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

Data Management System

Grid Geostationary Narrowband Radiances (GGEO) Subsystem (Subsystem 11.0)

Release 5 Test Plan TRMM Launch Version 6

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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.

SCCR Approval Date	Release/ Version Number	SCCR Number	Description of Revision	Section(s) Affected
11/27/01	R3V2	311	• Updated document to reflect two pass processing scheme. Sections 4.1 through 4.5 were modified to show first pass processing test. Sections 4.7 through 4.11 were added to show second pass processing test	Secs. 4.1-4.5, & 4.7-4.11
			 Added test for new PGE CER11.3P1, Recalibrate GGEO Input Radiance Data. 	Sec. 4.6
			 Added test for new PGE CER11.4P1, Create Correlation Plots of GGEO vs. VIRS Cloud Data. 	Sec. 4.12
			 Added test for new PGE CER11.5P1, Create Geostationary Regression Coefficients. 	Sec. 4.13
			 Modified Subsystem Overview to include summary of two pass processing scheme and new PGEs. 	Sec. 1.2
			 Modified Installation instructions to show that delivered data has been split between two tar files, one for data_IN and one for data_OUT. 	Sec. 2.1
			 Added information for staging or checking input data prior to testing. 	Secs. 3.1, 4.0.2, 4.1.1, 4.2.1, 4.3.1, 4.4.1, 4.5.1, 4.6.1, 4.7.1, 4.8.1, 4.9.1, 4.10.1, 4.11.1, 4.12.1, & 4.13.1
			 Removed prompt signs from command lines in order to ease cut and paste testing from document. 	All sections
			 Use automated procedures for evaluating test results during manual testing. 	Secs. 4.1.3, 4.2.3, 4.3.3, 4.4.3, 4.5.3, 4.6.3, 4.7.3, 4.8.3, 4.9.3, 4.10.3, 4.11.3, 4.12.3, & 4.13.4
			 Updated format to comply with standards. 	All

Document Revision Record

SCCR Approval Date	Release/ Version Number	SCCR Number	Description of Revision	Section(s) Affected
03/25/02	R3V3	329	 Updated test runtimes. Directory Structure Diagrams File Description Tables "makeall" -> "makeall 0" "runtest" -> "runtest 0" "ggeo-test_2-env.csh" -> "ggeo-test- env.csh" 	Secs. 4.1.2.4, 4.2.2.4, 4.3.2.4, 4.4.2.4, 4.5.2.4, 4.6.2.4, 4.7.2.4, 4.8.2.4, 4.9.2.4, 4.10.2.4, 4.11.2.4, & 4.12.2.4 App. A App. C Sec. 2.1 Secs. 3.1 & 3.6 Sec. 4.0.1
			standards.	All
06/07/02	R3V4	366	 Added desert output files for PGE CER11.3P1 test suites; removed zero- length output files. Removed zero-length output files from PGE CER11.4P1 test suites. Modified 2nd pass main processor PCFs to use default cal_coeffs file. Removed zero-length output files after job completion for PGEs CER11.3P1 and CER11.4P1. Added a list of the test environment variable values found in the document. This list was added to make updates to the document easier if the values are changed. Updated format to comply with standards. 	Secs. 3.3 & 4.6.2.2 Secs. 3.3 & 4.12.2.2 Secs. 4.7.2.1, 4.8.2.1, 4.9.2.1, 4.10.2.1 4.6.2.2, & 4.12.2.2 Sec. 2.0 All
09/03/02	R3V5	379	 Changed the structure naming scheme for the cal_coeffs files. There is now one for each satellite, instead of one for the month. Updated format to comply with standards. 	Secs. 3.3 & 4.6.2.2 All
03/31/03	R3V6	426	 Removed obsolete commands. Added output files. Updated format to comply with standards. 	Secs. 4.6.2.2 & 4.12.2.2 Sec. 4.11.2.2 All
11/24/03	R3V7	486	 Modified and added filenames in the CERESHOME/ggeo/web/ps directory. Added ColdCLDp and NoonDATAp file names to the test output list in the ggeo/data/qa_reports directory for first- pass processing. 	Sec. 4.12.2.2 Secs. 3.3, 4.1.2.2, 4.2.2.2, 4.3.2.2, & 4.4.2.2

SCCR Approval Date	Release/ Version Number	SCCR Number	Description of Revision	Section(s) Affected
11/24/03 (Cont'd)	R3V7	486	 Updated format to comply with standards. 	All
04/12/04	R3V8	518	 PGE11.5P1 is no longer an active PGE. Sections associated with PGE11.5P1 have been removed. References to PGE11.5P1 in other sections have been removed. The new tests require testing on five input satellites instead of four. Instead of {GOES-8, GOES-9, METEO-6, and GMS-5}, the satellites are now {GOES-8, GOES-10, METEO-5, METEO-7, and GMS-5}. New whole sections have been added to the Main processor testing to account for the extra satellite. 	Secs. 3.1 & 4.13 Secs. 1.2, 2.0, 3.1(new), & 3.2 Secs. 4.4 & 4.11
			 Changes to the satellite names, data dates, and the CC, SS, and PS codes impact test parameters and file names throughout the document. Updated format to comply with 	All sections
			standards.	
03/07/05	K3V9	553	 Tests added for five satellites running the new GGEO Main processor PGE, CER11.1P10, which uses McIdas format GEO inputs. Test added for GGEO Post Processor, CER11.2P2, using outputs from CER11.1P10. Test added for new GGEO Weeder PGE, CER11.6P1. The new tests use data from different months. This requires specific environment variable definition scripts for each test, rather than using a single ggeo-test-env.csh script for all tests. New environment variables added to the list at the beginning of the document. Updated format to comply with standards. 	Secs. 4.15 - 4.19 Sec. 4.20 Sec. 4.21 Secs. 4.0.1, 4.1.1, 4.2.1, 4.3.1, 4.4.1, 4.5.1, 4.6.1, 4.7.1, 4.8.1, 4.9.1, 4.10.1, 4.11.1, 4.12.1, 4.13.1, & 4.14.1 Sec. 2.0 All
04/14/06	R4V1	618	 Added new selection to compile PGE 11.6 code only. Corrected the selection to check PGE 11.6 inputs. Updated format to comply with standards 	Sec. 2.2 Sec. 4.21.2 All
08/25/06	R4V2	636	 Added new selection to compile PGE 11,1P10 only. 	Sec. 2.2

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SCCR Approval Date	Release/ Version Number	SCCR Number	Description of Revision	Section(s) Affected
08/25/06 (Cont'd)	R4V2	636	 Corrected sat variable to evaluate processed satellite test results. Added year, month variable as arguments for flovibility. 	Secs. 4.15.3, 4.16.3, 4.17.3, 4.18.3, & 4.19.3
			 Added test procedures for MTSAT-1 satellite. 	Sec. 4.20
			 Updated format to comply with standards. 	All
05/28/08	R5V1	675	 Added new section to compile and run PGE 11.7P1. 	Secs. 2.1, 2.2, & 4.23
05/16/07	R5V2	653	 Added new sections to compile and run satellites G-11, ISCCP-B1U MTSAT, MET7, and MET9 data. 	Secs. 4.15 – 4.24
			 Added new section to run satellite G-13. (08/28/2009) 	Sec. 4.21
10/28/09	R5V3	736	 Updated pcf, run scripts directory path location from bin directory to rcf directory for PGE CER11.7P1. Added qa files names which are not 	Sec. 4.28 Secs. 4.15, 4.16, &
			included in the sections. (This was corrected in the SCCR 653 GGEO Test Plan, so we also needed to update this test plan with the same information.) (02/26/2010)	4.18 - 4.25
03/04/10	R5V4	757	 Updated GGEO weeder process to reflect the changes to the directory structure and to run on <i>magneto</i>. 	Sec. 4.27
07/01/10	R5V5	787	 Added new section for MTSAT-2 process. 	Sec. 4.23
			Added statement to set EXPDIR.	Secs. 4.15 & 4.16, & 4.18 - 4.26
07/25/12	R5V6	916	 Updated environment varaibles and executable names. Added executable to evaluate outputs. 	Secs. 2.0 & 2.2
			 Removed automated test section. Removed PGEs CER11.1P1 - CER11.1P8, .CER11.2P1, CER11.2P2, CER11.3P1, CER11.4P1, CER11.1P10, and CER11.6P1. 	Sec. 3.0 Secs. 4.1 - 4.28
			 Removed the PCF Generator instructions. 	Sec. 4.29.1.1
			 Removed the command line execution instructions. 	Sec. 4.29.1.2

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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 ($0.3 - 5 \mu m$), a total channel ($0.3 - 200 \mu m$), and an infrared window channel ($8 - 12 \mu m$). 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.

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, the <u>Grid Geostationary Narrowband Radiances (GGEO) Subsystem (Subsystem 11), CERES Release 3 Delivery Test Plan</u>, provides a brief description of the GGEO Subsystem of CERES, along with procedures for installing and testing the Subsystem. Acronyms and abbreviations, a directory structure diagram, and file descriptions are contained in the appendices.

The document is organized as follows:

Section 1.0 - Introduction

Section 2.0 - Software and Data File Installation Procedures

Section 3.0 - Manual Test and Evaluation Procedures

Appendix A - Acronyms and Abbreviations

Appendix B - Directory Structure Diagram

Appendix C - File Description Tables

1.2 GGEO Subsystem Overview

The CERES project uses satellite-mounted scanner instruments to collect broadband radiative flux measurements around the globe. The purpose of collecting these data is to help atmospheric scientists better understand the Earth's radiant energy budget and to provide them with data for building better global climate models.

One shortcoming of the CERES data is that the number of satellites collecting the data is limited to a few orbiting platforms. Because of the orbital characteristics of these platforms, the CERES instruments can view any region on the Earth at most only two or three times during a 24-hour period. Therefore, every region will have large time gaps for which no observational broadband data will be available.

To help interpolate the data through the gaps, the CERES Project uses narrowband measurements collected by the International Satellite Cloud Climatology Project (ISCCP). The ISCCP data are collected primarily from instruments aboard geostationary satellites which view large areas of the Earth continuously and thus can provide a pattern for the diurnal variations of the regions within those areas. The geostationary satellites are at high altitudes, and near-global coverage can be achieved with as little as four or five strategically located satellites. The ISCCP project also collects data from polar orbiting satellites which provide some, but not continuous, coverage at the high latitude regions which are not visible from the geostationary platforms.

GGEO is the Subsystem which grids the ISCCP narrowband data within regions defined by the CERES one-degree nested grid and averages the data over each hour. The CERES Project will only use ISCCP data from every third hour. Currently, only data from geostationary satellites is being used.

The GGEO subsystem is designed to run as a two-pass processing system. During the first pass, input data is processed with default count conversion coefficients. Cloud processing is turned off to speed up processing. The resultant first-pass GGEO product is used to intercalibrate the input data from the various sources using VIRS data from the SFC product as a baseline. After this is accomplished, a second pass through the system is made, this time recalibrating the input data with coefficients generated during the first pass. Clouds processing is done during this pass. Plots are made comparing the GGEO cloud properties to the cloud properties on the SFC product.

2.0 Software and Data File Installation Procedures

The following environment variables are referenced in this document by value rather than by the variable name. The environment variables do not need to be set manually. They are assigned values when the appropriate GGEO environment variable script is sourced prior to each test.

The values shown below are samples only and do not apply to all tests in this document. To see the specific values used for each test, check the contents of the environment variable script used for that test.

SS11	Composite
SS11_7	Composite
PS11	Edition2A
PS11_7	TestSuite
CC11	019024
CC11_6	301300
CC11_7	000000
SW11	003
DATA11	003

To change the values used for any test, modify the values in the appropriate environment variable script. The corresponding changes would have to be made throughout this document.

2.1 Installation

In the installation instructions, use the following definition for the TAG variable, which is included in the file name of the delivery files.

TAG = $R{R#}-{SCCR#}$ where R# = CERES Software Release Number SCCR# = SCCR Number for GGEO Deliver Ex: TAG = R2-050 for CERES Software Release 2 and GGEO SCCR #050

Follow the steps below to uncompress and untar the GGEO software.

source \$CERESENV (SGI Fortran 64-bit compiler version)
mv (or cp) ggeo_src_{TAG}.tar.Z \$CERESHOME
mv (or cp) ggeo_data_*{TAG}.tar.Z \$CERESHOME
cd \$CERESHOME
uncompress ggeo_src_{TAG}.tar.Z
uncompress ggeo_dataIN_{TAG}.tar.Z
uncompress ggeo_dataOUT_{TAG}.tar.Z
tar xf ggeo_src_{TAG}.tar

tar xf ggeo_dataIN_{TAG}.tar tar xf ggeo_dataOUT_{TAG}.tar

In the above statements, CERESHOME, is a pre-defined environment variable pointing the CERES home directory on the system where the software is being installed.

2.2 Compilation

Complete the following steps to compile the GGEO source code.

1. Create the message files and message include files:

source \$CERESENV (SGI Fortran 64-bit compiler version)
cd \$CERESHOME/ggeo/smf
\$CERESLIB/bin/smfcompile all.csh

2. Compile the GGEO Subsystem code for PGE 11.7P1 only.

cd \$CERESHOME/ggeo/CER11.7P1/rcf ./compile_11.7P1.csh creates CER11.7P1_ppc64.exe on P6; CER11.7P1_x86_64.exe on x86

3. Compile HDF output evaluation executable.

```
cd $CERESHOME/ggeo/CER11.7P1/test_suites
make clean
make
creates hcmp_ppc64.exe on P6; hcmp_x86_64.exe on x86
```

Notes:

- The smfcompile_all.csh script and the makefile script will send a message to the screen at completion to indicate whether or not all operations performed were successful. If problems are encountered, contact one of the GGEO analysts before proceeding further.
- ASDC personnel may have an alternate procedure for compiling the message files. Any alternate procedure should copy all message include files to the \$PGSINC directory and all message files to the \$PGSMSG directory.

3.0 Manual Test and Evaluation Procedures

This section gives instructions on how to manually run and evaluate the GGEO test suites. All the procedures in this section are duplicated in a script that automates the test and evaluation procedures.

3.1 CER11.7P1 ISCCP-D2like-GEO Processor

3.1.1 Stand-alone Test Procedures

The CER11.7P1 test procedures cannot be run unless the appropriate environment scripts are run and environment variables are set.

Test-specific environment variables such as Sampling Strategy, Production Strategy, Configuration Code, and Software and Data SCCR Numbers, can be set by sourcing the 11.7P1 environment variable script.

\$CERESHOME should be set to the home directory.

source \$CERESENV

setenv TESTDIR \$CERESHOME/ggeo/CER11.7P1/test_suites setenv BINDIR \$CERESHOME/ggeo/CER11.7P1/bin setenv RCFDIR \$CERESHOME/ggeo/CER11.7P1/rcf setenv PCFDIR \$CERESHOME/ggeo/CER11.7P1/rcf/pcf setenv EXPDIR \$CERESHOME/ggeo/data_exp/CER11.7P1 setenv LOGDIR \$CERESHOME/ggeo/runlogs setenv OUTDIR \$CERESHOME/ggeo/data/ISCCP-D2like-GEO/Composite_TestSuite/2002/07

3.1.1.1 Execution Run the ISCCP_GEO Processor PGE:

> cd \$RCFDIR source env-variable.csh set data_year = 2002 set data_month = 07 setenv DATADATE \${data_year}\${data_month} \$RCFDIR/clean.pl \$DATADATE \$RCFDIR/CER11.7P1-SGE_Driver.pl -date \$DATADATE

After job completion, the following files will have been created:

In the **\$OUTDIR**:

CER_ISCCP-D2like-GEO_Composite_TestSuite_000000.200207 CER_ISCCP-D2like-GEO_Composite_TestSuite_000000.200207.met

In the **\$LOGDIR**:

CER11.7P1_LogReport_Composite_TestSuite_000000.200207 CER11.7P1_LogStatus_Composite_TestSuite_000000.200207 CER11.7P1_LogUser_Composite_TestSuite_000000.200207

3.1.1.2 Exit Codes

All GGEO 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.

3.1.1.3 Main Processor CER11.7P1 Test Summary

Here is the time function output from running the test:

Table 3-1. Run Times for PGE CER11.7P1

AMI-P6	AMI-x86	
~2 hours	~2 hours	

3.1.2 Evaluation Procedures

The generated files need to be compared with the expected files already in \$EXPDIR.

cd \$TESTDIR cp \$EXPDIR/variables-Exp . setVariables.csh Test

source \$RCFDIR/env-variable.csh

\$TESTDIR/eval_runtest.pl 1
\$TESTDIR/eval_runtest.pl 2
\$TESTDIR/eval_runtest.pl 3
\$TESTDIR/eval_runtest.pl 4

Each test evaluation should give a message indicating **SUCCESS**.

3.1.3 Solutions to Possible Problems

In the event of problems, contact one of the GGEO analysts.

Appendix A Acronyms and Abbreviations

ASDC	Atmospheric Science Data Center
CERES	Clouds and the Earth's Radiant Energy System
DAAC	Distributed Active Archive Center
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
GGEO	Grid GEOstationary data subsystem
GMT	Greenwich Mean Time
ISCCP	International Satellite Cloud Climatology Project
K	Kilobytes
LaTIS	Langley TRMM Information System
MBytes	Megabytes
NASA	National Aeronautics and Space Administration
NOAA	National Oceanic and Atmospheric Administration
PCF	Process Control File
PGE	Product Generation Executive (formerly Generation Executable)
SMF	Status Message File
TISA	Time Interpolation and Spatial Averaging
TRMM	Tropical Rainfall Measuring Mission

Appendix B Directory Structure Diagrams

Directory Structure for Subsystem 11



Figure B-1. Directory Structure for Subsystems 11 within the GGEO Working Group

Breakdown of the ggeo/ Directory

CER11.7P1 Directory



Figure B-2. Directory Structure for Subsystems 11 within the GGEO Working Group

Breakdown of the ggeo/ancillary Directory



Figure B-3. Directory Structure for Subsystems 11 within the GGEO Working Group



Figure B-4. Directory Structure for Subsystems 11 within the GGEO Working Group

Breakdown of the ggeo/data_exp Directory



Figure B-5. Directory Structure for Subsystems 11 within the GGEO Working Group

Appendix C File Description Tables

C.1 **Production Scripts**

Table C.1-1. Production Scripts, \$CERESHOME/ggeo/{PGE}/rcf directory

File Name	Format	Description
Cer11_7P1_env.pm		
Cer11_7P1_FileUtils.pm	Ascii	
CER11.7P1-Launch.pl	Ascii	
CER11.7P1_pcf_gen.pl	Ascii	
CER11.7P1_processor.pl	Ascii	
CER11.7P1-SGE_Driver.pl	Ascii	
clean.pl	Ascii	
compile_11.7P1.csh	Ascii	
env-variable.csh	Ascii	

C.2 Executables

Table C.2-1. Executables^a, \$CERESHOME/ggeo/{PGE}/bin directory

File Name	Format	Description
CER11.7P1_ppc64.exe	Binary	Main Processor executable on p6
CER11.7P1_x86_64.ex e	Binary	Main processor executablle on x86

a. The executable files are generated during compilation and are not included in the delivery tarfile.

Table C.2-2. Executables^a, \$CERESHOME/ggeo/web/plot/src directory

File Name	Format	Description

a. The executable files are generated during compilation and are not included in the delivery tarfile.

Table C.2-3. Executables, \$CERESHOME/ggeo/web/plot/src directory

File Name	Format	Description

C.3 IDL Files

Table C.3-1. IDL Executables, \$CERESHOME/ggeo/web/plot/src directory

File Name	Format	Description

C.4 Status Message Files (SMF)

Table C.4-1. Status Message Files; \$CERESHOME/ggeo/smf directory

File Name	Format	Description

C.5 Processing Control Files (PCF) and Metadata Control Files (MCF)

Table C.5-1. Processing Control Files^a (PCF); \$CERESHOME/ggeo/{PGE}/rcf/pcf directory

File Name		Description
CER11.7P1_PCF_Composite_TestSuite_000000.200207	Ascii	

a. The executable files are generated during compilation and are not included in the delivery tarfile.

Table C.5-2. Metadata Control Files (MCF); \$CERESHOME/ggeo/rcf/mcf directory

File Name	Format	Description
ISCCP.MCF	Ascii	MCF template to create met file.

C.6 HDF Read Software

Not Applicable

C.7 Ancillary Input Files

Not Applicable

C.8 Temporary Data Files (Production Results)

Table C.8-1. Temporary Data Files^a (PCF), \$CERESHOME/ggeo/rcf directory

File Name	Format	Description

a. The executable files are generated during compilation and are not included in the delivery tarfile.