2/rcf/Run.CER4.1-4.Cleanup.pl
$testdate
```

**For 16th MESH cases:**

```
source $CERESHOME/clouds/CER4.1-4.0P2/rcf/CER4.1-4.env 2  
$CERESHOME/clouds/CER4.1-4.0P2/rcf/Run.CER4.1-4.Cleanup.pl  
$testdate
```

Please contact Subsystem Lead for assistance if the cleanup and test case re-run are unsuccessful.

2. Many problems encountered during compilation, linking, and execution are due to incorrect environment configuration. Generally, these problems make themselves readily apparent via compiler errors or termination of the program during the initialization stage during the first few seconds of execution.

## 4.0 Test and Evaluation Procedures - CER4.1-4.0P3 Snow and Ice Processor

This section provides information on how to execute PGE CER4.1-4.0P3. It also provides an overview of the test and evaluation procedures. It includes a description of what is being tested and the order in which the tests should be performed.

### 4.1 Stand Alone Test Procedures

#### 4.1.1 Execution

##### Command Line Instructions :

```
cd $CERESHOME/clouds/CER4.1-4.0P3/rcf
source CER4.1-4.env
Run.CER4.1-4.Cleanup.pl $testdate
CER4.1-4.0P3-SGE_Driver.pl -date $testdate
```

The submitted jobs can be monitored with the **qstat** command and by following the content of the SGE log files

```
$CERESHOME/clouds/sge_logs/$PGENAME/$PGENAME\_SSS4_0\_PS4_0\_
$CC4_0P1.$testdate.o*
```

Job submission status can be found in the file:

```
$CERESHOME/clouds/$PGENAME/rcf/pcf/summary/$PGENAME\_SSS4_0\_
PS4_0\_CC4_0P1.$testdate.summary
```

Note: A file listing of expected output for each PGE can be found in the following file:

```
$CERESHOME/clouds/data_exp/out_description_CER4.1-4.0P3.txt
```

#### 4.1.2 Exit Codes

All CER4.1-4.0P3 software terminates using the CERES defined EXIT CODES for the Langley TRMM Information System (LaTIS). Successful completion is indicated by an exit code of 0.

#### 4.1.3 Snow and Ice Processor Test Summary

PGE Number	PGE Name	Run Time (mm:ss)	Disk Storage (MB)	Memory (MB)
CER4.1-4.0P3	Snow and Ice Processor	00:03	05	65

## 4.2 Evaluation Procedures

### 4.2.1 Log and Status File Results

The Log and Status files are created by the Toolkit and are located in the directory `$CERESHOME/clouds/runlogs` after the PGE has been executed. The comparisons of the Log and status files with their expected outputs are handled in Section [4.2.3](#).

### 4.2.2 Metadata Evaluation

Metadata files for this PGE are created at runtime and are located with their corresponding output files. The comparisons of the metadata files with their expected results are handled in Section [4.2.3](#).

### 4.2.3 Execution of Comparison Software

The evaluation software for this Subsystem will compare the ASDC generated output with the expected output included with this delivery package. To run the comparison software, execute the following command:

```
source $CERESHOME/clouds/CER4.1-4.0P3/rcf/CER4.1-4.env  
$CERESHOME/clouds/test_suites/bin/CER4.1-4.Validate.pl job=$testdate
```

### 4.2.4 Evaluation of Comparison Software Output

See [Appendix B](#) for a description of the output from the Comparison Software.

## 4.3 Solutions to Possible Problems

1. Output files are opened with Status = NEW. If any of these files exist when the generating PGE is executed, the PGE will fail. These files must be removed before any attempt is made to re-run any of the PGEs after the initial run is made. The Toolkit Log files also need to be deleted before each run to be consistent with the expected output. The specific problems can generally be found in the LogReport and/or LogStatus files. NOTE: For testing purposes only, if the test case must be re-run, you must first cleanup the PCF file generated from a previous run as shown below.

```
source $CERESHOME/clouds/CER4.1-4.0P3/rcf/CER4.1-4.env  
$CERESHOME/clouds/CER4.1-4.0P3/rcf/Run.CER4.1-4.Cleanup.pl $testdate
```

Please contact Subsystem Lead for assistance if the cleanup and test case re-run are unsuccessful.

2. Many problems encountered during compilation, linking, and execution are due to incorrect environment configuration. Generally, these problems make themselves readily apparent via compiler errors or termination of the program during the initialization stage during the first few seconds of execution.

## 5.0 Test and Evaluation Procedures - CER4.1-4.1P6 Aqua and Terra Main Processor

This section provides information on how to execute PGE CER4.1-4.1P6. It also provides an overview of the test and evaluation procedures. It includes a description of what is being tested and the order in which the tests should be performed.

\*\*\*This testing is intended for code compilation and execution on an x86 machine.\*\*\*

### 5.1 Stand Alone Test Procedures

NOTE: This version of Edition4 testing defines the test case dates in the environment script via environment variables YYYY, MM, D1, D2, for year, month, day1, day2.

#### 5.1.1 Execution

**Terra-MODIS Testing:**

```
cd $CERESHOME/clouds/CER4.1-4.1P6/rcf/
source CER4.1-4.env 3
set DAY1=$YYYY$MM$D1
set DAY2=$YYYY$MM$D2
echo;echo Testing $PGENAME $SAT $DAY1 $DAY2;echo

CER4.1-4.1P6.CopyECS.pl $CERESHOME/clouds/ancillary/CER4.1-
4.1P6/static/CER_ECS/StartUp/$SAT $SS4_2 StartUp 015000 XXXX$MM
$CERESHOME/clouds/data $SS4_1 $PS4_1 $CC4_1 $DAY1
CER4.1-4.1P6.CopyECS.pl $CERESHOME/clouds/ancillary/CER4.1-
4.1P6/static/CER_ECS/StartUp/$SAT $SS4_2 StartUp 015000 XXXX$MM
$CERESHOME/clouds/data $SS4_1 $PS4_1 $CC4_1 $DAY2
Run.CER4.1-4.Cleanup.pl $DAY1\00 $DAY2\23
setenv PGENAME CER4.1-4.2P5
Run.CER4.1-4.Cleanup.pl $DAY2
setenv PGENAME CER4.1-4.1P6
Submit_1P6_2P5.pl -start_date $DAY1 -end_date $DAY2
```

The submitted jobs can be monitored with the **qstat** command and by following the content of the SGE log files

```
$CERESHOME/clouds/sge_logs/$PGENAME/$PGENAME\_SS4_4\_PS4_1\_C
C4_1.$DAY1??.*
$CERESHOME/clouds/sge_logs/$PGENAME/$PGENAME\_SS4_4\_PS4_1\_C
C4_1.$DAY2??.*
```

Job submission status and job progress file can be found in the file:

**\$CERESHOME/clouds/\$PGENAME/rcf/pcf/summary/\$PGENAME\\_SSS4\_4\\_PS4\_1\\_CC4\_1.\$DAY1\00-\$DAY2\23.summary**

Once all jobs are completed, a listing of outputs can be generated:

**\$CERESHOME/clouds/\$PGENAME/rcf/GetExpOutput.pl purpose=outdesc**

### **Aqua-MODIS Testing:**

```
cd $CERESHOME/clouds/CER4.1-4.1P6/rcf/
source CER4.1-4.env 6
set DAY1=$YYYY$MM$D1
echo;echo Testing $PGENAME $SAT $DAY1;echo
```

```
CER4.1-4.1P6.CopyECS.pl $CERESHOME/clouds/ancillary/CER4.1-
4.1P6/static/CER_ECS/StartUp/$SAT $SS4_2 StartUp 015000 XXXX$MM
$CERESHOME/clouds/data $SS4_1 $PS4_1 $CC4_1 $YYYY$MM$D1
Run.CER4.1-4.Cleanup.pl $DAY1+
CER4.1-4.1P6-SGE_Driver.pl -date $DAY1
```

The submitted jobs can be monitored with the **qstat** command and by following the content of the SGE log files

**\$CERESHOME/clouds/sge\_logs/\$PGENAME/\$PGENAME\\_SSS4\_4\\_PS4\_1\\_CC4\_1.\$DAY1??.\***

Job submission status and job progress file can be found in the file:

**\$CERESHOME/clouds/\$PGENAME/rcf/pcf/summary/\$PGENAME\\_SSS4\_4\\_PS4\_1\\_CC4\_1.\$DAY1\00-\$DAY1\23.summary**

Once all jobs are completed, a listing of outputs can be generated:

**\$CERESHOME/clouds/\$PGENAME/rcf/GetExpOutput.pl purpose=outdesc**

Note: A file listing of expected test output can be found in the following file:

**\$CERESHOME/clouds/data\_exp/out\_description\_\$PGENAME.txt**

### **5.1.2 Exit Codes**

All CER4.1-4.1P6 software terminates using the CERES defined EXIT CODES for the Langley TRMM Information System (LaTIS). Successful completion is indicated by an exit code of 0.

### 5.1.3 Main Processor Test Summary

PGE Number	PGE Name	Test Case	Run Time (hh:mm:ss)	Disk Storage (MB)	Memory (GB)
CER4.1-4.1P6	Cloud Property Retrieval and Convolution	Terra/Aqua	1:00:00	840	1.3

## 5.2 Evaluation Procedures

### 5.2.1 Log and Status File Results

The Log and Status files are created by the Toolkit and are located in the directory `$CERESHOME/clouds/runlogs` after the PGE has been executed. The comparisons of the Log and status files with their expected outputs are handled in Section 5.2.3.

### 5.2.2 Metadata Evaluation

Metadata files for this PGE are created at runtime and are located with their corresponding output files. The comparisons of the metadata files with their expected results are handled in Section 5.2.3.

### 5.2.3 Execution of Comparison Software

The evaluation software for this Subsystem will compare the ASDC generated output with the expected output included with this delivery package. To run the comparison software, execute the following commands:

#### Terra-MODIS Test Case:

```
cd $CERESHOME/clouds/test_suites
source $CERESHOME/clouds/CER4.1-4.1P6/rcf/CER4.1-4.env 3
bin/CER4.1-4.Validate.pl > scr/$PGENAME\_SAT\_val.out &
tail -f scr/$PGENAME\_SAT\_val.out
```

#### Aqua-MODIS Test Case:

```
cd $CERESHOME/clouds/test_suites
source $CERESHOME/clouds/CER4.1-4.1P6/rcf/CER4.1-4.env 6
bin/CER4.1-4.Validate.pl > scr/$PGENAME\_SAT\_val.out &
tail -f scr/$PGENAME\_SAT\_val.out
```

### 5.2.4 Evaluation of Comparison Software Output

See [Appendix B](#) for a description of the output from the Comparison Software.

### 5.3 Solutions to Possible Problems

1. Output files are opened with Status = NEW. If any of these files exist when the generating PGE is executed, the PGE will fail. These files must be removed before any attempt is made to re-run any of the PGEs after the initial run is made. The Toolkit Log files also need to be deleted before each run to be consistent with the expected output. The specific problems can generally be found in the LogReport and/or LogStatus files. NOTE: For testing purposes only, if the test cases must be re-run, you must first cleanup the PCF files generated from previous runs as shown below.

**For Terra-MODIS Case:**

```
cd $CERESHOME/clouds/CER4.1-4.1P6/rcf/  
source CER4.1-4.env 3  
Run.CER4.1-4.Cleanup.pl $YYYY$MM$D1 $YYYY$MM$D2
```

**For Aqua-MODIS Case:**

```
cd $CERESHOME/clouds/CER4.1-4.1P6/rcf/  
source CER4.1-4.env 6  
Run.CER4.1-4.Cleanup.pl $YYYY$MM$D1+
```

Please contact Subsystem Lead for assistance if the cleanup and test cases re-run are unsuccessful.

2. Many problems encountered during compilation, linking, and execution are due to incorrect environment configuration. Generally, these problems make themselves readily apparent via compiler errors or termination of the program during the initialization stage during the first few seconds of execution.
3. Most errors encountered during PCF generation will provide a diagnostic as to the problem. If problems persist, check for the presence of all the mandatory input files and stage if necessary or contact the analyst.



## 6.0 Test and Evaluation Procedures - CER4.1-4.1P7 NPP Main Processor

This section provides information on how to execute PGE CER4.1-4.1P7. It also provides an overview of the test and evaluation procedures. It includes a description of what is being tested and the order in which the tests should be performed.

### 6.1 Stand Alone Test Procedures

#### 6.1.1 Execution

```
cd $CERESHOME/clouds/CER4.1-4.1P7/rcf/
source CER4.1-4.env
CER4.1-4.1P7.CopyECS.pl $CERESHOME/clouds/ancillary/CER4.1-
4.1P7/static/CER_ECS/StartUp/$SAT $SS4_2 StartUp 015000 XXXX03
InputArchiveSS $SS4_2 $PS4_2 $CC4_2 20120304
Run.CER4.1-4.Cleanup.pl 2012030410
CER4.1-4.1P7-SGE_Driver.pl -date 20120304 -hour 10
```

Job submission status and job progress file can be found in the file:  
**\$CERESHOME/clouds/CER4.1-4.1P7/rcf/pcf/summary/CER4.1-4.1P7\_\$SS4\_4\\_PS4\_1\\_CC4\_1.2012030410.summary**

Note: A file listing of expected output for each PGE can be found in the following file:

**\$CERESHOME/clouds/data\_exp/out\_description1P7.txt**

#### 6.1.2 Exit Codes

All CER4.1-4.1P7 software terminates using the CERES defined EXIT CODES for the Langley TRMM Information System (LaTIS). Successful completion is indicated by an exit code of 0.

#### 6.1.3 Main Processor Test Summary

PGE Number	PGE Name	Test Case	Run Time (mm:ss)	Disk Storage (MB)	Memory (MB)
CER4.1-4.1P7	Cloud Property Retrieval and Convolution	NPP	2:20:00	100	454

## 6.2 Evaluation Procedures

### 6.2.1 Log and Status File Results

The Log and Status files are created by the Toolkit and are located in the directory **\$CERESHOME/clouds/runlogs** after the PGE has been executed. The comparisons of the Log and status files with their expected outputs are handled in Section [6.2.3](#).

### 6.2.2 Metadata Evaluation

Metadata files for this PGE are created at runtime and are located with their corresponding output files. The comparisons of the metadata files with their expected results are handled in Section [6.2.3](#).

### 6.2.3 Execution of Comparison Software

The evaluation software for this Subsystem will compare the ASDC generated output with the expected output included with this delivery package. To run the comparison software, execute the following commands:

**NOTE:** Comparisons cannot be run on the head node (*ab01*). Log onto a P6 (*ba102*) blade to run the following commands.

```
cd $CERESHOME/clouds/CER4.1-4.1P7/rcf
source CER4.1-4.env
$CERESHOME/clouds/test_suites/bin/CER4.1-4.Validate.pl CER4.1-4.1P7
```

### 6.2.4 Evaluation of Comparison Software Output

See [Appendix B](#) for a description of the output from the Comparison Software.

## 6.3 Solutions to Possible Problems

1. Output files are opened with Status = NEW. If any of these files exist when the generating PGE is executed, the PGE will fail. These files must be removed before any attempt is made to re-run any of the PGEs after the initial run is made. The Toolkit Log files also need to be deleted before each run to be consistent with the expected output. The specific problems can generally be found in the LogReport and/or LogStatus files. **NOTE:** For testing purposes only, if the test cases must be re-run, you must first cleanup the PCF files generated from previous runs as shown below.

```
cd $CERESHOME/clouds/CER4.1-4.1P7/rcf
source CER4.1-4.env
Run.CER4.1-4.Cleanup.pl 2012030410
```

Please contact Subsystem Lead for assistance if the cleanup and test cases re-run are unsuccessful.

2. Many problems encountered during compilation, linking, and execution are due to incorrect environment configuration. Generally, these problems make themselves readily apparent via compiler errors or termination of the program during the initialization stage during the first few seconds of execution.
3. Most errors encountered during PCF generation will provide a diagnostic as to the problem. If problems persist, check for the presence of all the mandatory input files and stage if necessary or contact the analyst.

## 7.0 Test and Evaluation Procedures - CER4.1-4.1P7/CER4.1-4.2P7 2-Day Processor

This section provides information on how to execute PGEs CER4.1-4.1P7 and CER4.1-4.2P7 in 2-day groupings. This helps to ensure that 2 days of Clear Sky Updates are executed by CER4.1-4.2P7 at the proper time - after 2 full days of CER4.1-4.1P7 have completed and before the next 2 days of CER4.1-4.1P7 begin. It also provides an overview of the test and evaluation procedures.

### 7.1.1 Execution

#### NPP-VIIRS 2-Day Testing:

(This method is not to be used in production unless special permission is given along with specific instructions on how to run the days that are not a whole month.)

```
cd $CERESHOME/clouds/CER4.1-4.1P7/rcf/
source CER4.1-4.env
Run.CER4.1-4.Cleanup.pl 20120127 20120128
source $CERESHOME/clouds/CER4.1-4.2P7/rcf/CER4.1-4.env
$CERESHOME/clouds/CER4.1-4.2P7/rcf/Run.CER4.1-4.Cleanup.pl 20120128
source CER4.1-4.env
CER4.1-4.1P7.CopyECS.pl $CERESHOME/clouds/ancillary/CER4.1-
4.1P7/static/CER_ECS/Startup/$SAT $SS4_2 Startup 015000 XXXX01
$InputArchiveSS $SS4_2 $PS4_2 $CC4_2 20120127
CER4.1-4.1P7.CopyECS.pl $CERESHOME/clouds/ancillary/CER4.1-
4.1P7/static/CER_ECS/Startup/$SAT $SS4_2 Startup 015000 XXXX01
$InputArchiveSS $SS4_2 $PS4_2 $CC4_2 20120128
Submit_1P7_2P7.pl -start_date 20120127 -end_date 20120128
```

(Enter your name “testing” and date when asked about permission to run a job that is not a whole month.)

Once all jobs submitted, sge status and job progress files can be found in the file:

```
$CERESHOME/clouds/CER4.1-4.1P7/rcf/pcf/summary/CER4.1-
4.1P7_$SS4_4_$PS4_1_$CC4_1.2012012700-2012012823.summary
```

#### NPP-VIIRS One Month Testing:

```
cd $CERESHOME/clouds/CER4.1-4.1P7/rcf/
source CER4.1-4.env
Run.CER4.1-4.Cleanup.pl 20120201 20120229
source $CERESHOME/clouds/CER4.1-4.2P7/rcf/CER4.1-4.env
$CERESHOME/clouds/CER4.1-4.2P7/rcf/Run.CER4.1-4.Cleanup.pl 20120202
20120229
source CER4.1-4.env
```

```

CER4.1-4.1P7.CopyECS.pl $CERESHOME/clouds/ancillary/CER4.1-4.1P7/static/CER_ECS/StartUp/$SAT $SS4_2 StartUp 015000 XXXX02
$InputArchiveSS $SS4_2 $PS4_2 $CC4_2 20120201
CER4.1-4.1P7.CopyECS.pl $CERESHOME/clouds/ancillary/CER4.1-4.1P7/static/CER_ECS/StartUp/$SAT $SS4_2 StartUp 015000 XXXX02
$InputArchiveSS $SS4_2 $PS4_2 $CC4_2 20120202
Submit_1P7_2P7.pl -run_month 201202

```

For each pair of days, once all jobs submitted, sge status and job progress files can be found in the file:

```

$CERESHOME/clouds/CER4.1-4.1P7/rcf/pcf/summary/CER4.1-4.1P7_$SS4_4\_PS4_1\_CC4_1.201202D100-201202D223.summary

```

Restart Instructions: In the event that the script halts, it can be restarted without harming the validation process. The pair of days where the failure occurred must be cleaned up for CER4.1-4.1P7 (D1 and D2) and CER4.1-4.2P7 (D2). Determine the problem and make corrections. Execution can then be resumed with dates ranging from the first cleaned up date to the end of the original date range. For Month run, replace -run\_month line argument with arguments -start YYYYMMDD1 -end YYYYMMDDL, where DL is the last day of month MM. See Section 7.3 for cleanup procedures.

Note: A file listing of expected output for each Clouds 1P7 and 2P7 test job in the 2 day and one month SGE executions can be found in the following file:

```

$CERESHOME/clouds/data_exp/out_description1P72P7.txt

```

### 7.1.2 Exit Codes

See Sections 6.1.2 and 11.1.2 for CER4.1-4.1P7 and CER4.1-4.2P7 exit codes, respectively.

### 7.1.3 Test Summary

PGE Number	PGE Name	Test Case	Run Time (mm:ss)	Disk Storage (MB)	Memory (MB)
CER4.1-4.1P7 and CER4.1-4.2P7	Cloud Property Retrieval and Convolution and Daily CRH Processor	NPP	3:00:00 (2-day) 48:00:00 (monthly)	2000 (2-day) 30000 (monthly)	1.3

## 7.2 Evaluation Procedures

### 7.2.1 Log and Status File Results

The Log and Status files are created by the Toolkit and are located in the directory **\$CERESHOME/clouds/runlogs** after the PGE has been executed. These files will be created for each hour of CER4.1-4.1P7 run and for each day of CER4.1-4.2P7 run. The comparisons of the Log and status files with their expected outputs are handled in Section 7.2.3.

### 7.2.2 Metadata Evaluation

Metadata files for this section are created at runtime and are located with their corresponding output files. These files will be created for each hour of CER4.1-4.1P7 run and for each day of CER4.1-4.2P7 run. The comparisons of the metadata files with their expected results are handled in Section 7.2.3.

### 7.2.3 Execution of Comparison Software

The evaluation software for this section will compare the ASDC generated output with the expected output included with this delivery package. To run the comparison software, execute the following commands:

#### NPP-VIIRS 2-Day Test:

**NOTE:** Comparisons cannot be run on the head node (*ab01*). Log onto a P6 (*ba102*) blade to run the following commands.

```
cd $CERESHOME/clouds/CER4.1-4.1P7/rcf
source CER4.1-4.env
cd $CERESHOME/clouds/test_suites
bin/CER4.1-4.Validate.pl CER4.1-4.1P7 3 >scr/NPPVal2Day_$PS4_1\vsEXP.out&
tail -f scr/NPPVal2Day_$PS4_1\vsEXP.out
```

(Optional command.

Enter <ctrl>-c when “VALIDATION COMPLETE” is printed to screen.

Must complete before continuing.)

```
cd $CERESHOME/clouds/CER4.1-4.2P7/rcf
source CER4.1-4.env
cd $CERESHOME/clouds/test_suites
bin/CER4.1-4.Validate.pl CER4.1-4.2P7 3 >>
scr/NPPVal2Day_$PS4_1\vsEXP.out&
tail -f scr/NPPVal2Day_$PS4_1\vsEXP.out
```

(Optional command.

Enter <ctrl>-c when “VALIDATION COMPLETE” is printed to screen.)

The file `$CERESHOME/clouds/test_suites/scr/NPPVal2Day_$PS4_1\vsEXP.out` contains the 2-Day Terra validation output. Search this file for the word “fail” to locate any comparison failures. Search this file for “does not exist” to locate missing validation files.

#### NPP-VIIRS One Month Test:

**NOTE:** Comparisons cannot be run on the head node (*ab01*). Log onto a P6 (*ba102*) blade to run the following commands.

```
cd $CERESHOME/clouds/CER4.1-4.1P7/rcf
source CER4.1-4.env
cd $CERESHOME/clouds/test_suites
bin/CER4.1-4.Validate.pl CER4.1-4.1P7 4 > scr/NPPVal1mo_$PS4_1\vsEXP.out&
tail -f scr/NPPVal1mo_$PS4_1\vsEXP.out
```

(Optional command.

Enter <ctrl>-c when “VALIDATION COMPLETE” is printed to screen.

Must complete before continuing.)

```
cd $CERESHOME/clouds/CER4.1-4.2P7/rcf
source CER4.1-4.env
cd $CERESHOME/clouds/test_suites
bin/CER4.1-4.Validate.pl CER4.1-4.2P7 4 >> scr/NPPVal1mo_$PS4_1\vsEXP.out&
tail -f scr/NPPVal1mo_$PS4_1\vsEXP.out
```

(Optional command.

Enter <ctrl>-c when “VALIDATION COMPLETE” is printed to screen.)

The file `$CERESHOME/clouds/test_suites/scr/NPPVal1mo_$PS4_1\vsEXP.out` contains the validation output. Search this file for the word “fail” to locate any comparison failures. Search this file for “does not exist” to locate missing validation files.

NOTE : One Month Validation can be executed BEFORE the whole month has finished running, to check how the days run so far compare. Just ignore all validation output that occurs for jobs not yet complete.

#### 7.2.4 Evaluation of Comparison Software Output

See [Appendix B](#) for a description of the output from the Comparison Software.

### 7.3 Solutions to Possible Problems

1. Output files are opened with Status = NEW. If any of these files exist when the generating PGE is executed, the PGE will fail. These files must be removed before any attempt is made to re-run any of the PGEs after the initial run is made. The Toolkit Log files also need to be deleted before each run to be consistent with the expected output. The specific problems can generally be found in the LogReport and/or LogStatus files. NOTE: For testing purposes only, if the test cases must be re-run, you must first cleanup the PCF files generated from previous runs as shown below.

#### NPP-VIIRS 2-Day Testing:

```
cd $CERESHOME/clouds/CER4.1-4.1P7/rcf
source CER4.1-4.env
Run.CER4.1-4.Cleanup.pl 20120127 20120128
```

```
cd $CERESHOME/clouds/CER4.1-4.2P7/rcf  
source CER4.1-4.env  
Run.CER4.1-4.Cleanup.pl 20120128
```

**NPP-VIIRS One Month Testing:**

```
cd $CERESHOME/clouds/CER4.1-4.1P7/rcf  
source CER4.1-4.env  
Run.CER4.1-4.Cleanup.pl 20120201 20120229  
cd $CERESHOME/clouds/CER4.1-4.2P7/rcf  
source CER4.1-4.env  
Run.CER4.1-4.Cleanup.pl 20120202 20120229
```

For restarting a monthly run from a point of failure during days D1 and D2, replace 20120201 with 201202D1 in the 1P7 cleanup and replace 20120202 with 201202D2 in the 2P7 cleanup. Then restart with the commands:

```
cd $CERESHOME/clouds/CER4.1-4.1P7/rcf/  
source CER4.1-4.env  
Submit_1P7_2P7.pl -start_date 201202D1 -end_date 20120229
```

Please contact Subsystem Lead for assistance if the cleanup and test cases re-run are unsuccessful.

2. Many problems encountered during compilation, linking, and execution are due to incorrect environment configuration. Generally, these problems make themselves readily apparent via compiler errors or termination of the program during the initialization stage during the first few seconds of execution.

## 8.0 Test and Evaluation Procedures - CER4.1-4.2P4 Daily QC Processor

This section provides information on how to execute PGE CER4.1-4.2P4. It also provides an overview of the test and evaluation procedures. It includes a description of what is being tested and the order in which the tests should be performed.

\*\*\*This testing is intended for code compilation and execution on an x86 machine.\*\*\*

### 8.1 Stand Alone Test Procedures

#### 8.1.1 Execution

##### Terra-MODIS Testing:

```
cd $CERESHOME/clouds/CER4.1-4.2P4/rcf/
source CER4.1-4.env 3
set DAY1=$YYYY$MM$D1
set DAY2=$YYYY$MM$D2
echo;echo Testing $PGENAME $SAT $DAY1 $DAY2;echo
```

```
Run.CER4.1-4.Cleanup.pl $DAY1 $DAY2
CER4.1-4.2P4-SGE_Driver.pl -start $DAY1 -end $DAY2
```

The submitted jobs can be monitored with the **qstat** command and by following the content of the SGE log files

```
$CERESHOME/clouds/sge_logs/$PGENAME/$PGENAME\_SS4_1\_PS4_1\_
$CC4_1.$DAY1.o*
$CERESHOME/clouds/sge_logs/$PGENAME/$PGENAME\_SS4_1\_PS4_1\_
$CC4_1.$DAY2.o*
```

Job submission status and job progress file can be found in the file:

```
$CERESHOME/clouds/$PGENAME/rcf/pcf/summary/$PGENAME\_SS4_1\_PS
4_1\_CC4_1.$DAY1-$DAY2.summary
```

Once all jobs are completed, a listing of outputs can be generated:

```
$CERESHOME/clouds/$PGENAME/rcf/GetExpOutput.pl purpose=outdesc
```

##### Aqua-MODIS Testing:

```
cd $CERESHOME/clouds/CER4.1-4.2P4/rcf/
source CER4.1-4.env 6
set DAY1=$YYYY$MM$D1
echo; echo Testing $PGENAME $SAT $DAY1 ;echo
```

```
Run.CER4.1-4.Cleanup.pl $DAY1
CER4.1-4.2P4-SGE_Driver.pl -date $DAY1
```



The submitted job can be monitored with the **qstat** command and by following the content of the SGE log file

**\$CERESHOME/clouds/sgc\_logs/\$PGENAME/\$PGENAME\\_SSS4\_1\\_PS4\_1\\_CC4\_1.\$DAY1.o\***

Job submission status and job progress file can be found in the file:

**\$CERESHOME/clouds/\$PGENAME/rcf/pcf/summary/\$PGENAME\\_SSS4\_1\\_PS4\_1\\_CC4\_1.\$DAY1.summary**

Once all jobs are completed, a listing of outputs can be generated:

**\$CERESHOME/clouds/\$PGENAME/rcf/GetExpOutput.pl purpose=outdesc**

Note: A file listing of expected test output can be found in the following file:

**\$CERESHOME/clouds/data\_exp/out\_description\_\$PGENAME.txt**

### 8.1.2 Exit Codes

All CER4.1-4.2P4 software terminates using the CERES defined EXIT CODES for the Langley TRMM Information System (LaTIS). Successful completion is indicated by an exit code of 0.

### 8.1.3 Daily QC Processor Test Summary

PGE Number	PGE Name	Test Case	Run Time (mm:ss)	Disk Storage (MB)	Memory (MB)
CER4.1-4.2P4	Collection 005 Daily QC Processor	Terra/Aqua	00:30	200	973

## 8.2 Evaluation Procedures

### 8.2.1 Log and Status File Results

The Log and Status files are created by the Toolkit and are located in the directory **\$CERESHOME/clouds/runlogs** after the PGE has been executed. The comparisons of the Log and status files with their expected outputs are handled in Section [8.2.3](#).

### 8.2.2 Metadata Evaluation

Metadata files for this PGE are created at runtime and are located with their corresponding output files. The comparisons of the metadata files with their expected results are handled in Section [8.2.3](#).

### 8.2.3 Execution of Comparison Software

The evaluation software for this Subsystem will compare the ASDC generated output with the expected output included with this delivery package. To run the comparison software, execute the following commands:

**Terra-MODIS Test Case:**

```
source $CERESHOME/clouds/CER4.1-4.2P4/rcf/CER4.1-4.env 3
$CERESHOME/clouds/test_suites/bin/CER4.1-4.Validate.pl
```

**Aqua-MODIS Test Case:**

```
source $CERESHOME/clouds/CER4.1-4.2P4/rcf/CER4.1-4.env 6
$CERESHOME/clouds/test_suites/bin/CER4.1-4.Validate.pl
```

**8.2.4 Evaluation of Comparison Software Output**

See [Appendix B](#) for a description of the output from the Comparison Software.

**8.3 Solutions to Possible Problems**

1. Output files are opened with Status = NEW. If any of these files exist when the generating PGE is executed, the PGE will fail. These files must be removed before any attempt is made to re-run any of the PGEs after the initial run is made. The Toolkit Log files also need to be deleted before each run to be consistent with the expected output. The specific problems can generally be found in the LogReport and/or LogStatus files. NOTE: For testing purposes only, if the test cases must be re-run, you must first cleanup the PCF files generated from previous runs as shown below.

**For Terra-MODIS Case:**

```
cd $CERESHOME/clouds/CER4.1-4.2P4/rcf/
source CER4.1-4.env 3
Run.CER4.1-4.Cleanup.pl $YYYY$MM$D1 $YYYY$MM$D2
```

**For Aqua-MODIS Case:**

```
cd $CERESHOME/clouds/CER4.1-4.2P4/rcf/
source CER4.1-4.env 6
Run.CER4.1-4.Cleanup.pl $YYYY$MM$D1
```

Please contact Subsystem Lead for assistance if the cleanup and test cases re-run are unsuccessful.

2. Many problems encountered during compilation, linking, and execution are due to incorrect environment configuration. Generally, these problems make themselves readily apparent via compiler errors or termination of the program during the initialization stage during the first few seconds of execution.
3. Most errors encountered during PCF generation will provide a diagnostic as to the problem. If problems persist, check for the presence of all the mandatory input files and stage if necessary or contact the analyst.

## 9.0 Test and Evaluation Procedures - CER4.1-4.2P5 Daily QC Processor

This section provides information on how to execute PGE CER4.1-4.2P5. It also provides an overview of the test and evaluation procedures. It includes a description of what is being tested and the order in which the tests should be performed.

\*\*\*This testing is intended for code compilation and execution on an x86 machine.\*\*\*

### 9.1 Stand Alone Test Procedures

#### 9.1.1 Execution

##### Terra-MODIS Testing:

```
cd $CERESHOME/clouds/CER4.1-4.2P5/rcf/
source CER4.1-4.env 3
set DAY1=$YYYY$MM$D1
set DAY2=$YYYY$MM$D2
echo;echo Testing $PGENAME $SAT $DAY1 $DAY2;echo
```

```
Run.CER4.1-4.Cleanup.pl $DAY2
CER4.1-4.2P5-SGE_Driver.pl -date $DAY2
```

The submitted job can be monitored with the **qstat** command and by following the content of the SGE log file

```
$CERESHOME/clouds/sge_logs/$PGENAME/$PGENAME\_SSS4_1\_PS4_1\_
$CC4_1.$DAY2.o*
```

Job submission status and job progress file can be found in the file:

```
$CERESHOME/clouds/$PGENAME/rcf/pcf/summary/$PGENAME\_SSS4_1\_PS
4_1\_CC4_1.$DAY2.summary
```

Once all jobs are completed, a listing of outputs can be generated:

```
$CERESHOME/clouds/$PGENAME/rcf/GetExpOutput.pl purpose=outdesc
```

##### Aqua-MODIS Testing:

```
cd $CERESHOME/clouds/CER4.1-4.2P5/rcf/
source CER4.1-4.env 6
set DAY1=$YYYY$MM$D1
echo;echo Testing $PGENAME $SAT $DAY1;echo
```

```
Run.CER4.1-4.Cleanup.pl $DAY1
CER4.1-4.2P5-SGE_Driver.pl -date $DAY1 -sday
```

The submitted job can be monitored with the **qstat** command and by following the content of the SGE log file

**\$CERESHOME/clouds/sge\_logs/\$PGENAME/\$PGENAME\\_SSS4\_1\\_PS4\_1\\_CC4\_1.\$DAY1.o\***

Job submission status and job progress file can be found in the file:

**\$CERESHOME/clouds/\$PGENAME/rcf/pcf/summary/\$PGENAME\\_SSS4\_1\\_PS4\_1\\_CC4\_1.\$DAY1.summary**

Once all jobs are completed, a listing of outputs can be generated:

**\$CERESHOME/clouds/\$PGENAME/rcf/GetExpOutput.pl purpose=outdesc**

Note: A file listing of expected test output can be found in the following file:

**\$CERESHOME/clouds/data\_exp/out\_description\_\$PGENAME.txt**

### 9.1.2 Exit Codes

All CER4.1-4.2P5 software terminates using the CERES defined EXIT CODES for the Langley TRMM Information System (LaTIS). Successful completion is indicated by an exit code of 0.

### 9.1.3 Daily QC Processor Test Summary

PGE Number	PGE Name	Test Case	Run Time (mm:ss)	Disk Storage (MB)	Memory (MB)
CER4.1-4.2P5	Daily CRH Processor	Terra/Aqua	00:30	200	348

## 9.2 Evaluation Procedures

### 9.2.1 Log and Status File Results

The Log and Status files are created by the Toolkit and are located in the directory

**\$CERESHOME/clouds/runlogs** after the PGE has been executed. The comparisons of the Log and status files with their expected outputs are handled in Section [9.2.3](#).

### 9.2.2 Metadata Evaluation

Metadata files for this PGE are created at runtime and are located with their corresponding output files. The comparisons of the metadata files with their expected results are handled in Section [9.2.3](#).

### 9.2.3 Execution of Comparison Software

The evaluation software for this Subsystem will compare the ASDC generated output with the expected output included with this delivery package. To run the comparison software, execute the following commands:

**Terra-MODIS Test Case:**

```
source $CERESHOME/clouds/CER4.1-4.2P5/rcf/CER4.1-4.env 3
$CERESHOME/clouds/test_suites/bin/CER4.1-4.Validate.pl
```

**Aqua-MODIS Test Case:**

```
source $CERESHOME/clouds/CER4.1-4.2P5/rcf/CER4.1-4.env 6
$CERESHOME/clouds/test_suites/bin/CER4.1-4.Validate.pl
```

**9.2.4 Evaluation of Comparison Software Output**

See [Appendix B](#) for a description of the output from the Comparison Software.

**9.3 Solutions to Possible Problems**

1. Output files are opened with Status = NEW. If any of these files exist when the generating PGE is executed, the PGE will fail. These files must be removed before any attempt is made to re-run any of the PGEs after the initial run is made. The Toolkit Log files also need to be deleted before each run to be consistent with the expected output. The specific problems can generally be found in the LogReport and/or LogStatus files. NOTE: For testing purposes only, if the test cases must be re-run, you must first cleanup the PCF files generated from previous runs as shown below.

**For Terra-MODIS Case:**

```
cd $CERESHOME/clouds/CER4.1-4.2P5/rcf/
source CER4.1-4.env 3
Run.CER4.1-4.Cleanup.pl $YYYY$MM$D2
```

**For Aqua-MODIS Case:**

```
cd $CERESHOME/clouds/CER4.1-4.2P5/rcf/
source CER4.1-4.env 6
Run.CER4.1-4.Cleanup.pl $YYYY$MM$D1
```

Please contact Subsystem Lead for assistance if the cleanup and test cases re-run are unsuccessful.

2. Many problems encountered during compilation, linking, and execution are due to incorrect environment configuration. Generally, these problems make themselves readily apparent via compiler errors or termination of the program during the initialization stage during the first few seconds of execution.
3. Most errors encountered during PCF generation will provide a diagnostic as to the problem. If problems persist, check for the presence of all the mandatory input files and stage if necessary or contact the analyst.

## 10.0 Test and Evaluation Procedures - CER4.1-4.2P6 Daily QC Processor

This section provides information on how to execute PGE CER4.1-4.2P6. It also provides an overview of the test and evaluation procedures. It includes a description of what is being tested and the order in which the tests should be performed.

### 10.1 Stand Alone Test Procedures

#### 10.1.1 Execution

##### NPP-VIIRS Testing:

```
cd $CERESHOME/clouds/CER4.1-4.2P6/rcf/
source CER4.1-4.env
Run.CER4.1-4.Cleanup.pl 20120304
CER4.1-4.2P6-SGE_Driver.pl -date 20120304
```

The submitted job can be monitored with the **qstat** command.

Job submission status and job progress file can be found in the file:  
**\$CERESHOME/clouds/CER4.1-4.2P6/rcf/pcf/summary/CER4.1-4.2P6\_\$SS4\_1\\_PS4\_1\\_SCC4\_1.20120304.summary**

Note: A file listing of expected output for each Clouds PGE testing can be found in the following file:

**\$CERESHOME/clouds/data\_exp/out\_description2P6.txt**

#### 10.1.2 Exit Codes

All CER4.1-4.2P6 software terminates using the CERES defined EXIT CODES for the Langley TRMM Information System (LaTIS). Successful completion is indicated by an exit code of 0.

#### 10.1.3 Daily QC Processor Test Summary

PGE Number	PGE Name	Test Case	Run Time (mm:ss)	Disk Storage (MB)	Memory (MB)
CER4.1-4.2P6	Daily QC Processor	NPP	00:30	200	973

## 10.2 Evaluation Procedures

### 10.2.1 Log and Status File Results

The Log and Status files are created by the Toolkit and are located in the directory **\$CERESHOME/clouds/runlogs** after the PGE has been executed. The comparisons of the Log and status files with their expected outputs are handled in Section [10.2.3](#).

### 10.2.2 Metadata Evaluation

Metadata files for this PGE are created at runtime and are located with their corresponding output files. The comparisons of the metadata files with their expected results are handled in Section [10.2.3](#).

### 10.2.3 Execution of Comparison Software

The evaluation software for this Subsystem will compare the ASDC generated output with the expected output included with this delivery package. To run the comparison software, execute the following commands:

#### NPP-VIIRS Test Case:

```
cd $CERESHOME/clouds/CER4.1-4.2P6/rcf
source CER4.1-4.env
$CERESHOME/clouds/test_suites/bin/CER4.1-4.Validate.pl CER4.1-4.2P6 2
```

### 10.2.4 Evaluation of Comparison Software Output

See [Appendix B](#) for a description of the output from the Comparison Software.

## 10.3 Solutions to Possible Problems

1. Output files are opened with Status = NEW. If any of these files exist when the generating PGE is executed, the PGE will fail. These files must be removed before any attempt is made to re-run any of the PGEs after the initial run is made. The Toolkit Log files also need to be deleted before each run to be consistent with the expected output. The specific problems can generally be found in the LogReport and/or LogStatus files. NOTE: For testing purposes only, if the test cases must be re-run, you must first cleanup the PCF files generated from previous runs as shown below.

#### For NPP-VIIRS Case:

```
cd $CERESHOME/clouds/CER4.1-4.2P6/rcf
source CER4.1-4.env
Run.CER4.1-4.Cleanup.pl 20120304
```

Please contact Subsystem Lead for assistance if the cleanup and test cases re-run are unsuccessful.

2. Many problems encountered during compilation, linking, and execution are due to incorrect environment configuration. Generally, these problems make themselves readily apparent via compiler errors or termination of the program during the initialization stage during the first few seconds of execution.
3. Most errors encountered during PCF generation will provide a diagnostic as to the problem. If problems persist, check for the presence of all the mandatory input files and stage if necessary or contact the analyst.

## 11.0 Test and Evaluation Procedures - CER4.1-4.2P7 Daily QC Processor

This section provides information on how to execute PGE CER4.1-4.2P7. It also provides an overview of the test and evaluation procedures. It includes a description of what is being tested and the order in which the tests should be performed.

### 11.1 Stand Alone Test Procedures

#### 11.1.1 Execution

##### NPP-VIIRS Testing:

```
cd $CERESHOME/clouds/CER4.1-4.2P7/rcf/
source CER4.1-4.env
Run.CER4.1-4.Cleanup.pl 20120304
CER4.1-4.2P7-SGE_Driver.pl -date 20120304 -sday
```

The submitted job can be monitored with the **qstat** command.

Job submission status and job progress file can be found in the file:  
**\$CERESHOME/clouds/CER4.1-4.2P7/rcf/pcf/summary/CER4.1-4.2P7\_\$SS4\_1\\_PS4\_1\\_SCC4\_1.20120304.summary**

Note: A file listing of expected output for each Clouds PGE testing can be found in the following file:

**\$CERESHOME/clouds/data\_exp/out\_description2P7.txt**

#### 11.1.2 Exit Codes

All CER4.1-4.2P7 software terminates using the CERES defined EXIT CODES for the Langley TRMM Information System (LaTIS). Successful completion is indicated by an exit code of 0.

#### 11.1.3 Daily QC Processor Test Summary

PGE Number	PGE Name	Test Case	Run Time (mm:ss)	Disk Storage (MB)	Memory (MB)
CER4.1-4.2P7	Daily CRH Processor	NPP	00:30	200	348

## 11.2 Evaluation Procedures

### 11.2.1 Log and Status File Results

The Log and Status files are created by the Toolkit and are located in the directory **\$CERESHOME/clouds/runlogs** after the PGE has been executed. The comparisons of the Log and status files with their expected outputs are handled in Section [11.2.3](#).



### 11.2.2 Metadata Evaluation

Metadata files for this PGE are created at runtime and are located with their corresponding output files. The comparisons of the metadata files with their expected results are handled in Section [11.2.3](#).

### 11.2.3 Execution of Comparison Software

The evaluation software for this Subsystem will compare the ASDC generated output with the expected output included with this delivery package. To run the comparison software, execute the following commands:

#### NPP-VIIRS Test Case:

```
cd $CERESHOME/clouds/CER4.1-4.2P7/rcf
source CER4.1-4.env
$CERESHOME/clouds/test_suites/bin/CER4.1-4.Validate.pl CER4.1-4.2P7 2
```

### 11.2.4 Evaluation of Comparison Software Output

See [Appendix B](#) for a description of the output from the Comparison Software.

## 11.3 Solutions to Possible Problems

1. Output files are opened with Status = NEW. If any of these files exist when the generating PGE is executed, the PGE will fail. These files must be removed before any attempt is made to re-run any of the PGEs after the initial run is made. The Toolkit Log files also need to be deleted before each run to be consistent with the expected output. The specific problems can generally be found in the LogReport and/or LogStatus files. NOTE: For testing purposes only, if the test cases must be re-run, you must first cleanup the PCF files generated from previous runs as shown below.

#### For NPP-VIIRS Case:

```
cd $CERESHOME/clouds/CER4.1-4.2P7/rcf
source CER4.1-4.env
Run.CER4.1-4.Cleanup.pl 20120304
```

Please contact Subsystem Lead for assistance if the cleanup and test cases re-run are unsuccessful.

2. Many problems encountered during compilation, linking, and execution are due to incorrect environment configuration. Generally, these problems make themselves readily apparent via compiler errors or termination of the program during the initialization stage during the first few seconds of execution.
3. Most errors encountered during PCF generation will provide a diagnostic as to the problem. If problems persist, check for the presence of all the mandatory input files and stage if necessary or contact the analyst.

## 12.0 Test and Evaluation Procedures - CER4.1-4.3P3 Monthly QC Processor

This section provides information on how to execute PGE CER4.1-4.3P3. It also provides an overview of the test and evaluation procedures. It includes a description of what is being tested and the order in which the tests should be performed.

\*\*\*This testing is intended for code compilation and execution on an x86 machine.\*\*\*

### 12.1 Stand Alone Test Procedures

#### 12.1.1 Execution

##### Terra-MODIS Testing:

```
cd $CERESHOME/clouds/CER4.1-4.3P3/rcf/
source CER4.1-4.env 3
echo;echo Testing $PGENAME $SAT $YYYY$MM;echo
```

```
Run.CER4.1-4.Cleanup.pl $YYYY$MM
CER4.1-4.3P3-SGE_Driver.pl -date $YYYY$MM
```

The submitted job can be monitored with the **qstat** command and by following the content of the SGE log file

```
$CERESHOME/clouds/sge_logs/$PGENAME/$PGENAME\_SSS4_1\_PS4_1\_
$CC4_1.$YYYY$MM.o*
```

Job submission status and job progress file can be found in the file:

```
$CERESHOME/clouds/$PGENAME/rcf/pcf/summary/$PGENAME\_SSS4_1\_PS
4_1\_CC4_1.$YYYY$MM.summary
```

Once all jobs are completed, a listing of outputs can be generated:

```
$CERESHOME/clouds/$PGENAME/rcf/GetExpOutput.pl purpose=outdesc
```

##### Aqua-MODIS Testing:

```
cd $CERESHOME/clouds/CER4.1-4.3P3/rcf/
source CER4.1-4.env 6
echo;echo Testing $PGENAME $SAT $YYYY$MM;echo
```

```
Run.CER4.1-4.Cleanup.pl $YYYY$MM
CER4.1-4.3P3-SGE_Driver.pl -date $YYYY$MM
```

The submitted job can be monitored with the **qstat** command and by following the content of the SGE log file

```
$CERESHOME/clouds/sge_logs/$PGENAME/$PGENAME\_SSS4_1\_PS4_1\_
$CC4_1.$YYYY$MM.o*
```

Job submission status and job progress file can be found in the file:

**\$CERESHOME/clouds/\$PGENAME/rcf/pcf/summary/\$PGENAME\\_SS4\_1\\_PS4\_1\\_CC4\_1.\$YYYY\$MM.summary**

Once all jobs are completed, a listing of outputs can be generated:

**\$CERESHOME/clouds/\$PGENAME/rcf/GetExpOutput.pl purpose=outdesc**

Note: A file listing of expected test output can be found in the following file:

**\$CERESHOME/clouds/data\_exp/out\_description\_\$PGENAME.txt**

### 12.1.2 Exit Codes

All CER4.1-4.3P3 software terminates using the CERES defined EXIT CODES for the Langley TRMM Information System (LaTIS). Successful completion is indicated by an exit code of 0.

### 12.1.3 Daily QC Processor Test Summary

PGE Number	PGE Name	Test Case	Run Time (mm:ss)	Disk Storage (MB)	Memory (MB)
CER4.1-4.3P3	Collection 005 Monthly QC Processor	Terra/Aqua	00:20	350	374

## 12.2 Evaluation Procedures

### 12.2.1 Log and Status File Results

The Log and Status files are created by the Toolkit and are located in the directory **\$CERESHOME/clouds/runlogs** after the PGE has been executed. The comparisons of the Log and status files with their expected outputs are handled in Section [12.2.3](#).

### 12.2.2 Metadata Evaluation

Metadata files for this PGE are created at runtime and are located with their corresponding output files. The comparisons of the metadata files with their expected results are handled in Section [12.2.3](#).

### 12.2.3 Execution of Comparison Software

The evaluation software for this Subsystem will compare the ASDC generated output with the expected output included with this delivery package. To run the comparison software, execute the following commands:

**Terra-MODIS Test Case:**

```
source $CERESHOME/clouds/CER4.1-4.3P3/rcf/CER4.1-4.env 3
$CERESHOME/clouds/test_suites/bin/CER4.1-4.Validate.pl
```

**Aqua-MODIS Test Case:**

```
source $CERESHOME/clouds/CER4.1-4.3P3/rcf/CER4.1-4.env 6
$CERESHOME/clouds/test_suites/bin/CER4.1-4.Validate.pl
```

**12.2.4 Evaluation of Comparison Software Output**

See [Appendix B](#) for a description of the output from the Comparison Software.

**12.3 Solutions to Possible Problems**

1. Output files are opened with Status = NEW. If any of these files exist when the generating PGE is executed, the PGE will fail. These files must be removed before any attempt is made to re-run any of the PGEs after the initial run is made. The Toolkit Log files also need to be deleted before each run to be consistent with the expected output. The specific problems can generally be found in the LogReport and/or LogStatus files. NOTE: For testing purposes only, if the test cases must be re-run, you must first cleanup the PCF files generated from previous runs as shown below.

**For Terra-MODIS Case:**

```
cd $CERESHOME/clouds/CER4.1-4.3P3/rcf
source CER4.1-4.env 3
Run.CER4.1-4.Cleanup.pl $YYYY$MM
```

**For Aqua-MODIS Case:**

```
cd $CERESHOME/clouds/CER4.1-4.3P3/rcf
source CER4.1-4.env 6
Run.CER4.1-4.Cleanup.pl $YYYY$MM
```

Please contact Subsystem Lead for assistance if the cleanup and test cases re-run are unsuccessful.

2. Many problems encountered during compilation, linking, and execution are due to incorrect environment configuration. Generally, these problems make themselves readily apparent via compiler errors or termination of the program during the initialization stage during the first few seconds of execution.
3. Most errors encountered during PCF generation will provide a diagnostic as to the problem. If problems persist, check for the presence of all the mandatory input files and stage if necessary or contact the analyst.

## 13.0 Test and Evaluation Procedures - CER4.1-4.3P4 Monthly QC Processor

This section provides information on how to execute PGE CER4.1-4.3P4. It also provides an overview of the test and evaluation procedures. It includes a description of what is being tested and the order in which the tests should be performed.

### 13.1 Stand Alone Test Procedures

#### 13.1.1 Execution

##### NPP Testing:

```
cd $CERESHOME/clouds/CER4.1-4.3P4/rcf/
source CER4.1-4.env
Run.CER4.1-4.Cleanup.pl 201203
CER4.1-4.3P4-SGE_Driver.pl -date 201203
```

The submitted job can be monitored with the **qstat** command.

Job submission status and job progress file can be found in the file:  
**\$CERESHOME/clouds/CER4.1-4.3P4/rcf/pcf/summary/CER4.1-4.3P4\_\$SS4\_1\\_PS4\_1\\_SCC4\_1.201203.summary**

Note: A file listing of expected output for each Clouds PGE testing can be found in the following file:

**\$CERESHOME/clouds/data\_exp/out\_description3P4.txt**

#### 13.1.2 Exit Codes

All CER4.1-4.3P4 software terminates using the CERES defined EXIT CODES for the Langley TRMM Information System (LaTIS). Successful completion is indicated by an exit code of 0.

#### 13.1.3 Daily QC Processor Test Summary

PGE Number	PGE Name	Test Case	Run Time (mm:ss)	Disk Storage (MB)	Memory (MB)
CER4.1-4.3P4	Monthly QC Processor	NPP	00:20	350	374

## 13.2 Evaluation Procedures

### 13.2.1 Log and Status File Results

The Log and Status files are created by the Toolkit and are located in the directory **\$CERESHOME/clouds/runlogs** after the PGE has been executed. The comparisons of the Log and status files with their expected outputs are handled in Section [13.2.3](#).

### 13.2.2 Metadata Evaluation

Metadata files for this PGE are created at runtime and are located with their corresponding output files. The comparisons of the metadata files with their expected results are handled in Section [13.2.3](#).

### 13.2.3 Execution of Comparison Software

The evaluation software for this Subsystem will compare the ASDC generated output with the expected output included with this delivery package. To run the comparison software, execute the following commands:

#### NPP Test Case:

```
cd $CERESHOME/clouds/CER4.1-4.3P4/rcf
source CER4.1-4.env
$CERESHOME/clouds/test_suites/bin/CER4.1-4.Validate.pl CER4.1-4.3P4 2
```

### 13.2.4 Evaluation of Comparison Software Output

See [Appendix B](#) for a description of the output from the Comparison Software.

## 13.3 Solutions to Possible Problems

4. Output files are opened with Status = NEW. If any of these files exist when the generating PGE is executed, the PGE will fail. These files must be removed before any attempt is made to re-run any of the PGEs after the initial run is made. The Toolkit Log files also need to be deleted before each run to be consistent with the expected output. The specific problems can generally be found in the LogReport and/or LogStatus files. NOTE: For testing purposes only, if the test cases must be re-run, you must first cleanup the PCF files generated from previous runs as shown below.

```
cd $CERESHOME/clouds/CER4.1-4.3P4/rcf
source CER4.1-4.env
$CERESHOME/clouds/CER4.1-4.3P4/rcf/Run.CER4.1-4.Cleanup.pl
201203
```

Please contact Subsystem Lead for assistance if the cleanup and test cases re-run are unsuccessful.

5. Many problems encountered during compilation, linking, and execution are due to incorrect environment configuration. Generally, these problems make themselves readily apparent via compiler errors or termination of the program during the initialization stage during the first few seconds of execution.
6. Most errors encountered during PCF generation will provide a diagnostic as to the problem. If problems persist, check for the presence of all the mandatory input files and stage if necessary or contact the analyst.

## **Appendix A**

### **Acronyms and Abbreviations**

ASCII	American Standard Code Information Interchange
ASDC	Atmospheric Science Data Center
ATBD	Algorithm Theoretical Basis Document
AVHRR	Advanced Very High Resolution Radiometer
CERES	Clouds and the Earth's Radiant Energy System
CERESlib	CERES library
CID	Cloud Imager Data
CRH	Clear Radiance History
DAAC	Distributed Active Archive Center
DAO	Data Assimilation Office
EOS	Earth Observing System
EOS-AM	EOS Morning Crossing Mission
EOS-PM	EOS Afternoon Crossing Mission
ERBE	Earth Radiation Budget Experiment
ERBS	Earth Radiation Budget Satellite
FOV	Field-of-View
F90	Fortran 90
IES	Instrument Earth Scans
ISCCP	International Satellite Land Surface Climatology Project
IVT	Instrument Validation Tape
LaTIS	Langley TRMM Information System
MCF	Metadata Control File
MOA	Meteorological, Ozone, and Aerosol
MODIS	Moderate-Resolution Imaging Spectroradiometer
NASA	National Aeronautics and Space Administration
NOAA	National Oceanic and Atmospheric Administration
PCF	Process Control File
PGE	Product Generation Executives
PGS	Product Generation System
PSF	Point Spread Function
QC	Quality Control
SCF	Science Computing Facility
SGE	Sun Grid Engine
SMF	Status Message File
SSAI	Science Systems and Applications, Inc.

SSF	Single Scanner Footprint TOA and Surface Fluxes, Clouds
SURFMAP	SURFace MAP
TOA	Top-of-the-atmosphere
TRMM	Tropical Rainfall Measuring Mission
VIRS	Visible and Infrared System



## **Appendix B**

### **Evaluation of Comparison Software Output**

There are four phases run during the execution of the Comparison Software. The progress of the program is shown on the screen during execution and should resemble:

**Validating Data Products for <PGE>**

.

**Validating Metadata Files for <PGE>**

.

**Validating Support Files for <PGE>**

.

**Validating Log Files for <PGE>**

.

Where <PGE> is the PGE being validated and the “.” indicates a series of files evaluated during that phase. Data Products and Metadata files are those products produced by the subsystem. Support files are the PCF and its internal file. Log files are the Toolkit generated files. For each successful comparison, a message is issued:

**Level <N> Comparison Successful for <FILE>**

where “Level <N>” indicates the first level of test which yielded a successful result and “<FILE>” is the file compared. The levels you may see are:

Level 1: A flat binary compare between the generated and expected outputs was successful.

Level 2: An ASCII file, such as a log file, cannot successfully pass a binary compare. A successful Level 2 comparison means that certain strings, such as date, time, and OS specific fields, have been removed from both the generated and expected outputs and the results successfully compared.

Level 3: This level of comparison is provided for those support files, like the PCF, that may contain temporary file names generated by the Toolkit. This level of comparison removes the temporary file names from the generated and expected outputs.

Level 4: This level of comparison is used only to execute the software developed to compare Interim SSFs.

Level 5: This level of comparison is used to execute software developed to compare supposedly identical HDF files.