IRSPP version 1.1 – Release Note

13 October 2022

1. Introduction

The Infared Sounder Pre-processor (IRSPP) is a software package designed to process hyperspectral sounder data from the IRS instrument on the MTG-S1 and MTG-S2 satellites. The package is designed primarily for applications in numerical weather prediction (NWP). The first version (v1.0) was released in March 2022.

IRSPP version 1.1 is an updated release, compatible with the pre-launch simulated test data released by EUMESAT in July 2022, see https://www.eumetsat.int/new-mtg-s-irs-l1b-full-disc-test-dataset.

2. Changes in v1.1

The main purpose of v1.1 is to be able to process the latest EUMETSAT test data. This requires handling of an ancillary file in hdf5 format (rather than the original netCDF).

There are no science changes in IRSPP v1.1.

A detailed list of changes is shown in Table 1.

Table 1: Changes in IRSPP v1.1

Changed file	Purpose of change
configure_irspp.sh	ECCODES_DEFINITION_PATH doesn't need default path if ecCodes version is 2.18.0 or higher
src/bin/irs_main_parallel.sh	Add "-o outdir" option
src/bin/irs_generate_pcs.f90	Add calls to *irs_read_noise_hdf5* and *irs_write_eigenvectors_hdf5*
src/bin/irs_main.f90	Add call to *irs_read_eigenvectors_hdf5*
src/bin/irs_sss_filtering.f90	Add call to *irs_read_eigenvectors_hdf5*
src/libirs/Makefile	Add new files
src/libirs/irs_write_bufr.f90	Range checks for residualRmsInBand and confidenceFlag. Count the number of spectra, taking account of thinning requirements.
src/libirs/irs_compute_rr.f90	Set radiance to missing if any of the required PC scores are missing
src/libirs/irs_read_irsdata.f90	Account for missing values in latitude, longitude and angles. Check radiance scale when reading SSS data and adjust if necessary.
src/libirs/irs_read_spectra.f90	Check radiance scale when reading SSS data and adjust if necessary
src/libirs/irs_read_eigenvectors_hdf5.f90	New
src/libirs/irs_read_noise_hdf5.f90	New
src/libirs/irs_write_eigenvectors_hdf5.f90	New

3. Reference documents

The IRSPP documents are listed in Table 2. The IRSPP User Manual has been updated to reflect the changes made in IRSPP v1.1.

Table 2: IRSPP documentation

Doc reference	Title	Version / year	Status
NWPSAF-MO-UD-053	IRSPP User Manual	1.2 / 2022	Updated
NWPSAF-MO-DS-037	IRSPP Product Specification	1.0 / 2018	Published
NWPSAF-MO-DS-037	IRSPP Top Level Design	1.4 / 2022	Published

Note that the User Manual is the main document that users should refer to as it includes details of how to install the software, how to run the software and the scientific principles.

The documents can be accessed from the NWP SAF web site at

https://nwp-saf.eumetsat.int/site/software/irspp/

4. Package files

The IRSPP package files are listed in Table 3.

Table 3: IRSPP v1.1 package files

File name	Size (bytes)	Purpose
Release_note_IRSPPv1.1.pdf		This document
IRSPP_v1.1_source.tgz	34092	Source code
IRSPP_v1.1_exec.tgz	24208108	Executables and dynamic libraries (built on Red Hat 7.9) **- OPTIONAL**
IRSPPv1.1_test_cases.tgz	529381194	New test case comprising PC score product for LAC4 and an SSS file in new spectral grid. The previous test cases, exercising other parts of IRSPP, are still available and may be run if required.

Access to the IRSPP v1.1 code and executables is via the "software downloads" tab on the NWP SAF web site. User registration is required.

Users have the choice of building the package from source or using the supplied Red Hat 7.9 executables, if their system is compatible. See the User Manual for further information about compatibility.

The test cases are accessible from https://nwp-saf.eumetsat.int/downloads/irspp_testcases/

5. License

To use this software, users need to have agreed to the terms of the NWP SAF License Agreement. The License Agreement is displayed when a user is logged into the NWP SAF web site and chooses to change software preferences. It can also be viewed here:

https://nwp-saf.eumetsat.int/site/software/licence-agreement/.

6. System requirements

IRSPP has been tested on systems compatible with 64-bit CentOS7 and CentOS8. It would be expected to work on other Linux distributions, provided support for the dependency libraries exists. The dependency libraries include:

- ecCodes, distributed by ECMWF
- netCDF (Fortran and C interfaces)
- hdf5 (with Fortran enabled)
- LAPACK

For building IRSPP from source, a Fortran90 compiler is required. The recommended F90 compilers are gfortran and ifort.

The supplied test case scripts are based on Bash shell.

Standard Unix utilities (including gmake, ar, tar) are used.

There are no particular requirements on disk space (IRSPP takes up only about 300MB when built). But you will need space for the input and output IRS data files. The PC product occupies approximately 33MB per 10 second dwell. The instrument records 280 dwells per hour (see https://www.eumetsat.int/mtg-infrared-sounder), so throughput would be expected to be 220GB per day.

The test cases include a README file that gives typical run times on a system with 8 GB of memory and 4 processor cores. This could be considered a minimum configuration. IRSPP v1 does not include parallelisation within the Fortran code, but it is possible to improve throughput by processing several dwells simultaneously, provided the system has sufficient memory and cores.

7. Installing IRSPP

For instructions on installing IRSPP, please see sections 2 and 3 of the IRSPP User Manual. If you are building IRSPP from source, two scripts are supplied to assist the process:
- *install_dependencies.sh* – downloads the necessary dependency libraries and builds them
- *configure_irspp.sh* – prepares the necessary makefiles, ready for the user to run "make"

For details on using these scripts, see the User Manual.

8. Running the test cases

The test cases are documented in section 9 of the User Manual and are distributed as a single gzipped tar file.

The original test cases are based largely on a granule of simulated IRS data that was released by EUMETSAT in December 2019: see https://www.eumetsat.int/mtg-test-data.

The new test case is based on full-disc simulated IRS data that was released by EUMETSAT in July 2022: see https://www.eumetsat.int/new-mtg-s-irs-l1b-full-disc-test-dataset.

The availability of new test cases will be communicated to users via the IRSPP web page and NWP SAF news announcements.

9. Version control

Contents of the IRSPP_version.txt file released as part of IRSPP v1.1:

```
Last Changed Rev: 2036
Last Changed Date: 2022-09-26 15:32:59 +0100 (Mon, 26 Sep 2022)
```

This refers to the Subversion repository held at the Met Office.

10. User feedback

If you encounter a problem, or have suggestions for improvements, please use the NWP SAF Helpdesk, at https://nwp-saf.eumetsat.int/site/help-desk/.