




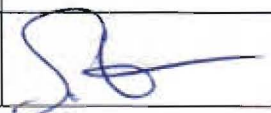


Test plan and report for BUFR conversion software

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| V1 | 17/03/08 | | Initial version |
| V2 | 02/04/08 | | Update reference to BUFR tables to refer to master table version 13, local table version 0. Add results of testing on NOAA-like platform. Change name of NOAA-like platform to dcom03 |
| V2A | 09/04/08 | | Update size of product after changing descriptor 0-10-084 to 0-10-101 in order to encode negative values. |
| V2B | 17/04/08 | | Update expected output to be consistent with FIST version of 1.1. |
| V3 | 17/06/08 | | Update scope and output to be consistent with FIST version of 1.3. |
| V3A | 25/06/08 | | Testing redone with update to Table D sequence 3-40-005 to use 0-25-097 rather than 0-25-090 for the orbit state flag. Real OGDR data from CNES used as now available post-launch. |
| V4 | 19/08/08 | | Specific testing performed to demonstrate correct functioning of upgrade from AR 86 (robust handling of negative temperatures). |
| V5 | 14/11/08 | | Update scope and output to be consistent with FIST version of 1.5. |
| V6 | 26/11/08 | | Specific testing performed to demonstrate correct handling of revised global attribute values for "processing_center". |
| v7 | 06/07/09 | | Update scope and output to be consistent with FIST version of 1.7. |
| v7A | 07/07/09 | | Update signature list. |
| v8 | 01/02/10 | | Update scope and output to be consistent with FIST version of 1.8. |

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1 INTRODUCTION

1.1 Purpose and Scope

The objective of this document is to describe the testing of the JASON-2 OGDR BUFR conversion software (FIST), and to report the testing results.

Information about the conversion software, its design and installation can be found in the following document: “BUFR Formatting Software Specification, Design and User Documentation”, EUM/JAS/TEN/07/0012.

2 TESTING PLAN

2.1 Selection of testing scenarios

The following is a list of the scenarios selected to test the JASON-2 OGDR BUFR conversion software (once on EUMETSAT like platform and once on NOAA like platform):

- 1) **Command line argument processing (J2-FIST-NT-1-E and J2-FIST-NT-1-N).**
Each of the allowed command line arguments and one invalid command line argument are passed to FIST.
- 2) **Nominal EUMETSAT OGDR data processing (J2-FIST-NT-2-E and J2-FIST-NT-2-N).** A nominal OGDR data set produced in netCDF by EUMETSAT is passed to FIST and converted into BUFR.
- 3) **Nominal NOAA OGDR data processing (J2-FIST-NT-3-E and J2-FIST-NT-3-N).** A nominal OGDR data set produced in netCDF by NOAA is passed to FIST and converted into BUFR.
- 4) **Nominal CNES IGDR data processing (J2-FIST-NT-4-E and J2-FIST-NT-4-N).** A nominal IGDR data set produced in netCDF by CNES is passed to FIST and converted into BUFR.
- 5) **Missing BUFR tables (J2-FIST-CT-1-E and J2-FIST-CT-1-N).** An attempt is made to convert a nominal OGDR data set produced in netCDF into BUFR without the BUFR tables being available
- 6) **Incorrect file name (J2-FIST-CT-2-E and J2-FIST-CT-2-N).** An attempt is made to convert a nominal OGDR data set produced in netCDF into BUFR, when the file name of the data set does not comply with the relevant specification.
- 7) **Corrupt input data (J2-FIST-CT-3-E and J2-FIST-CT-3-N).** A corrupt data set is passed to FIST.

The test identifiers are of the form **J2-FIST-[test class]-[test index]-[test platform]** where

- **[test class]** is **NT** for nominal scenarios, **CT** for contingency scenarios and **AT** for auxiliary scenarios,
- **[test index]** is a sequential numerical index within each test class, and
- **[test platform]** is **E** for a EUMETSAT like platform such as dcom01 and **N** for a NOAA like platform such as dcom03.

2.2 Testing environment

Test Items:

- JASON-2 OGDR BUFR conversion software (FIST). The software reads netCDF OGDR data generated by the JASON-2 NRT system and converts them into BUFR products ready for distribution to the GTS/RMDCN, EUMETCast, UMARF, CLASS and the NOAA Server. The software also reads netCDF IGDR data and converts them into BUFR.

Input Specification:

The following input files are to be used:

- JA2_OPN_2PcS057_082_20100121_115402_20100121_132620 for **J2-FIST-NT-1-E, J2-FIST-NT-1-N, J2-FIST-NT-2-E, J2-FIST-NT-2-N, J2-FIST-CT-1-E, and J2-FIST-CT-1-N**
- JA2_OPN_2PcS057_079_20100121_095735_20100121_115402 for **J2-FIST-NT-3-E and J2-FIST-NT-3-N**
- JA2_IPN_2PcP057_025_20100119_062643_20100119_072256 for **J2-FIST-NT-4-E and J2-FIST-NT-4-N**
- JA1_IPN_2PcP146_228_20051231_201822_20051231_211422.nc (symbolic link to JA2_OPN_2PcS057_082_20100121_115402_20100121_132620) for **J2-FIST-CT-2-E and J2-FIST-CT-2-N**
- BUFR tables B, B0000000000000014000.TXT for all tests and specifically for **J2-FIST-CT-3-E and J2-FIST-CT-3-N**
- BUFR tables C, C0000000000000014000.TXT for all tests
- BUFR tables D, D0000000000000014000.TXT for all tests

Output Specification:

- Specific information as request according to command line arguments for **J2-FIST-NT-1-E and J2-FIST-NT-1-N**
- OGDR data in BUFR format in files named according to WMO file naming specification and as per NOAA file naming requirements for **J2-FIST-NT-2-E, J2-FIST-NT-2-N, J2-FIST-NT-3-E and J2-FIST-NT-3-N**
- IGDR data in BUFR format in files named according to WMO file naming specification and as per NOAA file naming requirements for **J2-FIST-NT-4-E and J2-FIST-NT-4-N**
- No output for **J2-FIST-CT-1-E, J2-FIST-CT-1-N, J2-FIST-CT-2-E, J2-FIST-CT-2-N, J2-FIST-CT-3-E and J2-FIST-CT-3-N**

Environmental Needs:

- The tests should each be performed on a platform representative of the EUMETSAT processing environment (dcom01) and of the NOAA processing environment (dcom03)
- Software: In addition to the standard operating system libraries and the FIST application, and installation of the netCDF library is required. This is described in EUM/JAS/TEN/07/0012.

3 TEST REPORTS

3.1 Command line argument processing, J2-FIST-NT-1-E

Environment:

Test to be run on EUMETSAT like host, dcomo01

Test cases:

I) Command line argument `--wmo-file-name` produces expected output

Entering at the command prompt the following:

```
J2_OGDR_to_BUFR --wmo-file-name  
JA2_OPN_2PcS057_082_20100121_115402_20100121_132620
```

should produce an output of:

```
W_XX-EUMETSAT-  
Darmstadt,SURFACE+SATELLITE,JASON2+OGDR_C_EUMS_20100121135313_  
c_057_082_20100121132620.bin
```

at the console, and create no output file.

Result – *test passed*

II) Command line argument `--fist-version` produces expected output

Entering at the command prompt the following:

```
J2_OGDR_to_BUFR --fist-version
```

should produce an output of:

```
1.8
```

at the console, and create no output file.

Result – *test passed*

III) Command line argument `--bufr-table-versions` produces expected output

Entering at the command prompt the following:

```
J2_OGDR_to_BUFR --bufr-table-versions
```

should produce an output of:

14.0

at the console, and create no output file.

Result – *test passed*

IV) Command line argument `--ecmwf-library-version` produces expected output

Entering at the command prompt the following:

```
J2_OGDR_to_BUFR --ecmwf-library-version
```

should produce an output of:

380

at the console, and create no output file.

Result – *test passed*

V) Command line argument `--go-eagles` produces expected output

Entering at the command prompt the following:

```
J2_OGDR_to_BUFR --go-eagles
```

should produce no output.

The following text should be found in the relevant syslog (currently `/var/log/debug`):
`siParseInputFileName failed with status: -301`

Result – *test passed*

3.2 Command line argument processing, J2-FIST-NT-1-N

Environment:

Test to be run on NOAA like host, dcom03

Test cases:

I) Command line argument `--wmo-file-name` produces expected output

Entering at the command prompt the following:

```
J2_OGDR_to_BUFR --wmo-file-name  
JA2_OPN_2PcS057_082_20100121_115402_20100121_132620
```

should produce an output of:

W_XX-EUMETSAT-
Darmstadt,SURFACE+SATELLITE,JASON2+OGDR_C_EUMS_20100121135313_
c_057_082_20100121132620.bin

at the console, and create no output file.

Result – *test passed*

II) Command line argument `--fist-version` produces expected output

Entering at the command prompt the following:

J2_OGDR_to_BUFR `--fist-version`

should produce an output of:

1.8

at the console, and create no output file.

Result – *test passed*

III) Command line argument `--bufr-table-versions` produces expected output

Entering at the command prompt the following:

J2_OGDR_to_BUFR `--bufr-table-versions`

should produce an output of:

14.0

at the console, and create no output file.

Result – *test passed*

IV) Command line argument `--ecmwf-library-version` produces expected output

Entering at the command prompt the following:

J2_OGDR_to_BUFR `--ecmwf-library-version`

should produce an output of:

380

at the console, and create no output file.

Result – *test passed*

V) Command line argument `--go-eagles` produces expected output

Entering at the command prompt the following:

```
J2_OGDR_to_BUFR --go-eagles
```

should produce no output.

The following text should be found in the relevant syslog (currently `/var/log/debug`):
`siParseInputFileName failed with status: -301`

Result – *test passed*

3.3 Nominal EUMETSAT OGDR data processing, J2-FIST-NT-2-E

Environment:

Test to be run on EUMETSAT like host, `dcomo01`

Test cases:

1) Encoding of nominal OGDR data from EUMETSAT produces expected output

Entering at the command prompt the following:

```
J2_OGDR_to_BUFR  
JA2_OPN_2PcS057_082_20100121_115402_20100121_132620
```

should produce two output files called

```
W_XX-EUMETSAT-  
Darmstadt,SURFACE+SATELLITE,JASON2+OGDR_C_EUMS_20100121135313_  
c_057_082_20100121132620.bin
```

and

```
JA2_OPB_2PcS057_082_20100121_115402_20100121_132620
```

These should be identical and of size 471330 bytes. Each file should contain 8 BUFR bulletins, which can be extracted and decoded offline for comparison with the original netCDF OGDR data as required

The following text should be found in the relevant syslog (currently `/var/log/debug`):
`NetCDF file name:
JA2_OPN_2PcS057_082_20100121_115402_20100121_132620`

WMO file name: W_XX-EUMETSAT-
Darmstadt,SURFACE+SATELLITE,JASON2+OGDR_C_EUMS_20100121135313_
c_057_082_20100121132620.bin

NetCDF to BUFR translation completed nominally

Result – *test passed*

3.4 Nominal EUMETSAT OGDR data processing, J2-FIST-NT-2-N

Environment:

Test to be run on NOAA like host, dcom03

Test cases:

1) Encoding of nominal OGDR data from EUMETSAT produces expected output

Entering at the command prompt the following:

```
J2_OGDR_to_BUFR  
JA2_OPN_2PcS057_082_20100121_115402_20100121_132620
```

should produce two output files called

```
W_XX-EUMETSAT-  
Darmstadt,SURFACE+SATELLITE,JASON2+OGDR_C_EUMS_20100121135313_  
c_057_082_20100121132620.bin
```

and

```
JA2_OPB_2PcS057_082_20100121_115402_20100121_132620
```

These should be identical and of size 471330 bytes. Each file should contain 8 BUFR bulletins, which can be extracted and decoded offline for comparison with the original netCDF OGDR data as required

The following text should be found in the relevant syslog (currently /var/log/debug):

NetCDF file name:

```
JA2_OPN_2PcS057_082_20100121_115402_20100121_132620
```

```
WMO file name: W_XX-EUMETSAT-  
Darmstadt,SURFACE+SATELLITE,JASON2+OGDR_C_EUMS_20100121135313_  
c_057_082_20100121132620.bin
```

NetCDF to BUFR translation completed nominally

Result – *test passed*

3.5 Nominal NOAA OGDR data processing, J2-FIST-NT-3-E

Environment:

Test to be run on EUMETSAT like host, dcomo01

Test cases:

- 1) Encoding of nominal OGDR data from NOAA produces expected output

Entering at the command prompt the following:

```
J2_OGDR_to_BUFR  
JA2_OPN_2PcS057_079_20100121_095735_20100121_115402
```

should produce two output files called

```
W_US-NOAA-  
Washington,SURFACE+SATELLITE,JASON2+OGDR_C_KNES_20100121122512  
_c_057_079_20100121115402.bin
```

and

```
JA2_OPB_2PcS057_079_20100121_095735_20100121_115402
```

These should be identical and of size 548287 bytes. Each file should contain 9 BUFR bulletins, which can be extracted and decoded offline for comparison with the original netCDF OGDR data as required

The following text should be found in the relevant syslog (currently /var/log/debug):

NetCDF file name:

```
JA2_OPN_2PcS057_079_20100121_095735_20100121_115402
```

WMO file name: W_US-NOAA-

```
Washington,SURFACE+SATELLITE,JASON2+OGDR_C_KNES_20100121122512  
_c_057_079_20100121115402.bin
```

NetCDF to BUFR translation completed nominally

Result – *test passed*

3.6 Nominal NOAA OGDR data processing, J2-FIST-NT-3-N

Environment:

Test to be run on NOAA like host, dcomo03

Test cases:

- 1) Encoding of nominal OGDR data from NOAA produces expected output

Entering at the command prompt the following:

```
J2_OGDR_to_BUFR  
JA2_OPN_2PcS057_079_20100121_095735_20100121_115402
```

should produce two output files called

```
W_US-NOAA-  
Washington,SURFACE+SATELLITE,JASON2+OGDR_C_KNES_20100121122512  
_c_057_079_20100121115402.bin
```

and

```
JA2_OPB_2PcS057_079_20100121_095735_20100121_115402
```

These should be identical and of size 548287 bytes. Each file should contain 9 BUFR bulletins, which can be extracted and decoded offline for comparison with the original netCDF OGDR data as required

The following text should be found in the relevant syslog (currently /var/log/debug):

NetCDF file name:

```
JA2_OPN_2PcS057_079_20100121_095735_20100121_115402
```

WMO file name: W_US-NOAA-

```
Washington,SURFACE+SATELLITE,JASON2+OGDR_C_KNES_20100121122512  
_c_057_079_20100121115402.bin
```

NetCDF to BUFR translation completed nominally

Result – *test passed*

3.7 Nominal CNES IGDR data processing, J2-FIST-NT-4-E

Environment:

Test to be run on EUMETSAT like host, dcomo01

Test cases:

1) Encoding of nominal IGDR data from CNES produces expected output

Entering at the command prompt the following:

```
J2_OGDR_to_BUFR  
JA2_IPN_2PcP057_025_20100119_062643_20100119_072256
```

should produce two output files called

W_FR-CNES-
Toulouse,SURFACE+SATELLITE,JASON2+IGDR_C_LFPW_20100121123133_c
_057_025_20100119072256.bin

and

JA2_IPB_2PcP057_025_20100119_062643_20100119_072256

These should be identical and of size 294393 bytes. Each file should contain 5 BUFR bulletins, which can be extracted and decoded offline for comparison with the original netCDF IGDR data as required

The following text should be found in the relevant syslog (currently /var/log/debug):

NetCDF file name:

JA2_IPN_2PcP057_025_20100119_062643_20100119_072256

WMO file name: W_FR-CNES-

Toulouse,SURFACE+SATELLITE,JASON2+IGDR_C_LFPW_20100121123133_c
_057_025_20100119072256.bin

NetCDF to BUFR translation completed nominally

Result – *test passed*

3.8 Nominal CNES IGDR data processing, J2-FIST-NT-4-N

Environment:

Test to be run on NOAA like host, dcom03

Test cases:

1) Encoding of nominal IGDR data from CNES produces expected output

Entering at the command prompt the following:

J2_OGDR_to_BUFR

JA2_IPN_2PcP057_025_20100119_062643_20100119_072256

should produce two output files called

W_FR-CNES-

Toulouse,SURFACE+SATELLITE,JASON2+IGDR_C_LFPW_20100121123133_c
_057_025_20100119072256.bin

and

JA2_IPB_2PcP057_025_20100119_062643_20100119_072256

These should be identical and of size 294393 bytes. Each file should contain 5 BUFR bulletins, which can be extracted and decoded offline for comparison with the original netCDF IGDR data as required

The following text should be found in the relevant syslog (currently /var/log/debug):

NetCDF file name:

JA2_IPN_2PcP057_025_20100119_062643_20100119_072256

WMO file name: W_FR-CNES-

Toulouse,SURFACE+SATELLITE,JASON2+IGDR_C_LFPW_20100121123133_c_057_025_20100119072256.bin

NetCDF to BUFR translation completed nominally

Result – *test passed*

3.9 Missing BUFR tables, J2-FIST-CT-1-E

Environment:

Test to be run on EUMETSAT like host, dcomo01

Test cases:

1) Encoding of nominal OGDR data from EUMETSAT produces expected output

The environment variable BUFR_TABLES should be set temporarily to point to a directory in which the BUFR tables aren't. In C shell this would be achieved by typing, for example:

```
setenv BUFR_TABLES /tmp/
```

Entering at the command prompt the following:

```
J2_OGDR_to_BUFR
```

```
JA2_OPN_2PcS057_082_20100121_115402_20100121_132620
```

should produce one output file called

WMO file name: W_XX-EUMETSAT-

Darmstadt,SURFACE+SATELLITE,JASON2+OGDR_C_EUMS_20100121135313_c_057_082_20100121132620.bin

This should be of size 0 bytes. The ECMWF software may report the following error message:

```
open error on /tmp/B0000000000000014000.TXT
```

After this test, the environment variable BUFR_TABLES should be set back to its nominal value.

The following text should be found in the relevant syslog (currently /var/log/debug):

NetCDF file name:

JA2_OPN_2PcS057_082_20100121_115402_20100121_132620

WMO file name: W_XX-EUMETSAT-

Darmstadt,SURFACE+SATELLITE,JASON2+OGDR_C_EUMS_20100121135313_
c_057_082_20100121132620.bin

BUFREN failed with error code KERR = 61

Result – *test passed*

3.10 Missing BUFR tables, J2-FIST-CT-1-N

Environment:

Test to be run on NOAA like host, dcomo03

Test cases:

1) Encoding of nominal OGDR data from EUMETSAT produces expected output

The environment variable BUFR_TABLES should be set temporarily to point to a directory in which the BUFR tables aren't. In C shell this would be achieved by typing, for example:

```
setenv BUFR_TABLES /tmp/
```

Entering at the command prompt the following:

```
J2_OGDR_to_BUFR
```

```
JA2_OPN_2PcS057_082_20100121_115402_20100121_132620
```

should produce one output file called

WMO file name: W_XX-EUMETSAT-

Darmstadt,SURFACE+SATELLITE,JASON2+OGDR_C_EUMS_20100121135313_
c_057_082_20100121132620.bin

This should be of size 0 bytes. The ECMWF software may report the following error message:

```
open error on /tmp/B00000000000000014000.TXT
```

After this test, the environment variable BUFR_TABLES should be set back to its nominal value.

The following text should be found in the relevant syslog (currently /var/log/debug):

NetCDF file name:

JA2_OPN_2PcS057_082_20100121_115402_20100121_132620

WMO file name: W_XX-EUMETSAT-

Darmstadt,SURFACE+SATELLITE,JASON2+OGDR_C_EUMS_20100121135313_
c_057_082_20100121132620.bin

BUFREN failed with error code KERR = 61

Result – *test passed*

3.11 Incorrect file name, J2-FIST-CT-2-E

Environment:

Test to be run on EUMETSAT like host, dcomo01

Test cases:

1) Encoding of nominal OGDR data with invalid file name produces no output

For the purposes of testing a valid file containing OGDR data is used as a wrongly named OGDR file. Entering at the command prompt the following:

J2_OGDR_to_BUFR

JA1_IPN_2PcP146_228_20051231_201822_20051231_211422.nc

should produce no output.

The following text should be found in the relevant syslog (currently /var/log/debug):
siParseInputFileName failed with status: -303

Result – *test passed*

3.12 Incorrect file name, J2-FIST-CT-2-N

Environment:

Test to be run on NOAA like host, dcomo03

Test cases:

1) Encoding of nominal OGDR data with invalid file name produces no output

For the purposes of testing a valid file containing OGDR data is used as a wrongly named OGDR file Entering at the command prompt the following:

J2_OGDR_to_BUFR

JA1_IPN_2PcP146_228_20051231_201822_20051231_211422.nc

should produce no output.

The following text should be found in the relevant syslog (currently /var/log/debug):
siParseInputFileName failed with status: -303

Result – *test passed*

3.13 Corrupt input data, J2-FIST-CT-3-E

Environment:

Test to be run on EUMETSAT like host, dcomo01

Test cases:

1) Encoding of corrupt/invalid data with valid file name produces no output

In order to provide some data which are not in a valid netCDF format, any other file can be used (such as the BUFR table B). A symbolic link called:

```
JA2_OPN_2PaS164_234_20060628_140000_20060628_155959
```

should then be made to this file. Entering at the command prompt the following:

```
J2_OGDR_to_BUFR  
JA2_OPN_2PaS164_234_20060628_140000_20060628_155959
```

should produce no output other than an error from the netCDF library stating:

```
Error: NetCDF: Unknown file format
```

The following text should be found in the relevant syslog (currently /var/log/debug):
NetCDF file name:

```
JA2_OPN_2PaS164_234_20060628_140000_20060628_155959
```

Result – *test passed*

3.14 Corrupt input data, J2-FIST-CT-3-N

Environment:

Test to be run on NOAA like host, dcomo03

Test cases:

1) Encoding of corrupt/invalid data with valid file name produces no output

In order to provide some data which are not in a valid netCDF format, any other file can be used (such as the BUFR table B). A symbolic link called:

JA2_OPN_2PaS164_234_20060628_140000_20060628_155959

should then be made to this file. Entering at the command prompt the following:

```
J2_OGDR_to_BUFR
```

```
JA2_OPN_2PaS164_234_20060628_140000_20060628_155959
```

should produce no output other than an error from the netCDF library stating:

```
Error: NetCDF: Unknown file format
```

The following text should be found in the relevant syslog (currently /var/log/debug):

NetCDF file name:

```
JA2_OPN_2PaS164_234_20060628_140000_20060628_155959
```

Result – *test passed*

4 SUMMARY OF RESULTS

The following table summarises the results of the tests performed.

| Test identifier | Test case | Result |
|-----------------|---|--------|
| J2-FIST-NT-1-E | Command line argument processing (EUMETSAT), case I | PASS |
| | Command line argument processing (EUMETSAT), case II | PASS |
| | Command line argument processing (EUMETSAT), case III | PASS |
| | Command line argument processing (EUMETSAT), case IV | PASS |
| | Command line argument processing (EUMETSAT), case V | PASS |
| J2-FIST-NT-1-N | Command line argument processing (NOAA), case I | PASS |
| | Command line argument processing (NOAA), case II | PASS |
| | Command line argument processing (NOAA), case III | PASS |
| | Command line argument processing (NOAA), case IV | PASS |
| | Command line argument processing (NOAA), case V | PASS |
| J2-FIST-NT-2-E | Nominal EUMETSAT OGDR data processing (EUMETSAT) | PASS |
| J2-FIST-NT-2-N | Nominal EUMETSAT OGDR data processing (NOAA) | PASS |
| J2-FIST-NT-3-E | Nominal NOAA OGDR data processing (EUMETSAT) | PASS |
| J2-FIST-NT-3-N | Nominal NOAA OGDR data processing (NOAA) | PASS |
| J2-FIST-NT-4-E | Nominal CNES IGDR data processing (EUMETSAT) | PASS |
| J2-FIST-NT-4-N | Nominal CNES IGDR data processing (NOAA) | PASS |
| J2-FIST-CT-1-E | Missing BUFR tables (EUMETSAT) | PASS |
| J2-FIST-CT-1-N | Missing BUFR tables (NOAA) | PASS |
| J2-FIST-CT-2-E | Incorrect file name (EUMETSAT) | PASS |
| J2-FIST-CT-2-N | Incorrect file name (NOAA) | PASS |
| J2-FIST-CT-3-E | Corrupt input data (EUMETSAT) | PASS |
| J2-FIST-CT-3-N | Corrupt input data (NOAA) | PASS |

5 CONCLUSION

All tests executed on EUMETSAT like hardware, dcomo01, have been successfully executed.

All tests executed on NOAA like hardware, dcomo03, have been successfully executed.