Installation Instructions for the Community Satellite Processing Package (CSPP)
Microwave integrated Retrieval System (MiRS) Software Version 2.4

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Supported by the NASA/NOAA Joint Polar Satellite System (JPSS) Project

1 October 2020

Section 1: Introduction

1.1 Overview

This document contains instructions for installation and operation of the Community Satellite Processing Package (CSPP) release of the NOAA/NESDIS/STAR Microwave integrated Retrieval System (MiRS) software for retrieving atmospheric profiles and surface properties from direct broadcast NOAA-18,-19 and Metop-A,-B,-C AMSU-A/MHS Level 1B data and NOAA-20 and Suomi-NPP ATMS SDR data. MiRS is led by Quanhua (Mark) Liu and Chris Grassotti at the NOAA NESDIS Center for Satellite Applications and Research (STAR). This CSPP release (CSPP_MIRS) provides MiRS version 11.6 adapted and tested for operation in a real-time direct broadcast environment. The software contains binary executable files and supporting static data files. A separate test data package can be downloaded for verifying a successful installation.

The CSPP_MIRS software is available from the CSPP website:

https://cimss.ssec.wisc.edu/cspp/

Software, test data, and documentation may be downloaded from this web site. Please use the 'Contact Us' form on the website to submit any questions or comments about CSPP. Source code for the MiRS package is not included in this release. Source code can be provided upon receipt of a signed NOAA license agreement available (download the "access request form") from:

https://www.star.nesdis.noaa.gov/mirs/download.php

For more information on MiRS, plese visit: https://www.star.nesdis.noaa.gov/mirs.

1.2 What's New?

CSPP_MIRS v2.4 is the first release of MiRS v11.6, (the previous release, CSPP_MIRS v2.3, was built atop MiRS v11.4) and adds support for Metop-C and is ready for NOAA-21. CSPP_MIRS since v2.3 has been validated to use the new GFS FV3 forecast model files which became operational mid-2019. For more information on the GFS FV3 transition, please see: https://www.weather.gov/news/fv3.

1.3 System requirements

System requirements for the CSPP_MIRS v2.4 software are as follows:

- Intel or AMD CPU with 64-bit instruction support,
- `lftp` utility to fetch ancillary data (unless running in quarantine mode or with --noSFR),
- 8 GB RAM
- CentOS-7 64-bit Linux (or other compatible 64-bit Linux distribution),
- 2 GB of disk space (plus space for your own DB data and CSPP_MIRS products).

Linux terminal commands included in these instructions assume that the bash shell is used.

1.4 Implementation Notes

The directory/file structure of CSPP_MIRS_2_4 (pruned for the purposes of this document) is shown below:

```
CSPP_MIRS_2_4
|-- bin                                 CSPP provided binary utilities
|-- DAP                                 Below here is the NOAA delivery only
|   `-- mirs_v11r6_r110620219
|       |-- bin
|       |-- data
|       |-- doc                         NOAA MiRS documentation
|       |-- scripts
|       `-- setup
|-- lib                                 libraries to support dynamic-linked executables
`-- scripts                             CSPP environment and wrapper scripts
```

The CSPP_MIRS wrapper script `run_mirs.bash` creates a temporary working directory for each run. The directory structures and files referred to in the NOAA MiRS documentation are duplicated in this temporary working directory. At the end of processing, data products are moved out of the temporary working directory and, optionally but by default, the temporary directory is removed. NOAA MiRS documents referenced in this installation guide are available in the `CSPP_MIRS_2_4/DAP/mirs_v11r6_r110620219/doc` directory of the software distribution.

1.5 Input Data Requirements

CSPP_MIRS produces single Field-of-View (FOV) retrievals from input AMSU-A/MHS Level 1B data and from ATMS SDR calibrated/geolocated data. Metop-A/B/C and NOAA-18/19 retrievals are, by default, at the resolution of MHS, and AMSU-A are interpolated to match. Suomi-NPP and NOAA-20 (& NOAA-21) retrievals are at the full resolution of ATMS; for details, see section 3.3.1.2 of the *'User Manual (MiRS version 11.6)'* (MIRS_Users_Manual.pdf). **Table 1** provides information on the satellites and instruments supported by the CSPP_MIRS software, as well as the required input files and their naming conventions.

Table 1: CSPP_MIRS satellite input data file requirements.

Satellite	Instrument	Direct Broadcast Processing Software	Required input: Example Filenames (Direct Broadcast form)
Suomi-NPP	ATMS	CSPP SDR v3.x (or IDPS SDR)	Radiance, antenna temperature, geolocation: SATMS_npp*.h5, TATMS_npp*.h5, GATMO_npp*.h5
NOAA-20	ATMS	CSPP SDR v3.x (or IDPS SDR)	Radiance, antenna temperature, geolocation: SATMS_j01*.h5, TATMS_j01*.h5, GATMO_j01*.h5
NOAA-21	ATMS	CSPP SDR v3.x (or IDPS SDR)	Radiance, antenna temperature, geolocation: SATMS_j02*.h5, TATMS_j02*.h5, GATMO_j02*.h5
NOAA-18*	AMSUA-A + MHS	AAPP v8	Level 1B: amsual1b_noaa18*.l1b, mhsl1b_noaa18*.l1b
NOAA-19	AMSUA-A + MHS	AAPP v8	Level 1B: amsual1b_noaa19*.l1b, mhsl1b_noaa19*.l1b
Metop-A	AMSUA-A + MHS	AAPP v8	Level 1B: amsual1b_M02*.l1b, mhsl1b_M02*.l1b
Metop-B	AMSUA-A + MHS	AAPP v8	Level 1B: amsual1b_M01*.l1b, mhsl1b_M01*.l1b
Metop-C	AMSUA-A + MHS	AAPP v8	Level 1B: amsual1c_M03*.l1b, mhsl1c_M03*.l1c

*** WARNING:** The NOAA-18 MHS instrument began experiencing problems on 20 October 2018 and is not supported after this event.

CSPP is the Community Satellite Processing Package and in this instance refers to the SDR generating components of CSPP:

https://cimss.ssec.wisc.edu/cspp/

IDPS is the Interface Data Processing Segment developed by Raytheon Intelligence and Information Systems. SNPP products created by IDPS are available from the CLASS archive:

https://www.class.noaa.gov/

AAPP is the ATOVS (Advanced TIROS Operational Vertical Sounder) and AVHRR (Advanced High Resolution Radiometer) Processing Package distributed by the Met Office:

https://www.nwpsaf.eu/site/software/aapp

Note that support for DMSP F-16, F-17, F-18 and Megha-Tropiques SAPHIR has not been enabled or tested in this CSPP_MIRS release.

Dynamic Ancillary Data

The SnowFall Rate (SFR) product (and associated Prob_SF="Probability of falling snow") is the only product that requires dynamic ancillary data in the form of Global Forecast System (GFS) NWP GRIB2 model files. There is a flag that can be provided to the main run script (--noSFR) that will prevent the SFR product from being created, and hence not fetch any ancillary data.

SFR is available for all supported missions except Metop-A and NOAA-18. The specific GFS files used are 0.5 degree spatial resolution files that comprise 3-hourly forecast times based off 6-hourly analyses. If needed, they are, by default, automatically downloaded from the CSPP ancillary data server at:

http://jpssdb.ssec.wisc.edu/cspp_v_2_0/ancillary/

Two files are needed that bound the data time most closely. They have names like:

```
gfs.t12z.pgrb2.0p50.f006.20200825
```

1.6 Output Products

The MiRS retrieval algorithm creates the following products as described in the *'MIRS Delivery Memorandum Version 11.6'* (DAP/mirs_v11r6_r110620219/doc/MIRS_Delivery_Memo.pdf). **NOTE:** For interpretation of quality control fields we refer the reader to section 5.4.2 "Interpretation and Usage of Quality Control" in *'Microwave Integrated Retrieval System (MIRS) User Manual (MiRS version 11.6)'* (DAP/mirs_v11r6_r110620219/doc/MIRS_Users_Manual.pdf).

Official Validated Products for Suomi-NPP, NOAA-18/19, Metop-A/B/C, NOAA-20/21**

- Temperature profile over open water ocean
- Humidity profile over open water ocean
- Humidity Profile over non-coastal Land
- Total Precipitable Water (TPW) over open water ocean
- Total Precipitable Water over non-coastal land
- Land surface temperature
- Surface Emissivity over land and snow
- Surface Type Classification
- Snow Water Equivalent (SWE)
- Sea Ice Concentration (SIC)
- Snow Cover Extent (SCE), based on the SWE
- Vertically-Integrated Non-precipitating Cloud Liquid Water (CLW) over open water ocean
- Vertically-Integrated Ice Water Path (IWP)
- Vertically-Integrated Rain Water Path (RWP)
- Rainfall Rate (RR) over open water ocean and non-coastal, non-snow-covered land surface types
- Effective grain size of snow (over snow-covered land surface)*
- Multi-Year (MY) Type Sea Ice Concentration*
- First-Year (FY) Type Sea Ice Concentration*
- Snow fall rate and Probability of falling snow (SFR and Prob_SF)***

*Note that FY and MY Sea Ice Concentration, as well as Snow Grain Size are not officially operational, but preliminary products, which is a higher maturity level than experimental status.
**Note that all retrieval products from NOAA-20 are at full validated maturity level.
***Note that snowfall rate is not produced for Metop-A and NOAA-18.

Experimental Products (not validated)

The following products are also produced experimentally for NOAA-18, NOAA-19, Metop-A, Metop-B, Metop-C, Suomi-NPP, and NOAA-20. Note that they lack a thorough validation due to the absence of reliable ground truth measurements. These are made available to users for the purpose of evaluating their usefulness.

- Cloud Liquid Water Profile (CLWP) over ocean.
- Surface Temperature (skin) extended to snow-covered land surface type
- Surface Temperature (skin) extended to open ocean water

1.7 Disclaimer

Original scripts and automation included as part of this package are distributed under the GNU GENERAL PUBLIC LICENSE agreement version 3. Binary executable files included as part of this software package are copyrighted and licensed by their respective organizations, and distributed consistent with their licensing terms.

The University of Wisconsin-Madison Space Science and Engineering Center (SSEC) makes no warranty of any kind with regard to the CSPP software or any accompanying documentation, including but not limited to the implied warranties of merchantability and fitness for a particular purpose. SSEC does not indemnify any infringement of copyright, patent, or trademark through the use or modification of this software.

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Section 2: Installation and Configuration

2.1 Overview

This software package contains the CSPP_MIRS microwave sensor retrieval system based on the NOAA MiRS version 11.6 software bundled as a stand-alone processing package. NOAA documents including the MiRS User's Manual and Interface Control Document are included with this distribution, containing detailed information about the processing system, including input, output, static and semi-static data files.

2.2 Installation of CSPP_MIRS Software

Download the following file from the CSPP website (https://cimss.ssec.wisc.edu/cspp/)

`CSPP_MIRS_V2.4.tar.gz`

Install the software as shown below (a new directory named `CSPP_MIRS_2_4` will be created):

```
tar -xzf CSPP_MIRS_V2.4.tar.gz
```

Set the `CSPP_MIRS_HOME` environment variable to the name of the directory where CSPP_MIRS is installed, and execute the CSPP MIRS environment script as shown below:

```
export CSPP_MIRS_HOME=$HOME/CSPP_MIRS_2_4          # Edit for your install directory
source $CSPP_MIRS_HOME/scripts/cspp_mirs_env.sh
```

If you wish you can edit `cspp_mirs_env.sh` to set your installation directory.

2.3 Installation of CSPP_MIRS Test Data

Test data files are available in a tar file named `CSPP_MIRS_TESTDATA_V2.4.tar.gz`. They unpack into a directory named `CSPP_MIRS_TESTDATA_2_4` on the command:

```
tar -xzf CSPP_MIRS_TESTDATA_V2.4.tar.gz
```

Section 3: CSPP_MIRS Software

3.1 CSPP_MIRS Driver Script

The principal script is `CSPP_MIRS_2_4/scripts/run_mirs.bash`. This bash script checks for the `CSPP_MIRS_HOME` environment variable, unsets the stack limit, and then invokes the Perl script `$CSPP_MIRS_HOME/scripts/run_mirs.pl`, which contains all the remaining logic to organize MiRS processing.

This logic includes creating a temporary directory, pre-processing input files (which might include determining the endian-ness of L1B files and uncompressing and concatenating SDR files), copying output netCDF4 files to the designated target directory, and purging the temporary directory.

Several command line options are available for `run_mirs.bash` as shown over:

```
Options:
--version             show program's version number and exit
?, -h, --help         show this help message and exit
-n, --nothing         make the PCF and SCS files, but do not execute.

Mandatory Arguments:
  At a minimum these arguments must be specified [i.e. no default].

  -i INPUT_FILES, --input_files=INPUT_FILES
                      Fully qualified path to input files. May be directory
                      name, or directory/filemask (use * and ?, not regexp).
                      Filemasks MUST be "quoted" so OS does NOT expand!
                      e.g. -i "/dataDir/{GATMO,SATMS,TATMS}_npp*t1823486*.h5"
                      OR -i "/dataDir/{amsua,mhs}l1b_noaa18_*_1051*l1b" OR
                      -i "/dataDir/*.{AMA,MHS}X.M2.D13329.S0346.E0529.B*.SV"
                      (BUT -i /dataDir  really is the simplest way).
  -s MISSION, --sat=MISSION
                      The mission satellite data for MiRS algorithm.
                      Possible values (following MiRS documentation) ...
                      npp, n18, n19, n20, n21, metopA, metopB, metopC.

Extra Options:
  These options may be used to customize behaviour of this program.

  -w WORK_DIR, --work=WORK_DIR
                      The directory in which all activity will occur,
                      this is where output files will be put.
                      [default: current directory].
  -d DYNAMIC_ANC, --dynanc=DYNAMIC_ANC
                      Path to root of dynamic ancillary data tree; beneath
                      here data are organized as per SSEC remote ancillary
                      server for CSPP, i.e. %Y_%m_%d_%j where %Y is 4-digit
                      year, %m is 2-digit month, %d is 2-digit day of month
                      and %j is 3-digit day of year.
                      [default: environment var. $CSPP_DYNAMIC_ANCIL_DIR].
  -r RES, --resolution=RES
                      Executes retrieval in RES resolution mode for sensors
                      aboard n18, n19, metopA, metopB and metopC.  RES is
                      'HI' or 'LO'.  When 'LO' the higher resolution sensor
                      (MHS) is aggregated to the lower resolution sensor
                      (AMSUA) footprint. 'HI' means AMSUA interpolated to
                      MHS footprint.
                      [default: 'HI'].
  -p PROCESSORS, --processors=PROCESSORS
                      Number of cpus to use for CSPP_MIRS processing.
                      [default: --processors=1, max is 32].
  -b BLOCK, --block=BLOCK
                      Choose bias correction file for block BLOCK SDRs for
                      S-NPP and NOAA-20 ATMS only.  Represents ADL Block 1
                      or Block 2 software version.  ADL block 2 SDRs in
                      effect from about March 2017.
                      [default: 2; the only other valid option is 1].
  -f, --SFR           Generate SnowFall Rate (SFR).  The only step that
                      requires ancillary (GFS) data to be fetched, so we
                      recommended --noSFR if you do not need this product.
                      [default: --SFR, --noSFR is the contrary option].
  -x, --xfiles        Use the NOAA filenames for AMSUA/MHS L1B files
                      [default: Direct Broadcast filenames].
  -v, --verbose       Each occurrence increases verbosity 1 level from
                      [default: ERROR only] -v=WARNING -vv=INFO -vvv=DEBUG
  -c, --clean         Deletes temporary working directory under WORK_DIR
                      at process completion.
                      [default: --clean; --noclean is the contrary option].
  -q, --quarantine    Processing machine is not connected to the web for the
                      purpose of fetching required dynamic ancillary data.
                      [default: --noquarantine].
  -a, --aggregate     Aggregates npp/n20/n21 ATMS granules into swaths prior
                      to processing; you ought do this (to counter cross-
                      granule effects) unless files are already aggregated.
                      [default: --agg; --noagg is the contrary option].
```

Examples:

run_mirs.bash -s npp -i /data/atms_sdrs -w /cspp/work -d /CSPP/EDR/anc/cache -vv

run_mirs.bash -s metopB -i /metop/amsua_mhs -w /metop/output -d /dynamic_anc

run_mirs.bash -s n19 -i /n19/amsua_mhs -d /dynamic_anc --noSFR --noclean

Appendix A shows example screen output for a specific example command line.

An example of NOAA (--xfiles) versus Direct Broadcast names for metopB is shown below:

NOAA (--xfiles)	Direct Broadcast (default)
NSS.AMAX.M1.D18207.S0320.E0332.B3036767.WE	amsual1b_M01_20180726_0320_30367.l1b
NSS.MHSX.M1.D18207.S0320.E0332.B3036767.WE	mhsl1b_M01_20180726_0320_30367.l1b

3.2 CSPP_MIRS Quick Start

Follow the installation steps in Section 2.2. If you enter the command …

```
run_mirs.bash -h
```

… and are presented with the help screen shown on the previous page, CSPP_MIRS is installed and ready to use.

3.3 Running CSPP_MIRS Test Cases

It is recommended that you verify a correct installation by executing the software on the test cases. The verification script that we supply with the test data package will confirm that your installation is running correctly. It will also give some guidance on runtimes for your hardware. ***The verification script uses 8 CPUs (-p 8) for which a typical runtime is about 10 to 20 minutes.*** (If you do not have 8 idle CPUs, the script will still run, but more slowly). The verify script is listed in **Appendix B**. Unpack the test data as shown in Section 2.3 and run the verification script:

```
cd CSPP_MIRS_TESTDATA_2_4/work ;
../scripts/verify_mirs.bash
```

```
Run this in CSPP_MIRS_TESTDATA_2_4/work
---------------------------------------
Typical total runtime for 6 missions is 1 to 2 hours on single CPU
For 8 CPUs, runtime for 6 missions might be about 10 to 20 minutes
Running: run_mirs.bash -v -q -d ../dynanc -s metopA -i ../input -p 8 > metopA.log
Running: run_mirs.bash -v -q -d ../dynanc -s metopB -i ../input -p 8 > metopB.log
Running: run_mirs.bash -v -q -d ../dynanc -s metopC -i ../input -p 8 > metopC.log
Running: run_mirs.bash -v -q -d ../dynanc -s n19 -i ../input -p 8 > n19.log
Running: run_mirs.bash -v -q -d ../dynanc -s npp --noagg -i ../input -p 8 > npp.log
Running: run_mirs.bash -v -q -d ../dynanc -s n20 -i ../input -p 8 > n20.log

Begin verification
------------------
Verifying: metopA
Verifying: metopB
Verifying: metopC
Verifying: n19
Verifying: npp
Verifying: n20
```

If there are no errors or warnings, then the installation verification test is passed and CSPP_MIRS is ready to use. The reason `--noagg` is applied to npp processing in this instance is because input GATMO, SATMS and TATMS files are provided as already of overpass length. For n20 we have provided an overpass in the form of fifteen 32-second granules to exercise aggregation prior to processing, applying the default option of `--aggregate`.

3.4 CSPP_MIRS Output Files

On completion there will be several NetCDF files in the current directory with names like this:

```
NPR-MIRS-IMG_v11r6_ma1_s202008251453446_e202008251504300_c202009081743130.nc
NPR-MIRS-IMG_v11r6_ma2_s202008251344555_e202008251349009_c202009081740480.nc
NPR-MIRS-IMG_v11r6_ma3_s202008251408469_e202008251414441_c202009081745320.nc
NPR-MIRS-IMG_v11r6_n19_s202008251441526_e202008251447020_c202009081747070.nc
NPR-MIRS-IMG_v11r6_n20_s202008251715226_e202008251723223_c202009081752350.nc
NPR-MIRS-IMG_v11r6_npp_s202008251803546_e202008251814343_c202009081750070.nc
NPR-MIRS-SND_v11r6_ma1_s202008251453446_e202008251504300_c202009081743130.nc
NPR-MIRS-SND_v11r6_ma2_s202008251344555_e202008251349009_c202009081740480.nc
NPR-MIRS-SND_v11r6_ma3_s202008251408469_e202008251414441_c202009081745320.nc
NPR-MIRS-SND_v11r6_n19_s202008251441526_e202008251447020_c202009081747080.nc
NPR-MIRS-SND_v11r6_n20_s202008251715226_e202008251723223_c202009081752350.nc
NPR-MIRS-SND_v11r6_npp_s202008251803546_e202008251814343_c202009081750070.nc
```

The files including `IMG` in their name are the MiRS Image Product files, and the files including `SND` in their filenames are the MiRS Sounding Product files. Both product file types are in NetCDF4 format. The contents of these are described in section 4.3 of the *'NOAA MIRS Interface Control Document'* (MIRS_Interface-Control-Document.pdf). Note that some MiRS product fields are considered experimental and some have space reserved but no values retrieved. For more information see the *'MIRS Delivery Memorandum Version 11.6'* (MIRS_Delivery_Memo.pdf).

Appendix A: CSPP_MIRS example screen output

In this example we use just two CPUs (-p 2) rather than 8 (as in the verify script) as this reduces the volume of output but retains the information on when files are chopped and merged. We are also using the ancillary GFS data provided in the test data package rather than fetch from SSEC's ancillary data server (-q -d ../dynamic_ancillary).

```
$ pwd
/data1/users/jimd/CSPP/CSPP_MIRS_TESTDATA_2_4/work

$ run_mirs.bash -v -q -d ../dynanc -s n19 -i ../input -p 2
|----------------------------------------|
|                                        |
|      M I R S    T E S T B E D          |
|                                        |
|----------------------------------------|
|      General Information:              |
|----------------------------------------|
Script currently running: /data1/users/jimd/CSPP/CSPP_MIRS_TESTDATA_2_4/work/TMP__MIOjb/cspp_n19_scs.bash
LogFile             =.//n19_logFile
processingMode           =0
iSensor_ID               =4
outFMaccur               =0
prefixFMaccur            =QCcheck
nprofs2retr              =1000000
nprofs2fwd               =1000000
iAddDeviceNoise          =0
MonitorIterat            =0
nAttempts                =2
extBkgAtmUse             =1
ExternDataAvailab        =1
PrintMonitor             =0
iPrintMonitor_fwd        =0
GeogrLimits              =0
minLat                   =-90.
maxLat                   =90.
minLon                   =-180.
maxLon                   =180.
mxDaysAllowed            =0
NdayBack                 =2
tdrFormat                =1
Pass                     =2
DayUsed4Bias             =2006_02_01
DayUsed4Algs             =2006_02_01
norbits2process          =1000000
GifDensity               =100
iSrcExtData              =2
iFMtype                  =1
iBiasComputMethod        =1
nChoppedFilesPerOrbit    =2
retrOnOrbitOrSubOrbit    =1
retrOnWhichSDR           =1
Fmatrx2Use               =0
sweClimoUse              =1
makeOrNot                =0
CPUuse                   =1
Creating directory: working/TestbedData/DynamicData/tdr/n19_amsua/
Creating directory: working/TestbedData/DynamicData/tdr/n19_mhs/
Creating directory: working/TestbedData/DynamicData/sdr/n19_amsua/
Creating directory: working/TestbedData/DynamicData/sdr/n19_mhs/
Creating directory: working/TestbedData/DynamicData/fmsdr/n19_amsua_mhs/
Creating directory: working/TestbedData/DynamicData/fmsdrchopp/n19_amsua_mhs/
EDR  Directory: working/TestbedData/Outputs/edr/n19_amsua_mhs/
DEP  Directory: working/TestbedData/Outputs/dep/n19_amsua_mhs/
Creating directory: working/TestbedData/Outputs/grid/n19_amsua_mhs/
NETCDF4  Directory: working/TestbedData/Outputs/nc/n19_amsua_mhs/
Creating directory: working/TestbedData/Outputs/figs/n19_amsua_mhs/
Creating directory: working/TestbedData/Outputs/sfr/n19_amsua_mhs/
Creating directory: working/TestbedData/PerfsMonitoring/n19_amsua_mhs/
GRID-BIAS  Directory: working/TestbedData/Outputs/grid/n19_amsua_mhs/
QCCheck  Directory: working/TestbedData/PerfsMonitoring/n19_amsua_mhs/
regr-FIGS  Directory: working/TestbedData/PerfsMonitoring/n19_amsua_mhs/
```

```
Creating directory: working/TestbedData/DynamicData/nwp_analys/n19_amsua_mhs/
Creating directory: working/TestbedData/DynamicData/fwd_analys/n19_amsua_mhs/
Creating directory: working/TestbedData/PerfsMonitoring/n19_amsua_mhs/orbitmon/
Creating directory: working/TestbedData/DynamicData/regress_retr/n19_amsua_mhs/
Creating directory: working/TestbedData/DynamicData/swe_climo/n19_amsua_mhs/
Creating directory: working/TestbedData/DynamicData/ff_colloc/n19_amsua_mhs/
Creating directory: working/TestbedData/DynamicData/ims_colloc/n19_amsua_mhs/
============== RUNNING RDR->TDR(amsua) STEP ======================
RDR-AMSUA directory: ./
 /data1/users/jimd/CSPP/CSPP_MIRS_2_4/DAP/mirs_v11r6_r110620219/bin/rdr2tdr_n19_amsua <
working/ControlData/n19_amsua_rdr2tdr_NP.D20238.S1441.E1447.B5951616.WE.in
  AMSU-A number of scan lines =      44  File#           1
  Reported Missing:      0
End of step rdr2tdr 1
============== RUNNING RDR->TDR(mhs) STEP ======================
RDR-MHSX directory: ./
 /data1/users/jimd/CSPP/CSPP_MIRS_2_4/DAP/mirs_v11r6_r110620219/bin/rdr2tdr_n19_mhs <
working/ControlData/n19_mhs_rdr2tdr_NP.D20238.S1441.E1447.B5951616.WE.in
 ================================================
  MHS number of scan lines =     131
  Reported Missing:      0
End of step rdr2tdr 1
============== RUNNING MRG-NEDT STEP ======================
 /data1/users/jimd/CSPP/CSPP_MIRS_2_4/DAP/mirs_v11r6_r110620219/bin/mergeNEDT <
working/ControlData/n19_mergeNEDT_NP.D20238.S1441.E1447.B5951616.WE.in
End of step mergeNedt
============== RUNNING TDR->SDR(amsua) STEP ======================
 /data1/users/jimd/CSPP/CSPP_MIRS_2_4/DAP/mirs_v11r6_r110620219/bin/tdr2sdr <
working/ControlData/n19_amsua_tdr2sdr_NP.D20238.S1441.E1447.B5951616.WE.in
 ifile=           1
TDR=working/TestbedData/DynamicData/tdr/n19_amsua//TDR_AMAX.NP.D20238.S1441.E1447.B5951616.WE
SDR=working/TestbedData/DynamicData/sdr/n19_amsua//SDR_AMAX.NP.D20238.S1441.E1447.B5951616.WE

End of step tdr2sdr
============== RUNNING TDR->SDR(mhs) STEP ======================
 /data1/users/jimd/CSPP/CSPP_MIRS_2_4/DAP/mirs_v11r6_r110620219/bin/tdr2sdr <
working/ControlData/n19_mhs_tdr2sdr_NP.D20238.S1441.E1447.B5951616.WE.in
 ifile=           1
TDR=working/TestbedData/DynamicData/tdr/n19_mhs//TDR_MHSX.NP.D20238.S1441.E1447.B5951616.WE
SDR=working/TestbedData/DynamicData/sdr/n19_mhs//SDR_MHSX.NP.D20238.S1441.E1447.B5951616.WE

End of step tdr2sdr
============== RUNNING FM STEP ======================
 /data1/users/jimd/CSPP/CSPP_MIRS_2_4/DAP/mirs_v11r6_r110620219/bin/fm_n19 <
working/ControlData/n19_amsua_mhs_fm_NP.D20238.S1441.E1447.B5951616.WE.in

Input AMSUA file=working/TestbedData/DynamicData/sdr/n19_amsua//SDR_AMAX.NP.D20238.S1441.E1447.B5951616.WE
Input MHS file=working/TestbedData/DynamicData/sdr/n19_mhs//SDR_MHSX.NP.D20238.S1441.E1447.B5951616.WE
 AMSUA scan=          44 , AMSUA nfov=          30 , AMSUA nprf=        1320
 MHS scan=         131 , MHS nfov=          90 , MHS nprf=       11790
Output FM
file=working/TestbedData/DynamicData/fmsdr/n19_amsua_mhs//FMSDR_SX.NP.D20238.S1441.E1447.B5951616.WE.HR
 FM scan =         117
 FM nfov=          90
 FM nprf=       10530
End of step fm
============== RUNNING CHOPPING FMSDR STEP ======================
 /data1/users/jimd/CSPP/CSPP_MIRS_2_4/DAP/mirs_v11r6_r110620219/bin/chopp <
working/ControlData/n19_Chopp_NP.D20238.S1441.E1447.B5951616.WE.in
Input
file=working/TestbedData/DynamicData/fmsdr/n19_amsua_mhs//FMSDR_SX.NP.D20238.S1441.E1447.B5951616.WE.HR
 Number of profiles, nProfs=       10530
 Number of Sub-Files, nChoppedFiles=           2
 Expected average number of profiles in each Sub-File, np=        5265

 Sub-File number:           1
working/TestbedData/DynamicData/fmsdrchopp/n19_amsua_mhs//CHPDR_SX.NP.D20238.S1441.E1447.B5951616.WE.HR_001
 Number of effective profiles:        5265

 Sub-File number:           2
working/TestbedData/DynamicData/fmsdrchopp/n19_amsua_mhs//CHPDR_SX.NP.D20238.S1441.E1447.B5951616.WE.HR_002
 Number of effective profiles:        5265

End of step chopp
============== APPLICATION OF REGRESSION ALGORITHMS ======================
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```
 /data1/users/jimd/CSPP/CSPP_MIRS_2_4/DAP/mirs_v11r6_r110620219/bin/ApplyRegress <
working/ControlData/n19_ApplyRegress_NP.D20238.S1441.E1447.B5951616.WE.in

 ApplyRegress           1
 Input
FMSDR=working/TestbedData/DynamicData/fmsdrchopp/n19_amsua_mhs//CHPDR_SX.NP.D20238.S1441.E1447.B5951616.WE.H
R_001
 Output
REGRESS=working/TestbedData/DynamicData/regress_retr/n19_amsua_mhs//REGRESSX.NP.D20238.S1441.E1447.B5951616.
WE.HR_001

 ApplyRegress           2
 Input
FMSDR=working/TestbedData/DynamicData/fmsdrchopp/n19_amsua_mhs//CHPDR_SX.NP.D20238.S1441.E1447.B5951616.WE.H
R_002
 Output
REGRESS=working/TestbedData/DynamicData/regress_retr/n19_amsua_mhs//REGRESSX.NP.D20238.S1441.E1447.B5951616.
WE.HR_002
End of step applyRegress
=============== RUNNING FMSDR->EDR STEP ======================
nfiles=2
Processing File# 1
working/TestbedData/DynamicData/fmsdrchopp/n19_amsua_mhs//CHPDR_SX.NP.D20238.S1441.E1447.B5951616.WE.HR_001
 /data1/users/jimd/CSPP/CSPP_MIRS_2_4/DAP/mirs_v11r6_r110620219/bin/1dvar <
working/ControlData/n19_CntrlConfig_1dvar_NP.D20238.S1441.E1447.B5951616.WE.in_1 &
Processing File# 2
working/TestbedData/DynamicData/fmsdrchopp/n19_amsua_mhs//CHPDR_SX.NP.D20238.S1441.E1447.B5951616.WE.HR_002
 /data1/users/jimd/CSPP/CSPP_MIRS_2_4/DAP/mirs_v11r6_r110620219/bin/1dvar <
working/ControlData/n19_CntrlConfig_1dvar_NP.D20238.S1441.E1447.B5951616.WE.in_2 &
 ACCoeff_ReadFile(Binary)(INFORMATION) : FILE:
/data1/users/jimd/CSPP/CSPP_MIRS_2_4/DAP/mirs_v11r6_r110620219/data/StaticData/CRTMFiles/amsua_n19.SpcCoeff.
bin;
 ACCoeff RELEASE.VERSION:  1.05
   N_FOVS=30  N_CHANNELS=15
 SpcCoeff_ReadFile(Binary)(INFORMATION) : FILE:
/data1/users/jimd/CSPP/CSPP_MIRS_2_4/DAP/mirs_v11r6_r110620219/data/StaticData/CRTMFiles/amsua_n19.SpcCoeff.
bin;
 SpcCoeff RELEASE.VERSION:  8.01
   N_CHANNELS=15
 ACCoeff_ReadFile(Binary)(INFORMATION) : FILE:
/data1/users/jimd/CSPP/CSPP_MIRS_2_4/DAP/mirs_v11r6_r110620219/data/StaticData/CRTMFiles/mhs_n19.SpcCoeff.bi
n;
 ACCoeff RELEASE.VERSION:  1.05
   N_FOVS=90  N_CHANNELS=5
 SpcCoeff_ReadFile(Binary)(INFORMATION) : FILE:
/data1/users/jimd/CSPP/CSPP_MIRS_2_4/DAP/mirs_v11r6_r110620219/data/StaticData/CRTMFiles/mhs_n19.SpcCoeff.bi
n;
 SpcCoeff RELEASE.VERSION:  8.01
   N_CHANNELS=5
 Read_ODPS_Binary(INFORMATION) : FILE:
/data1/users/jimd/CSPP/CSPP_MIRS_2_4/DAP/mirs_v11r6_r110620219/data/StaticData/CRTMFiles/amsua_n19.TauCoeff.
bin;
   ODPS RELEASE.VERSION:  2.01  N_LAYERS=100  N_COMPONENTS=2  N_ABSORBERS=1  N_CHANNELS=15  N_COEFFS=21600
 Read_ODPS_Binary(INFORMATION) : FILE:
/data1/users/jimd/CSPP/CSPP_MIRS_2_4/DAP/mirs_v11r6_r110620219/data/StaticData/CRTMFiles/mhs_n19.TauCoeff.bi
n;
   ODPS RELEASE.VERSION:  2.01  N_LAYERS=100  N_COMPONENTS=2  N_ABSORBERS=1  N_CHANNELS=5  N_COEFFS=10200
 CloudCoeff_ReadFile(Binary)(INFORMATION) : FILE:
/data1/users/jimd/CSPP/CSPP_MIRS_2_4/DAP/mirs_v11r6_r110620219/data/StaticData/CRTMFiles/CloudCoeff.bin;
 CloudCoeff RELEASE.VERSION:  3.04  N_FREQUENCIES(MW)=  31  N_FREQUENCIES(IR)=  61  N_RADII(MW)=10
N_RADII(IR)=10  N_TEMPERATURES= 5  N_DENSITIES= 3  N_LEGENDRE_TERMS=38  N_PHASE_ELEMENTS= 1
 AerosolCoeff_ReadFile(Binary)(INFORMATION) : FILE:
/data1/users/jimd/CSPP/CSPP_MIRS_2_4/DAP/mirs_v11r6_r110620219/data/StaticData/CRTMFiles/AerosolCoeff.bin;
 AerosolCoeff RELEASE.VERSION:  3.04  N_WAVELENGTHS=  61  N_RADII= 36  N_TYPES= 8  N_RH= 36
N_LEGENDRE_TERMS=37  N_PHASE_ELEMENTS= 1
 SEcategory_ReadFile(INFORMATION) : FILE:
/data1/users/jimd/CSPP/CSPP_MIRS_2_4/DAP/mirs_v11r6_r110620219/data/StaticData/CRTMFiles/NPOESS.IRland.EmisC
oeff.bin;
 SEcategory RELEASE.VERSION:  3.01
   CLASSIFICATION: NPOESS,  N_FREQUENCIES=20  N_SURFACE_TYPES=20
 IRwaterCoeff_ReadFile(INFORMATION) : FILE:
/data1/users/jimd/CSPP/CSPP_MIRS_2_4/DAP/mirs_v11r6_r110620219/data/StaticData/CRTMFiles/Nalli.IRwater.EmisC
oeff.bin;
 IRwaterCoeff RELEASE.VERSION:  3.01  N_ANGLES= 16  N_FREQUENCIES= 2223  N_WIND_SPEEDS= 11
```

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 SEcategory_ReadFile(INFORMATION) : FILE:
/data1/users/jimd/CSPP/CSPP_MIRS_2_4/DAP/mirs_v11r6_r110620219/data/StaticData/CRTMFiles/NPOESS.IRsnow.EmisC
oeff.bin;
 SEcategory RELEASE.VERSION:  3.01
   CLASSIFICATION: NPOESS,  N_FREQUENCIES=20  N_SURFACE_TYPES=2
 SEcategory_ReadFile(INFORMATION) : FILE:
/data1/users/jimd/CSPP/CSPP_MIRS_2_4/DAP/mirs_v11r6_r110620219/data/StaticData/CRTMFiles/NPOESS.IRice.EmisCo
eff.bin;
 SEcategory RELEASE.VERSION:  3.01
   CLASSIFICATION: NPOESS,  N_FREQUENCIES=20  N_SURFACE_TYPES=1
 SEcategory_ReadFile(INFORMATION) : FILE:
/data1/users/jimd/CSPP/CSPP_MIRS_2_4/DAP/mirs_v11r6_r110620219/data/StaticData/CRTMFiles/NPOESS.VISland.Emis
Coeff.bin;
 SEcategory RELEASE.VERSION:  3.01
   CLASSIFICATION: NPOESS,  N_FREQUENCIES=57  N_SURFACE_TYPES=20
 SEcategory_ReadFile(INFORMATION) : FILE:
/data1/users/jimd/CSPP/CSPP_MIRS_2_4/DAP/mirs_v11r6_r110620219/data/StaticData/CRTMFiles/NPOESS.VISwater.Emi
sCoeff.bin;
 SEcategory RELEASE.VERSION:  3.01
   CLASSIFICATION: NPOESS,  N_FREQUENCIES=57  N_SURFACE_TYPES=1
 SEcategory_ReadFile(INFORMATION) : FILE:
/data1/users/jimd/CSPP/CSPP_MIRS_2_4/DAP/mirs_v11r6_r110620219/data/StaticData/CRTMFiles/NPOESS.VISsnow.Emis
Coeff.bin;
 SEcategory RELEASE.VERSION:  3.01
   CLASSIFICATION: NPOESS,  N_FREQUENCIES=57  N_SURFACE_TYPES=2
 SEcategory_ReadFile(INFORMATION) : FILE:
/data1/users/jimd/CSPP/CSPP_MIRS_2_4/DAP/mirs_v11r6_r110620219/data/StaticData/CRTMFiles/NPOESS.VISice.EmisC
oeff.bin;
 SEcategory RELEASE.VERSION:  3.01
   CLASSIFICATION: NPOESS,  N_FREQUENCIES=57  N_SURFACE_TYPES=1
 FitCoeff_ReadFile(INFORMATION) : FILE:
/data1/users/jimd/CSPP/CSPP_MIRS_2_4/DAP/mirs_v11r6_r110620219/data/StaticData/CRTMFiles/FASTEM5.MWwater.Emi
sCoeff.bin;
 FitCoeff RELEASE.VERSION : 1.5; DIMENSIONS= 2
 FitCoeff_ReadFile(INFORMATION) : FILE:
/data1/users/jimd/CSPP/CSPP_MIRS_2_4/DAP/mirs_v11r6_r110620219/data/StaticData/CRTMFiles/FASTEM5.MWwater.Emi
sCoeff.bin;
 FitCoeff RELEASE.VERSION : 1.5; DIMENSIONS= 6
 FitCoeff_ReadFile(INFORMATION) : FILE:
/data1/users/jimd/CSPP/CSPP_MIRS_2_4/DAP/mirs_v11r6_r110620219/data/StaticData/CRTMFiles/FASTEM5.MWwater.Emi
sCoeff.bin;
 FitCoeff RELEASE.VERSION : 1.5; DIMENSIONS= 3, 7, 2
 FitCoeff_ReadFile(INFORMATION) : FILE:
/data1/users/jimd/CSPP/CSPP_MIRS_2_4/DAP/mirs_v11r6_r110620219/data/StaticData/CRTMFiles/FASTEM5.MWwater.Emi
sCoeff.bin;
 FitCoeff RELEASE.VERSION : 1.5; DIMENSIONS= 10, 4, 3
 FitCoeff_ReadFile(INFORMATION) : FILE:
/data1/users/jimd/CSPP/CSPP_MIRS_2_4/DAP/mirs_v11r6_r110620219/data/StaticData/CRTMFiles/FASTEM5.MWwater.Emi
sCoeff.bin;
 FitCoeff RELEASE.VERSION : 1.5; DIMENSIONS= 8
 FitCoeff_ReadFile(INFORMATION) : FILE:
/data1/users/jimd/CSPP/CSPP_MIRS_2_4/DAP/mirs_v11r6_r110620219/data/StaticData/CRTMFiles/FASTEM5.MWwater.Emi
sCoeff.bin;
 FitCoeff RELEASE.VERSION : 1.5; DIMENSIONS= 3, 6, 2
 MWwaterLUT_ReadFile(INFORMATION) : FILE:
/data1/users/jimd/CSPP/CSPP_MIRS_2_4/DAP/mirs_v11r6_r110620219/data/StaticData/CRTMFiles/FASTEM5.MWwater.Emi
sCoeff.bin;
 MWwaterLUT RELEASE.VERSION:  1.01
   N_ANGLES=15  N_FREQUENCIES=18  N_TEMPERATURES=12  N_WIND_SPEEDS=16
 MWwaterCoeff_ReadFile(INFORMATION) : FILE:
/data1/users/jimd/CSPP/CSPP_MIRS_2_4/DAP/mirs_v11r6_r110620219/data/StaticData/CRTMFiles/FASTEM5.MWwater.Emi
sCoeff.bin;
 MWwaterCoeff RELEASE.VERSION: 1.5
 SeaIceTypeadjust:computing ilowFreq, ihighFreq
 ilowFreq,CentrFreq(ilowFreq)=           2   31.4007797
 ihighFreq,CentrFreq(ihighFreq)=          15   89.0022202
 ACCoeff_ReadFile(Binary)(INFORMATION) : FILE:
/data1/users/jimd/CSPP/CSPP_MIRS_2_4/DAP/mirs_v11r6_r110620219/data/StaticData/CRTMFiles/amsua_n19.SpcCoeff.
bin;
 ACCoeff RELEASE.VERSION:  1.05
   N_FOVS=30  N_CHANNELS=15
 SpcCoeff_ReadFile(Binary)(INFORMATION) : FILE:
/data1/users/jimd/CSPP/CSPP_MIRS_2_4/DAP/mirs_v11r6_r110620219/data/StaticData/CRTMFiles/amsua_n19.SpcCoeff.
bin;
 SpcCoeff RELEASE.VERSION:  8.01
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   N_CHANNELS=15
 ACCoeff_ReadFile(Binary)(INFORMATION) : FILE:
/data1/users/jimd/CSPP/CSPP_MIRS_2_4/DAP/mirs_v11r6_r110620219/data/StaticData/CRTMFiles/mhs_n19.SpcCoeff.bi
n;
 ACCoeff RELEASE.VERSION:  1.05
   N_FOVS=90  N_CHANNELS=5
 SpcCoeff_ReadFile(Binary)(INFORMATION) : FILE:
/data1/users/jimd/CSPP/CSPP_MIRS_2_4/DAP/mirs_v11r6_r110620219/data/StaticData/CRTMFiles/mhs_n19.SpcCoeff.bi
n;
 SpcCoeff RELEASE.VERSION:  8.01
   N_CHANNELS=5
 Read_ODPS_Binary(INFORMATION) : FILE:
/data1/users/jimd/CSPP/CSPP_MIRS_2_4/DAP/mirs_v11r6_r110620219/data/StaticData/CRTMFiles/amsua_n19.TauCoeff.
bin;
   ODPS RELEASE.VERSION:  2.01  N_LAYERS=100  N_COMPONENTS=2  N_ABSORBERS=1  N_CHANNELS=15  N_COEFFS=21600
 Read_ODPS_Binary(INFORMATION) : FILE:
/data1/users/jimd/CSPP/CSPP_MIRS_2_4/DAP/mirs_v11r6_r110620219/data/StaticData/CRTMFiles/mhs_n19.TauCoeff.bi
n;
   ODPS RELEASE.VERSION:  2.01  N_LAYERS=100  N_COMPONENTS=2  N_ABSORBERS=1  N_CHANNELS=5  N_COEFFS=10200
 CloudCoeff_ReadFile(Binary)(INFORMATION) : FILE:
/data1/users/jimd/CSPP/CSPP_MIRS_2_4/DAP/mirs_v11r6_r110620219/data/StaticData/CRTMFiles/CloudCoeff.bin;
 CloudCoeff RELEASE.VERSION:  3.04  N_FREQUENCIES(MW)=  31  N_FREQUENCIES(IR)=  61  N_RADII(MW)=10
N_RADII(IR)=10  N_TEMPERATURES= 5  N_DENSITIES= 3  N_LEGENDRE_TERMS=38  N_PHASE_ELEMENTS= 1
 AerosolCoeff_ReadFile(Binary)(INFORMATION) : FILE:
/data1/users/jimd/CSPP/CSPP_MIRS_2_4/DAP/mirs_v11r6_r110620219/data/StaticData/CRTMFiles/AerosolCoeff.bin;
 AerosolCoeff RELEASE.VERSION:  3.04  N_WAVELENGTHS=  61  N_RADII= 36  N_TYPES= 8  N_RH= 36
N_LEGENDRE_TERMS=37  N_PHASE_ELEMENTS= 1
 SEcategory_ReadFile(INFORMATION) : FILE:
/data1/users/jimd/CSPP/CSPP_MIRS_2_4/DAP/mirs_v11r6_r110620219/data/StaticData/CRTMFiles/NPOESS.IRland.EmisC
oeff.bin;
 SEcategory RELEASE.VERSION:  3.01
   CLASSIFICATION: NPOESS,  N_FREQUENCIES=20  N_SURFACE_TYPES=20
 IRwaterCoeff_ReadFile(INFORMATION) : FILE:
/data1/users/jimd/CSPP/CSPP_MIRS_2_4/DAP/mirs_v11r6_r110620219/data/StaticData/CRTMFiles/Nalli.IRwater.EmisC
oeff.bin;
 IRwaterCoeff RELEASE.VERSION:  3.01  N_ANGLES= 16  N_FREQUENCIES= 2223  N_WIND_SPEEDS= 11
 SEcategory_ReadFile(INFORMATION) : FILE:
/data1/users/jimd/CSPP/CSPP_MIRS_2_4/DAP/mirs_v11r6_r110620219/data/StaticData/CRTMFiles/NPOESS.IRsnow.EmisC
oeff.bin;
 SEcategory RELEASE.VERSION:  3.01
   CLASSIFICATION: NPOESS,  N_FREQUENCIES=20  N_SURFACE_TYPES=2
 SEcategory_ReadFile(INFORMATION) : FILE:
/data1/users/jimd/CSPP/CSPP_MIRS_2_4/DAP/mirs_v11r6_r110620219/data/StaticData/CRTMFiles/NPOESS.IRice.EmisCo
eff.bin;
 SEcategory RELEASE.VERSION:  3.01
   CLASSIFICATION: NPOESS,  N_FREQUENCIES=20  N_SURFACE_TYPES=1
 SEcategory_ReadFile(INFORMATION) : FILE:
/data1/users/jimd/CSPP/CSPP_MIRS_2_4/DAP/mirs_v11r6_r110620219/data/StaticData/CRTMFiles/NPOESS.VISland.Emis
Coeff.bin;
 SEcategory RELEASE.VERSION:  3.01
   CLASSIFICATION: NPOESS,  N_FREQUENCIES=57  N_SURFACE_TYPES=20
 SEcategory_ReadFile(INFORMATION) : FILE:
/data1/users/jimd/CSPP/CSPP_MIRS_2_4/DAP/mirs_v11r6_r110620219/data/StaticData/CRTMFiles/NPOESS.VISwater.Emi
sCoeff.bin;
 SEcategory RELEASE.VERSION:  3.01
   CLASSIFICATION: NPOESS,  N_FREQUENCIES=57  N_SURFACE_TYPES=1
 SEcategory_ReadFile(INFORMATION) : FILE:
/data1/users/jimd/CSPP/CSPP_MIRS_2_4/DAP/mirs_v11r6_r110620219/data/StaticData/CRTMFiles/NPOESS.VISsnow.Emis
Coeff.bin;
 SEcategory RELEASE.VERSION:  3.01
   CLASSIFICATION: NPOESS,  N_FREQUENCIES=57  N_SURFACE_TYPES=2
 SEcategory_ReadFile(INFORMATION) : FILE:
/data1/users/jimd/CSPP/CSPP_MIRS_2_4/DAP/mirs_v11r6_r110620219/data/StaticData/CRTMFiles/NPOESS.VISice.EmisC
oeff.bin;
 SEcategory RELEASE.VERSION:  3.01
   CLASSIFICATION: NPOESS,  N_FREQUENCIES=57  N_SURFACE_TYPES=1
 FitCoeff_ReadFile(INFORMATION) : FILE:
/data1/users/jimd/CSPP/CSPP_MIRS_2_4/DAP/mirs_v11r6_r110620219/data/StaticData/CRTMFiles/FASTEM5.MWwater.Emi
sCoeff.bin;
 FitCoeff RELEASE.VERSION : 1.5; DIMENSIONS= 2
 FitCoeff_ReadFile(INFORMATION) : FILE:
/data1/users/jimd/CSPP/CSPP_MIRS_2_4/DAP/mirs_v11r6_r110620219/data/StaticData/CRTMFiles/FASTEM5.MWwater.Emi
sCoeff.bin;
 FitCoeff RELEASE.VERSION : 1.5; DIMENSIONS= 6
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 FitCoeff_ReadFile(INFORMATION) : FILE:
/data1/users/jimd/CSPP/CSPP_MIRS_2_4/DAP/mirs_v11r6_r110620219/data/StaticData/CRTMFiles/FASTEM5.MWwater.Emi
sCoeff.bin;
 FitCoeff RELEASE.VERSION : 1.5; DIMENSIONS= 3, 7, 2
 FitCoeff_ReadFile(INFORMATION) : FILE:
/data1/users/jimd/CSPP/CSPP_MIRS_2_4/DAP/mirs_v11r6_r110620219/data/StaticData/CRTMFiles/FASTEM5.MWwater.Emi
sCoeff.bin;
 FitCoeff RELEASE.VERSION : 1.5; DIMENSIONS= 10, 4, 3
 FitCoeff_ReadFile(INFORMATION) : FILE:
/data1/users/jimd/CSPP/CSPP_MIRS_2_4/DAP/mirs_v11r6_r110620219/data/StaticData/CRTMFiles/FASTEM5.MWwater.Emi
sCoeff.bin;
 FitCoeff RELEASE.VERSION : 1.5; DIMENSIONS= 8
 FitCoeff_ReadFile(INFORMATION) : FILE:
/data1/users/jimd/CSPP/CSPP_MIRS_2_4/DAP/mirs_v11r6_r110620219/data/StaticData/CRTMFiles/FASTEM5.MWwater.Emi
sCoeff.bin;
 FitCoeff RELEASE.VERSION : 1.5; DIMENSIONS= 3, 6, 2
 MWwaterLUT_ReadFile(INFORMATION) : FILE:
/data1/users/jimd/CSPP/CSPP_MIRS_2_4/DAP/mirs_v11r6_r110620219/data/StaticData/CRTMFiles/FASTEM5.MWwater.Emi
sCoeff.bin;
 MWwaterLUT RELEASE.VERSION:  1.01
   N_ANGLES=15  N_FREQUENCIES=18  N_TEMPERATURES=12  N_WIND_SPEEDS=16
 MWwaterCoeff_ReadFile(INFORMATION) : FILE:
/data1/users/jimd/CSPP/CSPP_MIRS_2_4/DAP/mirs_v11r6_r110620219/data/StaticData/CRTMFiles/FASTEM5.MWwater.Emi
sCoeff.bin;
 MWwaterCoeff RELEASE.VERSION: 1.5
 SeaIceTypeadjust:computing ilowFreq, ihighFreq
 ilowFreq,CentrFreq(ilowFreq)=           2   31.4007797
 ihighFreq,CentrFreq(ihighFreq)=          15   89.0022202



 ________________________________________

 Process Summary:
 ________________________________________
Input
file=working/TestbedData/DynamicData/fmsdrchopp/n19_amsua_mhs//CHPDR_SX.NP.D20238.S1441.E1447.B5951616.WE.HR
_002
Output file=working/TestbedData/Outputs/edr/n19_amsua_mhs/EDR_SX.NP.D20238.S1441.E1447.B5951616.WE.HR_002
          Total Number of Profiles submitted:           5265
          Total Number of Profiles processed:           5265
Total Number of Profiles detected over ocean:           1068
  Total Number of Profiles detected over ice:              0
 Total Number of Profiles detected over land:           4197
 Total Number of Profiles detected over snow:              0
               Number of Convergent Profiles:           5118
                  Total Number of Iterations:           9162
                    Avg # Iterations/Profile:        1.74017
                             Convergence Rate:       97.20798%
 ________________________________________

 Timing:
 ________________________________________
                    Uploading/Initialization:        1.73135        2.54160%
                   Reading radiance/extr data:        0.06461        0.09484%
     Preparing matrices(Sa,Xb,Se,Fe,U,X1st):        2.90842        4.26952%
     Setting up scene/Merging cov, EOF proj:        6.63884        9.74571%
                           Forward Operator:       55.47917       81.44257%
            Inversion & Pre-Post Processing:        1.28320        1.88373%
          Error Analysis & characterization:        0.00315        0.00463%
                Output (Scene & Monitoring):        0.17902        0.26280%
                                      Total:       68.12060      100.00000%

 Deallocation in progress...
 _____________
 End of 1dvar.



 ________________________________________

 Process Summary:
 ________________________________________
```

```
Input
file=working/TestbedData/DynamicData/fmsdrchopp/n19_amsua_mhs//CHPDR_SX.NP.D20238.S1441.E1447.B5951616.WE.HR
_002
Output file=working/TestbedData/Outputs/edr/n19_amsua_mhs/EDR_SX.NP.D20238.S1441.E1447.B5951616.WE.HR_002
         Total Number of Profiles submitted:           5265
         Total Number of Profiles processed:           5265
Total Number of Profiles detected over ocean:           1068
  Total Number of Profiles detected over ice:              0
 Total Number of Profiles detected over land:           4197
 Total Number of Profiles detected over snow:              0
               Number of Convergent Profiles:           5118
                  Total Number of Iterations:           9162
                    Avg # Iterations/Profile:        1.74017
                             Convergence Rate:       97.20798%

 ________________________________________

 Timing:
 ________________________________________
                       Uploading/Initialization:        1.74422        2.59008%
                     Reading radiance/extr data:        0.06564        0.09747%
     Preparing matrices(Sa,Xb,Se,Fe,U,X1st):        2.79045        4.14369%
     Setting up scene/Merging cov, EOF proj:        6.64206        9.86316%
                             Forward Operator:       54.80350       81.38075%
            Inversion & Pre-Post Processing:        1.27496        1.89326%
          Error Analysis & characterization:        0.00298        0.00443%
                Output (Scene & Monitoring):        0.17894        0.26572%
                                      Total:       67.34209      100.00000%

 Deallocation in progress...
 _____________
 End of 1dvar.



 ________________________________________

 Process Summary:
 ________________________________________
Input
file=working/TestbedData/DynamicData/fmsdrchopp/n19_amsua_mhs//CHPDR_SX.NP.D20238.S1441.E1447.B5951616.WE.HR
_001
Output file=working/TestbedData/Outputs/edr/n19_amsua_mhs/EDR_SX.NP.D20238.S1441.E1447.B5951616.WE.HR_001
         Total Number of Profiles submitted:           5265
         Total Number of Profiles processed:           5265
Total Number of Profiles detected over ocean:            106
  Total Number of Profiles detected over ice:              0
 Total Number of Profiles detected over land:           5138
 Total Number of Profiles detected over snow:             21
               Number of Convergent Profiles:           4752
                  Total Number of Iterations:          11840
                    Avg # Iterations/Profile:        2.24881
                             Convergence Rate:       90.25641%

 ________________________________________

 Timing:
 ________________________________________
                       Uploading/Initialization:        1.67338        1.02825%
                     Reading radiance/extr data:        0.06996        0.04299%
     Preparing matrices(Sa,Xb,Se,Fe,U,X1st):        4.93091        3.02993%
     Setting up scene/Merging cov, EOF proj:        8.16952        5.01998%
                             Forward Operator:      146.89056       90.26080%
            Inversion & Pre-Post Processing:        2.27876        1.40024%
          Error Analysis & characterization:        0.00344        0.00211%
                Output (Scene & Monitoring):        0.18856        0.11586%
                                      Total:      162.74016      100.00000%

 Deallocation in progress...
 _____________
 End of 1dvar.



 ________________________________________

 Process Summary:
```

```
 ____________________________________
Input
file=working/TestbedData/DynamicData/fmsdrchopp/n19_amsua_mhs//CHPDR_SX.NP.D20238.S1441.E1447.B5951616.WE.HR
_001
Output file=working/TestbedData/Outputs/edr/n19_amsua_mhs/EDR_SX.NP.D20238.S1441.E1447.B5951616.WE.HR_001
          Total Number of Profiles submitted:           5265
          Total Number of Profiles processed:           5265
Total Number of Profiles detected over ocean:            106
  Total Number of Profiles detected over ice:              0
 Total Number of Profiles detected over land:           5138
 Total Number of Profiles detected over snow:             21
               Number of Convergent Profiles:           4752
                  Total Number of Iterations:          11840
                    Avg # Iterations/Profile:        2.24881
                             Convergence Rate:       90.25641%
 ____________________________________

 Timing:
 ____________________________________
                      Uploading/Initialization:        1.87885        1.18066%
                    Reading radiance/extr data:        0.06614        0.04156%
      Preparing matrices(Sa,Xb,Se,Fe,U,X1st):        4.50277        2.82952%
      Setting up scene/Merging cov, EOF proj:        7.86353        4.94140%
                             Forward Operator:      143.85136       90.39548%
            Inversion & Pre-Post Processing:        2.21508        1.39194%
          Error Analysis & characterization:        0.00283        0.00178%
                Output (Scene & Monitoring):        0.18046        0.11340%
                                      Total:      159.13557      100.00000%

 Deallocation in progress...

 _____________
 End of 1dvar.
End of step fmsdr2edr
=============== RUNNING MERGING EDR STEP ======================
 /data1/users/jimd/CSPP/CSPP_MIRS_2_4/DAP/mirs_v11r6_r110620219/bin/mergeEDR <
working/ControlData/n19_MergeEDR_NP.D20238.S1441.E1447.B5951616.WE.in_0
 Processing :working/TestbedData/Outputs/edr/n19_amsua_mhs/EDR_SX.NP.D20238.S1441.E1447.B5951616.WE.HR.ORB
Processed file:1
End of step mergeEdr
 /data1/users/jimd/CSPP/CSPP_MIRS_2_4/DAP/mirs_v11r6_r110620219/bin/prepSweClimo <
working/ControlData/n19_prepSweClimo_NP.D20238.S1441.E1447.B5951616.WE.in
sweClimoFile=/data1/users/jimd/CSPP/CSPP_MIRS_2_4/DAP/mirs_v11r6_r110620219/data/StaticData/SWE_Climatology/
swe_ssmis_climo_ease_NHSH.dat_ascii
sweStdevFile=/data1/users/jimd/CSPP/CSPP_MIRS_2_4/DAP/mirs_v11r6_r110620219/data/StaticData/SWE_Climatology/
swe_ssmis_stdev_ease_NHSH.dat_ascii
 Reading SWE Climatology file
 SWE Climatology grid: ncols,nrows,nm,nhm=         721         721          12           2
 Start subroutine ReadSweStdev
 finish open
 dummy=SSMIS SWE Stdev Monthly Mean Climatology (1997-2003), Northern Hemisphere
 dummy=ncol, nrow, nmonth, nhem
 Reading SWE Std Dev Climatology file
 SWE Std Dev Climatology grid: ncols,nrows,nm,nhm=         721         721          12           2

 prepSweClimo, ifile:            1
 Input
FMSDR=working/TestbedData/DynamicData/fmsdr/n19_amsua_mhs//FMSDR_SX.NP.D20238.S1441.E1447.B5951616.WE.HR
 Output
DEP(SweClim)=working/TestbedData/DynamicData/swe_climo/n19_amsua_mhs//DEPswecl.NP.D20238.S1441.E1447.B595161
6.WE.HR
End of step prepSweClimo
 /data1/users/jimd/CSPP/CSPP_MIRS_2_4/DAP/mirs_v11r6_r110620219/bin/viirsForFracColloc <
working/ControlData/n19_ffColloc_NP.D20238.S1441.E1447.B5951616.WE.in

forestFracFile=/data1/users/jimd/CSPP/CSPP_MIRS_2_4/DAP/mirs_v11r6_r110620219/data/StaticData/ForestFraction
/VIIRS_2014_GST_latlon_avg25km.dat
 i=           1
 minval(forestFrac(i,1:ncols,1:nrows))=   0.00000000
 maxval(forestFrac(i,1:ncols,1:nrows))=  0.998888910
 i=           2
 minval(forestFrac(i,1:ncols,1:nrows))=   0.00000000
 maxval(forestFrac(i,1:ncols,1:nrows))=   1.00000000
 i=           3
 minval(forestFrac(i,1:ncols,1:nrows))=   0.00000000
 maxval(forestFrac(i,1:ncols,1:nrows))=   1.00000000
```

```
 i=           4
 minval(forestFrac(i,1:ncols,1:nrows))=   0.00000000
 maxval(forestFrac(i,1:ncols,1:nrows))=  0.995555580
 i=           5
 minval(forestFrac(i,1:ncols,1:nrows))=   0.00000000
 maxval(forestFrac(i,1:ncols,1:nrows))=   1.00000000
 i=           6
 minval(forestFrac(i,1:ncols,1:nrows))=   0.00000000
 maxval(forestFrac(i,1:ncols,1:nrows))=   1.00000000
 Lat/Lon file grid: nlon,nlat=        1440         720
 Forest Fraction data file grid: ncols,nrows=        1440         720

 viirsForFracColloc, ifile:            1
 Input
FMSDR=working/TestbedData/DynamicData/fmsdr/n19_amsua_mhs//FMSDR_SX.NP.D20238.S1441.E1447.B5951616.WE.HR
 Output
DEP(FFcol)=working/TestbedData/DynamicData/ff_colloc/n19_amsua_mhs//FFcol_SX.NP.D20238.S1441.E1447.B5951616.
WE.HR
End of step ffColloc
=============== RUNNING VIPP STEP ======================
edrList4VIPP=working/InputsData/n19_edrFiles_NP.D20238.S1441.E1447.B5951616.WE.list
 /data1/users/jimd/CSPP/CSPP_MIRS_2_4/DAP/mirs_v11r6_r110620219/bin/vipp <
working/ControlData/n19_Vipp_NP.D20238.S1441.E1447.B5951616.WE.in
 Finished reading sweClimo file list, nfilesSweClimo=           1
 Finished reading ffColloc file list, nfilesFF=           1

 ifile=           1
EDR file=working/TestbedData/Outputs/edr/n19_amsua_mhs//EDR_SX.NP.D20238.S1441.E1447.B5951616.WE.HR.ORB
DEP file=working/TestbedData/Outputs/dep/n19_amsua_mhs//DEP_SX.NP.D20238.S1441.E1447.B5951616.WE.HR.ORB
 finished reading sweClimo DEP header,nprfsSweClimo=       10530
 finished reading FF DEP header,nprfFF=       10530
End of step vipp
=============== RUNNING SFR/RETRIEVAL STEP ======================
 /data1/users/jimd/CSPP/CSPP_MIRS_2_4/DAP/mirs_v11r6_r110620219/bin/sfr
working/ControlData/n19_Sfr_NP.D20238.S1441.E1447.B5951616.WE.in
-----------------------
ffn_conf: working/ControlData/n19_Sfr_NP.D20238.S1441.E1447.B5951616.WE.in
Successfully open file: working/ControlData/n19_Sfr_NP.D20238.S1441.E1447.B5951616.WE.in
sat, sen, reg: n19, amsua, swath
s_iftype: fmsdr
Successfully open file: working/InputsData/n19_fmsdrFiles_4Sfr_NP.D20238.S1441.E1447.B5951616.WE.list
Cannot open xxxxxx.list
This file may not needed, decide later ...
---------------------------------
ffn_pin:
/data1/users/jimd/CSPP/CSPP_MIRS_2_4/DAP/mirs_v11r6_r110620219/data/StaticData/SFR//input_prod_n19_amsua.dat
Successfully open file:
/data1/users/jimd/CSPP/CSPP_MIRS_2_4/DAP/mirs_v11r6_r110620219/data/StaticData/SFR//input_prod_n19_amsua.dat
Successfully read in
/data1/users/jimd/CSPP/CSPP_MIRS_2_4/DAP/mirs_v11r6_r110620219/data/StaticData/SFR//input_prod_n19_amsua.dat
---------------------------------
Successfully open file:
/data1/users/jimd/CSPP/CSPP_MIRS_2_4/DAP/mirs_v11r6_r110620219/data/StaticData/SFR//mask.bin
Successfully read in
/data1/users/jimd/CSPP/CSPP_MIRS_2_4/DAP/mirs_v11r6_r110620219/data/StaticData/SFR//mask.bin
---------------------------------
Successfully read in
/data1/users/jimd/CSPP/CSPP_MIRS_2_4/DAP/mirs_v11r6_r110620219/data/StaticData/SFR//lese_tab.dat
---------------------------------
Successfully open file:
/data1/users/jimd/CSPP/CSPP_MIRS_2_4/DAP/mirs_v11r6_r110620219/data/StaticData/SFR//tis_n19_amsua.dat
Successfully read in
/data1/users/jimd/CSPP/CSPP_MIRS_2_4/DAP/mirs_v11r6_r110620219/data/StaticData/SFR//tis_n19_amsua.dat
---------------------------------
ffn_lut:
/data1/users/jimd/CSPP/CSPP_MIRS_2_4/DAP/mirs_v11r6_r110620219/data/StaticData/SFR//snowShape_sphere_optics_
amsua.dat
Successfully open file:
/data1/users/jimd/CSPP/CSPP_MIRS_2_4/DAP/mirs_v11r6_r110620219/data/StaticData/SFR//snowShape_sphere_optics_
amsua.dat
nel_l=1900260
  3.79367680e-06  9.08740520e-01  3.79367725e-06
  5.21916672e-06  8.98768780e-01  5.21916627e-06
---------------------------------
####################
```

```
file index : 0
ffn_file0:
working/TestbedData/DynamicData/fmsdr/n19_amsua_mhs//FMSDR_SX.NP.D20238.S1441.E1447.B5951616.WE.HR
nscan, nfov, nchan: 117 90 20
ffn0: |working/ExternalData/gridNWP_sfr/avn_comb12.bin.20200825|
avn_ind[0] 0  avn_flag[0] 0
ffn1: |working/ExternalData/gridNWP_sfr/avn_comb15.bin.20200825|
avn_ind[1] 1  avn_flag[1] 0
fnmod, fcfmt: fmbin, fmbin
ffn_out: working/TestbedData/Outputs/sfr/n19_amsua_mhs//SFR_SX.NP.D20238.S1441.E1447.B5951616.WE.HR
####################


########################################
# report
########################################
Total             : 1 files
Input file format : fmsdr
Output file mode  : fmbin
########################################


=============== RUNNING SFR/SFR2DEP STEP ======================
1
working/TestbedData/Outputs/dep/n19_amsua_mhs//DEP_SX.NP.D20238.S1441.E1447.B5951616.WE.HR.ORB--
>working/TestbedData/Outputs/dep/n19_amsua_mhs//SFR_SX.NP.D20238.S1441.E1447.B5951616.WE.HR.ORB
working/InputsData/n19_sfrFiles_NP.D20238.S1441.E1447.B5951616.WE.list
 /data1/users/jimd/CSPP/CSPP_MIRS_2_4/DAP/mirs_v11r6_r110620219/bin/sfr2dep <
working/ControlData/n19_Sfr2dep_NP.D20238.S1441.E1447.B5951616.WE.in
 ifile=           1
SFR=working/TestbedData/Outputs/sfr/n19_amsua_mhs//SFR_SX.NP.D20238.S1441.E1447.B5951616.WE.HR
DEP1=working/TestbedData/Outputs/dep/n19_amsua_mhs//SFR_SX.NP.D20238.S1441.E1447.B5951616.WE.HR.ORB
DEP2=working/TestbedData/Outputs/dep/n19_amsua_mhs//DEP_SX.NP.D20238.S1441.E1447.B5951616.WE.HR.ORB

End of step sfr
rdrListFile=  working/InputsData/n19_amsua_rdrFiles_NP.D20238.S1441.E1447.B5951616.WE.list
rdrType=  0
nedr,ndep,nrdr=  1, 1, 1
prodSite= NSOF
prodEnv= OE
hdfdumpStr= /Data_Products/ATMS-TDR/ATMS-TDR_Aggr
Normal case: HMS_s <= HMS_e
For this satellite, isRDRneeded is 0
 /data1/users/jimd/CSPP/CSPP_MIRS_2_4/DAP/mirs_v11r6_r110620219/bin/mirs2nc
working/TestbedData/Outputs/edr/n19_amsua_mhs//EDR_SX.NP.D20238.S1441.E1447.B5951616.WE.HR.ORB
working/TestbedData/Outputs/dep/n19_amsua_mhs//DEP_SX.NP.D20238.S1441.E1447.B5951616.WE.HR.ORB
working/TestbedData/Outputs/nc/n19_amsua_mhs// NPR-MIRS-
IMG_v11r6_n19_s202008251441000_e202008251447000_c202009090207390.nc NPR-MIRS-
SND_v11r6_n19_s202008251441000_e202008251447000_c202009090207390.nc -999 -999 NSOF OE 11 6
Input edr & dep files:
working/TestbedData/Outputs/edr/n19_amsua_mhs//EDR_SX.NP.D20238.S1441.E1447.B5951616.WE.HR.ORB
working/TestbedData/Outputs/dep/n19_amsua_mhs//DEP_SX.NP.D20238.S1441.E1447.B5951616.WE.HR.ORB
Data dimension of orbit: nscan=117, npos=90, nchan=20, nlay=100
Output sounding & imaging netcdf4 files:
working/TestbedData/Outputs/nc/n19_amsua_mhs//NPR-MIRS-
SND_v11r6_n19_s202008251441000_e202008251447000_c202009090207390.nc
working/TestbedData/Outputs/nc/n19_amsua_mhs//NPR-MIRS-
IMG_v11r6_n19_s202008251441000_e202008251447000_c202009090207390.nc

End of step mirs2nc
  Changed: NPR-MIRS-IMG_v11r6_n19_s202008251441000_e202008251447000_c202009090207390.nc
       to: NPR-MIRS-IMG_v11r6_n19_s202008251441526_e202008251447020_c202009090207410.nc
  Changed: NPR-MIRS-SND_v11r6_n19_s202008251441000_e202008251447000_c202009090207390.nc
       to: NPR-MIRS-SND_v11r6_n19_s202008251441526_e202008251447020_c202009090207420.nc
```

Appendix B: CSPP_MIRS_TESTDATA_2_4 verification script

`scripts/verify_mirs.bash` is a simple bash script that can be edited to change the source of GFS data and the number of processors employed. The default is 8 processors and to use the GFS data pre-fetched from the SSEC CSPP ancillary data server and supplied in the test data package.

```
#!/bin/bash
here="$(dirname $0)"
ncpu="8"
gfs_gofetch="-d dynanc"
gfs_supplied="-q -d ../dynanc"
mygfs=$gfs_supplied
echo
echo "Run this in CSPP_MIRS_TESTDATA_2_4/work"
echo "---------------------------------------"
echo "Typical total runtime for 6 missions is 1 to 2 hours on single CPU"
echo "For 8 CPUs, runtime for 6 missions might be about 10 to 20 minutes"
echo "Start metopA" > timing.txt ; date >> timing.txt
echo "Running: run_mirs.bash -v $mygfs -s metopA -i ../input -p $ncpu > metopA.log"
run_mirs.bash -v $mygfs -s metopA -i ../input -p $ncpu > metopA.log
date >> timing.txt ; echo "End   metopA" >> timing.txt ;
echo "Start metopB" >> timing.txt ; date >> timing.txt
echo "Running: run_mirs.bash -v $mygfs -s metopB -i ../input -p $ncpu > metopB.log"
run_mirs.bash -v $mygfs -s metopB -i ../input -p $ncpu > metopB.log
date >> timing.txt ; echo "End   metopB" >> timing.txt ;
echo "Start metopC" >> timing.txt ; date >> timing.txt
echo "Running: run_mirs.bash -v $mygfs -s metopC -i ../input -p $ncpu > metopB.log"
run_mirs.bash -v $mygfs -s metopC -i ../input -p $ncpu > metopC.log
date >> timing.txt ; echo "End   metopC" >> timing.txt ;
echo "Start n19" >> timing.txt ; date >> timing.txt
echo "Running: run_mirs.bash -v $mygfs -s n19 -i ../input -p $ncpu > n19.log"
run_mirs.bash -v $mygfs -s n19 -i ../input -p $ncpu > n19.log
date >> timing.txt ; echo "End   n19" >> timing.txt ;
echo "Start npp" >> timing.txt ; date >> timing.txt
echo "Running: run_mirs.bash -v $mygfs -s npp --noagg -i ../input -p $ncpu > npp.log"
run_mirs.bash -v $mygfs -s npp --noagg -i ../input -p $ncpu > npp.log
date >> timing.txt ; echo "End   npp" >> timing.txt ;
echo "Start n20" >> timing.txt ; date >> timing.txt
echo "Running: run_mirs.bash -v $mygfs -s n20 -i ../input -p $ncpu > n20.log"
run_mirs.bash -v $mygfs -s n20 -i ../input -p $ncpu > n20.log
date >> timing.txt ; echo "End   n20" >> timing.txt ;
echo
echo "Begin verification"
echo "------------------"
echo "Verifying: metopA"
$here/compare_mirs.pl -s metopA -i ../output
echo "Verifying: metopB"
$here/compare_mirs.pl -s metopB -i ../output
echo "Verifying: metopC"
$here/compare_mirs.pl -s metopC -i ../output
echo "Verifying: n19"
$here/compare_mirs.pl -s n19 -i ../output
echo "Verifying: npp"
$here/compare_mirs.pl -s npp -i ../output
echo "Verifying: n20"
$here/compare_mirs.pl -s n20 -i ../output
```