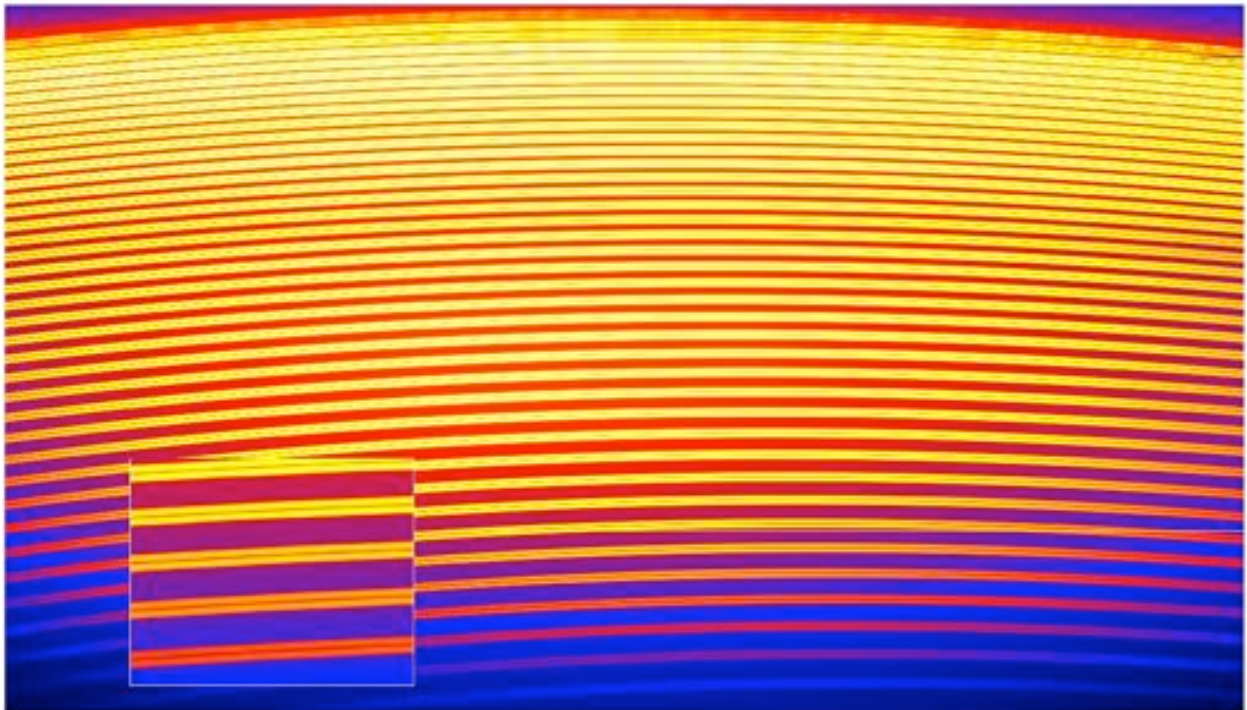




OPERA PIPELINE PROJECT

OPERA Test Plan



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1. Introduction

1.1 Testing at CFHT

This is an evolving document which outlines testing strategies for the OPERA pipeline at CFHT. As new functionality is added, the document will grow to cover that functionality.

The tester should install opera and move to the opera directory.

```
. /data/world/doug/INSTALL_OPERA-1.0 /data/world/doug/opera-1.0.zip
```

```
cd $HOME/opera-1.0
```

```
. ./setup.sh
```

A good resource to familiarize the tester with test is the test/ directory which contains the file testscript.sh. Please have a look at this file and familiarize yourself with the contents.

1.2 Expectations for Testers

Testers should try to drill down to get as much detail on the problems as possible. For example, a tester should not report: “opera crashes”. Instead the tester should give as much detail and analysis as possible: “In the directory 11AQ00-Jan12, which contains a mix of OLAPA-a and OLAPA-ab images, the images in OLAPA-ab mode cause a double free problem on the second pass of the oepaGain module gain/error calculations. The deletion of the badpixel mask in operaGain.cpp should be taken out of the loop.”

1.3 Documentation Needs Testing Too

Testers should also read all the documentation in the distribution, the READMEs, INSTALLATION, etc, all the documentation in the distribution. Any sample commands given should be tested to ensure that they work as advertised/

2. NIGHT/Directory-Based Testing

This section contains test strategies that require coordination between testers so that they do not both work on the same night/directory data and create conflicts.

2.1 Suggested NIGHT/Directories

Good nights to use with only one Observing mode (and: Olapa and EEV1):

11AQ14-Jul02 (pol):

11AQ14-Jul03 (pol):

11AQ14-Jul08 (sp2):

10BQ11-Dec13 (pol):

09AQ02-Feb04 (sp1):

Good nights to use with 2 Observing modes (and: Olapa and EEV1):

11AQ14-Jul01 (pol, sp1):

11AQ14-Jul04 (sp1, pol):

11AQ14-Jul07 (sp2, pol):

10BQ11-Dec14 (sp1, pol):

10BQ11-Dec16 (pol, sp1):

10BQ09-Nov27 (pol, sp2): (actually 3 Obs mode but one was not used)

10BQ01-Aug05 (sp2, sp1):

10AQ15-Jul27 (pol, sp1):

Good nights to use with 3 Observing modes (EEV1 only):

10BQ09-Nov26 (sp1, pol, sp1):

10AQ02-Mar06 (pol, sp2, pol):

09AQ08-May01 (sp1, sp2, pol):

Good nights with mix of Olapa-a and Olapa-ab:

11AQ12-Jun16 (pol; pol):

10BQ06-Oct20 (pol, sp1; pol, sp1):

2.2 Reductionlists

Reductionlists and gainlists are created for each detector, mode, speed and set of data. A set of data is one that has no intervening mode change.

```
opera DATADIR=/data/uhane5/opera/$NIGHT reductionlist -t
```

And then compare it with the upena reductionlists:

```
upena DATADIR=/data/uhane5/opera/$NIGHT reductionlist -t
```

Substitute \$NIGHT with that actual night directory. Nadine has set up a number of night directories that test difficult situations for reductionlist creation. The -t option means trace. This shows the actual command that is executed. If the tester wishes to drill down a into a test failure, the tester can copy and paste the command. the -v option turns on verbose output, which may help narrow the problem. Currently the nights are:

```
NIGHTS="09AQ02-Feb04 10BQ06-Oct20 10BQ11-Dec16 11AQ14-Jul04 11AQ14-Jul08  
09AQ08-May01 10BQ09-Nov26 11AQ12-Jun16 10AQ02-Mar06 10BQ09-Nov27 11AQ14-Jul01  
10AQ15-Jul27 10BQ11-Dec13 11AQ14-Jul02 11AQ14-Jul07 10BQ01-Aug05 10BQ11-Dec14  
11AQ14-Jul03 11AQ14-Jul08"
```

After testing is complete, the tester should clean up the directories:

```
opera DATADIR=/data/uhane5/opera/$NIGHT clean
```

The tester should verify that the NIGHT directories are all deleted.

EXAMPLE:

COMMAND: opera DATADIR=/data/uhane5/opera/10BQ01-Aug02 reductionlist

COMPARE:

what's in the night directory with the data, look at the FITS keywords

INSTMODE and EREADSPD

with what's in the reduction and gain lists, in

/data/uhane5/opera/byproducts/

check that the gain list only has one set of calibrations, either before

or after the object exposures, but not both

2.3 Master Calibrations

Master calibrations cover masterflats, mastebiases, mastercomparisons and masterfabryperots. There are two cases, one where a single source from the input list is “picked” as the master, (pick=1 or pick=2) and two where a median stack is taken (pick=0). The tester should fitsverify all out-

puts and inspect the images to be sure that the correct “pick” was chosen or that the master represents a legitimate median of the inputs.

```
opera DATADIR= /data/uhane5/opera/$NIGHT masterflats -t
opera DATADIR= /data/uhane5/opera/$NIGHT masterbiases --pick=0 -t
opera DATADIR= /data/uhane5/opera/$NIGHT mastercomparisons --pick=1 -t}
opera DATADIR= /data/uhane5/opera/$NIGHT masterfabperots --pick=2 -t
```

2.4 Major Classes and Data Structures

There are test cases for the major classes and data structures. The tester should verify that the outputs are legitimate and there are no seg faults or exceptions thrown. All output should fitsverify and the output have a legitimate espadons image.

```
operaTiledImageTest --image=/data/uhane5/opera/11AQ12-Jun16/1310052b.fits
--output=foo.fits ${optargs}
fitsverify foo.fits
operaImageOperatorTest --bias=/data/uhane5/opera/11AQ12-Jun16/1310052b.fits
--flat1=/data/uhane5/opera/11AQ12-Jun16/1310041f.fits
--flat2=/data/uhane5/opera/11AQ12-Jun16/1310050f.fits
--badpix=$opera/config/badpix_olapa-a.fits --output=foo.fits ${optargs}
fitsverify foo.fits

operaFITSSubImageTest --bias=/data/uhane5/opera/11AQ12-Jun16/1310052b.fits
--flat1=/data/uhane5/opera/11AQ12-Jun16/1310041f.fits
--flat2=/data/uhane5/opera/11AQ12-Jun16/1310050f.fits
--badpix=$opera/config/badpix_olapa-a.fits --output=foo.fits ${optargs}
fitsverify foo.fits

operaFITSImageTest --images=/data/uhane5/opera/11AQ12-Jun16/1310169o.fits
--images=/data/uhane5/opera/11AQ12-Jun16/1310170o.fits
--images=/data/uhane5/opera/11AQ12-Jun16/1310171o.fits --output=foo.fits ${optargs}
fitsverify foo.fits

operaEspadonsImageTest --image=/data/uhane5/opera/11AQ12-Jun16/1310171o.fits
--output=foo.fits ${optargs}
fitsverify foo.fits

rm -f foo.fits
```


2.5 Gain and Noise

Gain noise tests are as below. You should compare the expected vs actual gain and noise values returned from opera and also compare with the upena results

COMMAND: opera DATADIR=/data/uhane5/opera/10BQ01-Aug02 gains

COMPARE:

The gain and readout noise values from LE, found in
/data/uhane5/upena/reductions/10BQ01-Aug02/gain*.dat
with the gain and readout noise values from OPERA, found in
/data/uhane5/opera/byproducts/10BQ01-Aug02/gain*.dat

2.6 Science Libraries

There are test cases for the major science libraries. The tester should verify that the outputs are legitimate and there are no seg faults or exceptions thrown.

operaStatsLibTest

operaFitLibTest

3. Independent Testing

3.1 Introduction

This section lists tests that can be done independently so that testers may work in parallel:

3.1 CFHT Reduction From Archive

There is a CFHT-only feature in OPERA permitting reduction directly from the CFHT archive. It requires a date range (HST) and some place to put the reduced data. The place should look something like an espadons night directory.:

```
opera ARCHIVE="2010/12/15-2010/12/16" NIGHT=00AQ00-Jan00 reductionset -t  
opera NIGHT=00AQ00-Jan00 clean -t
```

The tester should then go through all test patterns in section 2 to ensure that:

- a. the correct calibrations are downloaded
- b. enough calibrations are downloaded
- c. no extraneous images are downloaded

All tests in the previous sections should be executed.

3.2 CADC Reduction From Archive

This test requires the the tester log in to the CADC site (<http://cadwww.dao.nrc.ca/AdvancedSearch/>). select espadons data for the date range of one night and download it. The tester should then go through all test patterns in section 2 to ensure that:

- a. the correct calibrations are downloaded
- b. enough calibrations are downloaded
- c. no extraneous images are downloaded

All tests in the previous sections should be executed.

4. Conclusion

This is a living document which will evolve with OPERA. It outlines test strategies to date. More entries will be added as OEPRa develops. It shows the tester basic test patterns and strategies to test OPERA.