NWP SAF

RTTOV Version 14
Release Note
(Updated for v14.1)

Version 1.1.1

21st January 2026

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(Updated for v14.1)

This documentation was developed within the context of the EUMETSAT Satellite Application Facility on Numerical Weather Prediction (NWP SAF), under the Cooperation Agreement dated 7 September 2021, between EUMETSAT and the Met Office, UK, by one or more partners within the NWP SAF. The partners in the NWP SAF are the Met Office, ECMWF, DWD and Météo France.

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Change record				
Version	**Date**	**Author**	**Approved**	**Remarks**
1.0	05/09/24	JH		First version
1.0.1	10/10/24	JH		Updates after Met Office review
1.0.2	28/11/24	JH		Updates after DRR
1.1	13/01/26	JH		Updates for v14.1
1.1.1	21/01/26	JH		Updates after Met Office review

Table of Contents

1. DOCUMENTATION

The following user documentation is included in the RTTOV package:

- *NWPSAF_ReleaseNote_RTTOV14.1* - this document
- *users_guide_rttov14_v1.1.pdf* - user guide giving full details of how to compile and run RTTOV and how to incorporate it into the user's application
- *rttov14_user_interface_changes.pdf* - detailed description of changes in the interface since v13 to help users of earlier RTTOV versions update their code
- *rttov-quick-start.pdf* - beginner's guide to getting started with RTTOV
- *rttov_gui _v14.pdf* - user guide for RTTOV GUI
- *rttov-wrapper.pdf* - user guide for the C++/Python interface to RTTOV
- *rttov-test.pdf* - detailed description of the RTTOV test suite

2. REFERENCING RTTOV

RTTOV v14.1 has the following DOI: https://doi.org/10.15770/EUM_SEC_CLM_1010

When citing RTTOV it may be described as:

RTTOV is an operational product developed and distributed by the EUMETSAT Satellite Application Facility for Numerical Weather Prediction (NWP SAF) and can be downloaded from https://nwp-saf.eumetsat.int/.

And the most recent general paper on the software is:

Saunders, R., Hocking, J., Turner, E., Rayer, P., Rundle, D., Brunel, P., Vidot, J., Roquet, P., Matricardi, M., Geer, A., Bormann, N., and Lupu, C., 2018: An update on the RTTOV fast radiative transfer model (currently at version 12), *Geosci. Model Dev.*, 11, 2717-2737, https://doi.org/10.5194/gmd-11-2717-2018

3. MAIN CHANGES

Changes between RTTOV v14.0 and v14.1

This section provides details of the differences between RTTOV v14.0 and v14.1. You can replace v14.0 with v14.1 in your application without making any other code changes. Outputs are extremely similar but not bit-identical due to refactoring of the code in v14.1, and notwithstanding bug fixes.

General

- Option to allow cosmic MW background radiation to be excluded from simulations as some observations (e.g. SMAP) have this contribution removed.

Surface emissivity/reflectance

- Option to turn off sun-glint in sea surface solar reflectance model (intended for certain simulated imagery applications).
- Add total transmittance optional output argument to emissivity retrieval subroutine (may be useful for screening out retrieved emissivities where the channel is less sensitive to the surface).

Scattering

- Enable MFASIS-NN support for aerosol scattering simulations for CAMS aerosol species (cannot be used simultaneously with hydrometeors).
- MFASIS-NN cloud simulation updates to extend support to additional VIS/NIR channels with greater water vapour or oxygen absorption.
- New RTTOV v14.1 MFASIS-NN coefficients are not backwards compatible with v14.0, but all existing v14.0 coefficients can be used in v14.1.
- New exponential-random cloud overlap option with user-configurable decorrelation distance (optionally parameterised as per Shonk *et al*, 2010).
- Option to apply maximum-random and exponential-random overlap from bottom of the profile up instead of top of profile down (previous behaviour, default). The bottom-up approach may be preferred for VIS channels.
- Enable explicit hydrometeor optical property inputs (*user_hydro_opt_param*) with two-column user-specified *hydro_frac_eff* overlap scheme.

Wrapper

- Updates to support new features in v14.1.
- Add explicit members/methods for ICON-ART aerosol species.

GUI

- Updates to support new features in v14.1.

Technical

- Optimisation of the SURFEM-Ocean sea surface emissivity model, especially for gfortran builds.
- Optimisation of DOM solar solver with Rayleigh multiple scattering enabled giving a significant reduction in run-time. Some slow-down for DOM simulations with Rayleigh single-scattering due to required refactoring.
- Fix long-standing issue where the maximum-random overlap scheme was generating redundant cloud columns of zero width for profiles with fully overcast layer(s). Columns are now excluded when their weights are less than or equal to *col_threshold* whereas previously it was only for weights strictly less than. This speeds up simulations using maximum-random overlap for these cases. In rare cases this could change output radiances slightly by rejecting columns of weight equal to *col_threshold* when this has been set to a positive value. Emissivity retrieval outputs may contain fewer cloud columns than in v14.0 but these omitted columns have zero weights so do not contribute to the simulation.
- Minor changes to the format of the *channels.dat* files used for generating hydrotables for MW sensors. The code that reads the files has also been updated to be less rigid about the formatting of the *channels.dat* files.
- Allow the trajectory structures to be over-allocated with *nprofiles* larger than the number of profiles (size of *profiles(:)*) in the current simulation.

Changes between RTTOV v13.2 and v14.0

RTTOV v14.0 represents a major update from v13. A separate document **rttov14_user_interface_changes.pdf** is provided in the **docs/** directory of the package describing changes in the user interface between v13.2 and v14.0 in detail. Users are strongly recommended to consult this when updating their code from earlier versions to v14.0. The most significant changes from a technical implementation perspective are highlighted in **bold red** in the list below.

General:

- **Revise the input profile structure so that all input variables (temperature, gases, scattering inputs) are provided on the same vertical grid. This improves consistency with NWP model fields.**
- New option to output overcast BTs in addition to existing overcast radiances.
- New option to enable UV/VIS/NIR Jacobians in terms of reflectance (now the default) instead of radiance.
- New diagnostic output structure containing per-profile outputs, including geometric heights of pressure half- and full-levels, and computed effective hydro fraction.
- Improved user-level routines for checking inputs to RTTOV before running full simulations.
- Improved notification to users via the *radiance%quality(:)* output when input values are clipped by various parameterisations within RTTOV.
- Zeeman coefficients based on v13 predictors enabled.
- **Default values of various options have changed since RTTOV v13.**

Surface emissivity/reflectance:

- **Emissivity and reflectance inputs/outputs refactored into a single new *rttov_emis_refl* data structure.**
- Enable full user control over diffuse reflectance at all wavelengths in the same way as for emissivity and BRDF.
- Diffuse reflectance is added to BRDF from sea sun-glint model for VIS channels to allow for consistency in treatment of ocean colour/sub-surface scattering.
- USGS water reflectance datasets extended to the UV (used for sea surface reflectance).
- **Enable fully flexible heterogenous surface capability: users can specify surface and near-surface properties for multiple surfaces per profile, and the properties are combined before the radiance solver is called.**
- Implement interface to CAMEL v3 IR land surface emissivity atlas datasets.
- Enable optional return of nearby land IR emissivity/BRDF within a user-specified distance if atlas has no data at the original location.
- Emissivity retrieval output structure generalised for dynamic emissivity retrievals in clear-sky cases, and for Chou-scaling solver in addition to delta-Eddington, and for all cloud overlap options.

Scattering:

- **Scattering for MW sensors now run through the main RTTOV interface in a very similar way to IR sensors from a technical perspective (the separate RTTOV-SCATT model no longer exists).**
- Delta-Eddington solver implemented within RTTOV for infrared and microwave sensors.
- Radar solver implemented in RTTOV, and passive radiances are computed alongside radar reflectivities.
- Cloud overlap options formerly in RTTOV-SCATT available as additional options in RTTOV.
- Consistent unit conversions applied for hydrometeor concentrations in the UV/VIS/IR and MW.
- Allow separate units selection for hydrometeors and aerosols.
- UV/VIS/IR hydrometeor optical properties made fully flexible allowing any combination of particle types to be used in the same simulation (as implemented in earlier RTTOV versions for aerosols and MW hydrometeors).

- Explicit optical property inputs can be used for MW simulations as well as UV/VIS/IR.
- Explicit optical property phase functions and Legendre coefficients are no longer active variables in the TL/AD/K.
- Tang *et al* modification to Chou-scaling solver implemented to improve accuracy particularly for hydrometeor simulations with ice clouds in the far-IR.
- MFASIS-NN updates include improved accuracy by better treatment of water vapour and heterogenous surfaces, and code optimisation.

PC-RTTOV:

- New PC coefficients for IASI, IASI-NG, and Hamming apodised MTG-IRS supporting simulations over all surface types, with all trace gases, and optionally with either the NLTE correction, aerosol scattering, or hydrometeor scattering.
- Input profiles for PC-RTTOV simulations are no longer modified when the *apply_reg_limits* option is true. Values falling outside the limits are still flagged via the *radiance%quality(:)* output as for standard RTTOV simulations.

Wrapper:

- Python and C++ interfaces fully updated with respect to the changes in RTTOV.
- Enable return of explicit optical property Jacobians through wrapper.
- Enable user specification of radar K inputs so that the full Jacobian matrix can be computed for radar simulations.
- Add wrapper interface to the *rttov_aer_clim_prof* subroutine.
- Add a new *StoreEmisRefl* option and accessor functions to obtain surface emissivity/reflectance values used in the simulations so that the input emissivity/reflectance values are not overwritten.
- Rename *Options*, *Atlas*, and *Profiles* C++ source files with *Rttov* prefix to avoid potential name clashes/confusion with unrelated external libraries.
- Technical improvements to the C++ interface.

GUI:

- The RTTOV GUI is now a pure Python application that uses the *pyrttov* interface.
- The GUI now supports MW scattering simulations.
- The GUI no longer supports PC-RTTOV simulations.

Technical:

- **Numerous updates to the RTTOV Fortran interface to improve clarity and consistency. This includes significant changes to the *rttov_options* structure, updates to various module and subroutine names and subroutine interfaces, and other variable and derived type name changes.**
- HDF5 has been replaced by netCDF4 for large coefficient files and emissivity/BRDF atlas files. HDF5 is no longer an explicit dependence.
- New subroutine *rttov_wmo2rttov_sat_id* that maps WMO satellite IDs to RTTOV platform/satellite ID pairs.
- Reduce the number of memory allocations done within RTTOV to decrease run-time.
- Allow external allocation of all “trajectory” (internal state) data structures for single-threaded runs. This can improve performance in cases where many calls are made to RTTOV and the parallel interface is not used.

Capabilities removed:

- **Surface implicitly lies on bottom pressure half-level so RTTOV v14 cannot be called for profiles on fixed pressure levels with a separate surface pressure that is independent from the pressure levels.**
- FASTEM-1/2/3/4 and TESSEM2 microwave sea surface emissivity models.
- JONSWAP wave spectrum option for solar sea BRDF model.
- Solar single-scattering solver for clouds/aerosols.
- MFASIS-LUT fast visible solver for clouds based on look-up tables.
- HTFRTC Principal Components based model.
- Deprecated options removed: *grid_box_avg_cloud, dtau_test, reg_limit_extrap, spacetop*.

Coefficient file compatibility:

- RTTOV v14 can read all ASCII RTTOV v13-compatible optical depth coefficient files.
- Binary/Fortran unformatted optical depth coefficient files must be regenerated using RTTOV v14.
- HDF5 optical depth coefficient files cannot be read by v14: it is recommended to download the corresponding netCDF4 file from the RTTOV v14 coefficients download page.
- All other aerosol/hydrometeor optical property files and MFASIS-NN and PC-RTTOV coefficient files are mutually incompatible between v13 and v14: you must download new files from the RTTOV v14 coefficients download page.

4. INSTALLATION

Detailed installation instructions are provided in the user guide. A brief overview is given below.

Extraction

The RTTOV v14.1 package is named *rttov141.tar.xz*. This can be downloaded from the NWP SAF website after registering with the site and agreeing to the terms of the licence. To unpack, copy the tarball to a new directory (e.g. *~/rttov141/*) which becomes your RTTOV top-level directory, and do the following:

$ tar xf rttov141.tar.xz

Compilation

It is recommended to compile RTTOV against the netCDF library (v4 or later) as this provides the ability to read netCDF coefficient and land surface BRDF and emissivity atlas files. To do this, you must first edit the file *build/Makefile.local* to point to the location of your netCDF installation. Usually this involves:

- specifying the path to your netCDF build in NETCDF_PREFIX
- uncommenting the FFLAGS_NETCDF definition appropriate to your compiler
- uncommenting the LDFLAGS_NETCDF definition for your netCDF version

You may also need to specify the location of the HDF5 library on which your netCDF library depends by:

- specifying the path to your HDF5 build in HDF5_PREFIX
- uncommenting the LDFLAGS_HDF5 definition

Then to compile RTTOV you can run the interactive script provided:

$ build/rttov_compile.sh

To use the RTTOV Python wrapper (and so also the GUI which depends on it) you must also have f2py installed on your system. The script detects the presence of f2py and provides the option of compiling the Python-related code.

More details including compatible compilers and information on compiling manually are given in the user guide.

Coefficient files and other ancillary data

The RTTOV package contains a commonly used subset of optical depth coefficient files. By default, coefficient files are found in the *rtcoef_rttov14/* directory. Coefficient files for all supported sensors are available from the website:
https://nwp-saf.eumetsat.int/site/software/rttov/download/coefficients/coefficient-download/

These include optical depth coefficients for all supported sensors, aerosol/hydrometeor optical property files for scattering simulations, MFASIS-NN coefficient files, and PC-RTTOV coefficient files. The user guide provides more information about the different types of coefficient files. It is not necessary to download all coefficient files: only those relevant to the simulations you are running are required.

The NWP SAF website now allows you to optionally subscribe to receive an email notification whenever new coefficient files are uploaded on the website.

The land surface BRDF and emissivity atlas files are not included in the package due to their size. These can also be downloaded from the website:
https://nwp-saf.eumetsat.int/site/software/rttov/download/#Emissivity_BRDF_atlas_data

Verifying the build

RTTOV comes with a comprehensive test suite which is described in the user guide and more fully in the *rttov-test.pdf* document. The RTTOV test scripts and data are contained in the *rttov_test/* directory. You can run a basic test to check your installation as follows.

$ cd rttov_test
$ ./test_rttov14.sh ARCH=myarch BIN=myinstalldir/bin

You must provide the name of the compiler flag file you used when compiling RTTOV (e.g. *gfortran-openmp*) as *myarch*. If you specified an installation directory when compiling RTTOV you must provide the location of the *bin/* directory created by the build. If you did not specify an installation directory, the *bin/* directory is in your top-level RTTOV folder, and you do not need to pass the *BIN=* argument to the test scripts.

This script runs several simulations using coefficient files which are provided in the package and checks the direct, tangent linear, adjoint and Jacobian model output against reference data. If the tests report OK, then RTTOV has compiled correctly. (You may see some very small differences to the reference data reported, particularly for the Jacobians: these are due to compiler-dependent differences and are not cause for concern).

Several other test scripts that run different kinds of simulations are included in the package. Some of these require additional files to be downloaded from the website. The user guide provides more details.

5. LICENCE

To use this software, users need to have registered for RTTOV with the NWP SAF (https://nwp-saf.eumetsat.int), and to have agreed to the terms of the RTTOV licence agreement (https://nwp-saf.eumetsat.int/site/software/licence-agreement/)

6. PACKAGE CONTENTS

The contents of the package are as follows:

```
ReleaseNote.pdf
docs/
docs/doxygen_config_dev
docs/doxygen_config_user
docs/NWPSAFLogo_gradient_S.png
docs/NWPSAF_ReleaseNote_RTTOV14.1.pdf
docs/readme_rttov_make_aertable.txt
docs/rttov_doxygen_readme.dox
docs/rttov_gas_cloud_aerosol_units.pdf
docs/rttov_gui_v14.pdf
docs/rttov-quick-start.pdf
docs/rttov-test.pdf
docs/rttov-wrapper.pdf
docs/rttov14_user_interface_changes.pdf
docs/sharp_1983_radiance_to_bt_conversion.pdf
docs/users_guide_rttov14_v1.1.pdf
brdf_data/
build/
build/arch/
build/arch/aix
build/arch/cray-aocc
build/arch/cray-ecmwf
build/arch/cray-gfortran
build/arch/cray-gfortran-debug
build/arch/cray-ifort-dwd
build/arch/cray-nvfortran
build/arch/gfortran
build/arch/gfortran-debug
build/arch/gfortran-gprof
build/arch/gfortran-openmp
build/arch/ifort
build/arch/ifort-codecov
build/arch/ifort-debug
build/arch/ifort-gprof
build/arch/ifort-mf
build/arch/ifort-openmp
build/arch/ifort-ops
build/arch/nagfor
build/arch/nagfor-debug
build/arch/nagfor-openmp
build/arch/nec-dwd
build/arch/pgf90
build/arch/pgf90-debug
build/arch/pgf90-openmp
build/cpinch.pl
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build/Makefile.PL
build/mkintf.pl
build/mvdmod.pl
build/mypcpp.pl
build/rttov_compile.sh
data/
data/asdu00
data/Be_LUT.2007.txt
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data/dust_woodward.dat
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src/main/rttov_cloud_overlap_tl.F90
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gui/icons/SO2.png	src/main/rttov_init_cloud_columns.F90
gui/icons/stock_down.png	src/main/rttov_init_diagnostic_output.F90
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gui/icons/stock_right.xpm	src/main/rttov_init_opdp_path.F90
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gui/icons/stock_up.xpm	src/main/rttov_init_opt_param_solar.F90
gui/install_python_for_gui.sh	src/main/rttov_init_optp_interp.F90
gui/r1Dvar/	src/main/rttov_init_pccomp.F90
gui/r1Dvar/data/	src/main/rttov_init_predictor.F90
gui/r1Dvar/data/AIRS_COEFFS_DIR/	src/main/rttov_init_profiles.F90
gui/r1Dvar/data/AIRS_COEFFS_DIR/ChannelChoice_orig.dat	src/main/rttov_init_profiles_internal.F90
gui/r1Dvar/data/AIRS_COEFFS_DIR/Rmatrix_orig	src/main/rttov_init_radiance.F90
gui/r1Dvar/data/ATMS_COEFFS_DIR/	src/main/rttov_init_raytracing.F90
gui/r1Dvar/data/ATMS_COEFFS_DIR/ChannelChoice_orig.dat	src/main/rttov_init_reflectivity.F90
gui/r1Dvar/data/ATMS_COEFFS_DIR/Rmatrix_orig	src/main/rttov_init_scatt_aux_column.F90
gui/r1Dvar/data/ATOVS_CLOUDY_COEFFS_DIR/	src/main/rttov_init_scatt_aux.F90
gui/r1Dvar/data/ATOVS_CLOUDY_COEFFS_DIR/ChannelChoice_orig.dat	src/main/rttov_init_sunglint.F90
gui/r1Dvar/data/ATOVS_CLOUDY_COEFFS_DIR/Rmatrix_orig	src/main/rttov_init_surface_total.F90
gui/r1Dvar/data/ATOVS_COEFFS_DIR/	src/main/rttov_init_traj_sta.F90
gui/r1Dvar/data/ATOVS_COEFFS_DIR/ChannelChoice_orig.dat	src/main/rttov_init_transmission_aux.F90
gui/r1Dvar/data/ATOVS_COEFFS_DIR/Rmatrix_orig	src/main/rttov_init_transmission.F90
gui/r1Dvar/data/CrIS_COEFFS_DIR/	src/main/rttov_intavg_chan_ad.F90
gui/r1Dvar/data/CrIS_COEFFS_DIR/ChannelChoice_orig.dat	src/main/rttov_intavg_chan.F90
gui/r1Dvar/data/CrIS_COEFFS_DIR/Rmatrix_orig	src/main/rttov_intavg_chan_k.F90
gui/r1Dvar/data/IASI_COEFFS_DIR/	src/main/rttov_intavg_chan_tl.F90
gui/r1Dvar/data/IASI_COEFFS_DIR/Bmatrix	src/main/rttov_intavg_prof_ad.F90
gui/r1Dvar/data/IASI_COEFFS_DIR/ChannelChoice.dat	src/main/rttov_intavg_prof.F90
gui/r1Dvar/data/IASI_COEFFS_DIR/ChannelChoice_orig.dat	src/main/rttov_intavg_prof_k.F90
gui/r1Dvar/data/IASI_COEFFS_DIR/Rmatrix	src/main/rttov_intavg_prof_tl.F90
gui/r1Dvar/data/IASI_COEFFS_DIR/Rmatrix_orig	src/main/rttov_integrate_solar_ad.F90
gui/r1Dvar/data/Sample_Background/	src/main/rttov_integrate_solar.F90
gui/r1Dvar/data/Sample_Background/BACKGROUND_43L.dat	src/main/rttov_integrate_solar_k.F90
gui/r1Dvar/data/Sample_Background/BACKGROUND_51L.dat	src/main/rttov_integrate_solar_tl.F90
gui/r1Dvar/data/Sample_Background/BACKGROUND_54L.dat	src/main/rttov_integratesource_ad.F90
gui/r1Dvar/data/Sample_Background/BACKGROUND_with_CLW.dat	src/main/rttov_integratesource.F90
gui/r1Dvar/data/Sample_Background/truth_43L.dat	src/main/rttov_integratesource_tl.F90
gui/r1Dvar/data/Sample_Background/truth_51L.dat	src/main/rttov_integrate_thermal_ad.F90
gui/r1Dvar/data/Sample_Background/truth_54L.dat	src/main/rttov_integrate_thermal.F90
gui/r1Dvar/data/Sample_Bmatrices/	src/main/rttov_integrate_thermal_k.F90
gui/r1Dvar/data/Sample_Bmatrices/Bmatrix_43L	src/main/rttov_integrate_thermal_tl.F90
gui/r1Dvar/data/Sample_Bmatrices/Bmatrix_51L	src/main/rttov_k.F90
gui/r1Dvar/data/Sample_Bmatrices/Bmatrix_54L	src/main/rttov_kinds.F90
gui/r1Dvar/data/SSMIS_COEFFS_DIR/	src/main/rttov_lapack_mod.F90
gui/r1Dvar/data/SSMIS_COEFFS_DIR/ChannelChoice_orig.dat	src/main/rttov_layeravg_ad.F90
gui/r1Dvar/data/SSMIS_COEFFS_DIR/Rmatrix_orig	src/main/rttov_layeravg.F90
gui/r1Dvar/__init__.py	src/main/rttov_layeravg_tl.F90
gui/r1Dvar/r1dvarObjects.py	src/main/rttov_locpat_ad.F90
gui/r1Dvar/r1dvar.py	src/main/rttov_locpat.F90
gui/rcontroller/	src/main/rttov_locpat_k.F90
gui/rcontroller/controller.py	src/main/rttov_locpat_tl.F90
gui/rcontroller/__init__.py	src/main/rttov_math_mod.F90
gui/rcontroller/optionctrl.py	src/main/rttov_mfasis_nn_ad.F90
gui/rcontroller/profilectrl.py	src/main/rttov_mfasis_nn.F90
gui/rcontroller/r1dvarController.py	src/main/rttov_mfasis_nn_mod.F90
gui/rcontroller/surfacectrl.py	src/main/rttov_mfasis_nn_tl.F90
gui/rcontroller/util.py	src/main/rttov_mult_profiles_k.F90
gui/requirements.txt	src/main/rttov_mw_clw_absorption_ad.F90
gui/rmodel/	src/main/rttov_mw_clw_absorption.F90
gui/rmodel/config.py	src/main/rttov_mw_clw_absorption_k.F90
gui/rmodel/__init__.py	src/main/rttov_mw_clw_absorption_tl.F90

gui/rmodel/karchive.py	src/main/rttov_nlte_bias_correction_ad.F90
gui/rmodel/project.py	src/main/rttov_nlte_bias_correction.F90
gui/rttov/	src/main/rttov_nlte_bias_correction_k.F90
gui/rttov/chanprof.py	src/main/rttov_nlte_bias_correction_tl.F90
gui/rttov/core.py	src/main/rttov_opdep_13_ad.F90
gui/rttov/data/	src/main/rttov_opdep_13.F90
gui/rttov/data/CH4.txt	src/main/rttov_opdep_13_tl.F90
gui/rttov/data/CO2.txt	src/main/rttov_opdep_78_ad.F90
gui/rttov/data/CO.txt	src/main/rttov_opdep_78.F90
gui/rttov/data/H2O.txt	src/main/rttov_opdep_78_k.F90
gui/rttov/data/N2O.txt	src/main/rttov_opdep_78_tl.F90
gui/rttov/data/O3.txt	src/main/rttov_opdep_9_ad.F90
gui/rttov/data/P.txt	src/main/rttov_opdep_9.F90
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gui/rttov/getcoefval.py	src/main/rttov_opdep_gamma_correction.F90
gui/rttovgui	src/main/rttov_optp_interpolate_ad.F90
gui/rttov_gui.env	src/main/rttov_optp_interpolate.F90
gui/rttovguienv.conda	src/main/rttov_optp_interpolate_setup_ad.F90
gui/rttov/hdf_to_param.py	src/main/rttov_optp_interpolate_setup.F90
gui/rttov/__init__.py	src/main/rttov_optp_interpolate_setup_k.F90
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gui/rttov/mfasis.py	src/main/rttov_opts_eq.F90
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gui/rttov/option.py	src/main/rttov_pcscores.F90
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gui/rttov/radiance.py	src/main/rttov_pcscores_tl.F90
gui/rttov/reflemiss.py	src/main/rttov_pmcshift_pred_mod.F90
gui/rttov/transmission.py	src/main/rttov_populate_profiles_coef_ad.F90
gui/run	src/main/rttov_populate_profiles_coef.F90
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gui/rview/colors.py	src/main/rttov_populate_profiles_internal_ad.F90
gui/rview/console.py	src/main/rttov_populate_profiles_internal.F90
gui/rview/helpframe.py	src/main/rttov_populate_profiles_internal_k.F90
gui/rview/__init__.py	src/main/rttov_populate_profiles_internal_tl.F90
gui/rview/kmatrixframe.py	src/main/rttov_predictor_precalc_13_ad.F90
gui/rview/kprofileframe.py	src/main/rttov_predictor_precalc_13.F90
gui/rview/layeritem.py	src/main/rttov_predictor_precalc_13_k.F90
gui/rview/myunits.py	src/main/rttov_predictor_precalc_13_tl.F90
gui/rview/option.py	src/main/rttov_predictor_precalc_789_ad.F90
gui/rview/profileframe.py	src/main/rttov_predictor_precalc_789.F90
gui/rview/profileframeutils.py	src/main/rttov_predictor_precalc_789_k.F90
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gui/rview/r1dvarView.py	src/main/rttov_profiles_internal_mod.F90
gui/rview/radianceframe.py	src/main/rttov_rayleigh_extinction_ad.F90
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gui/rview/surfedit.py	src/main/rttov_reconstruct_ad.F90
gui/rview/util.py	src/main/rttov_reconstruct.F90
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rtcoef_rttov14/	src/main/rttov_reconstruct_tl.F90
rtcoef_rttov14/aertable_visir/	src/main/rttov_scattering_mod.F90
rtcoef_rttov14/aertable_visir/readme.txt	src/main/rttov_scatt_optp_ad.F90
rtcoef_rttov14/hydrotable_mw/	src/main/rttov_scatt_optp.F90
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rtcoef_rttov14/hydrotable_visir/	src/main/rttov_scatt_optp_tl.F90
rtcoef_rttov14/hydrotable_visir/readme.txt	src/main/rttov_setgeometry.F90
rtcoef_rttov14/mfasis_nn/	src/main/rttov_setpredictors_13_ad.F90
rtcoef_rttov14/mfasis_nn/readme.txt	src/main/rttov_setpredictors_13.F90
rtcoef_rttov14/pc/	src/main/rttov_setpredictors_13_k.F90
rtcoef_rttov14/pc/readme.txt	src/main/rttov_setpredictors_13_tl.F90
rtcoef_rttov14/rttov13pred101L/	src/main/rttov_setpredictors_789_ad.F90
rtcoef_rttov14/rttov13pred101L/readme.txt	src/main/rttov_setpredictors_789.F90
rtcoef_rttov14/rttov13pred54L/*	src/main/rttov_setpredictors_789_k.F90
rtcoef_rttov14/rttov13pred54L/readme.txt	src/main/rttov_setpredictors_789_tl.F90
rtcoef_rttov14/rttov7pred101L/	src/main/rttov_solar_refl_mod.F90
rtcoef_rttov14/rttov7pred101L/readme.txt	src/main/rttov_store_emis_ret_terms.F90
rtcoef_rttov14/rttov7pred54L/	src/main/rttov_sublayer_ad.F90
rtcoef_rttov14/rttov7pred54L/readme.txt	src/main/rttov_sublayer.F90
rtcoef_rttov14/rttov8pred101L/	src/main/rttov_sublayer_tl.F90
rtcoef_rttov14/rttov8pred101L/readme.txt	src/main/rttov_surfem_ocean_ad_mod.F90
rtcoef_rttov14/rttov8pred51L/	src/main/rttov_surfem_ocean_coef_mod.F90
rtcoef_rttov14/rttov8pred51L/readme.txt	src/main/rttov_surfem_ocean_mod.F90
rtcoef_rttov14/rttov8pred54L/	src/main/rttov_surfem_ocean_tl_mod.F90
rtcoef_rttov14/rttov8pred54L/readme.txt	src/main/rttov_tl.F90
rtcoef_rttov14/rttov9pred101L/	src/main/rttov_transmit_solar_ad.F90
rtcoef_rttov14/rttov9pred101L/readme.txt	src/main/rttov_transmit_solar.F90
rtcoef_rttov14/rttov9pred54L/	src/main/rttov_transmit_solar_k.F90
rtcoef_rttov14/rttov9pred54L/readme.txt	src/main/rttov_transmit_solar_tl.F90
rtcoef_rttov14/rttov_coef_download.sh	src/main/rttov_transmit_thermal_ad.F90
rtcoef_rttov14/rttov_mviri_vis_channel_select.py	src/main/rttov_transmit_thermal.F90
rttov_test/	src/main/rttov_transmit_thermal_tl.F90
rttov_test/profile-datasets/*	src/main/rttov_types.F90
rttov_test/rttov_test.pl	src/main/rttov_unix_env.F90
rttov_test/rttov_test_plot_mod.py	src/main/rttov_user_check_emis_refl.F90
rttov_test/rttov_test_plot.py	src/main/rttov_user_check_options.F90
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rttov_test/run_example_aer_param_fwd.sh	src/main/rttov_user_check_profile.F90
rttov_test/run_example_atlas_fwd.sh	src/main/throw.h
rttov_test/run_example_fwd.sh	src/main/yomhook.F90
rttov_test/run_example_hydro_mfasis_nn_fwd.sh	src/Makefile
rttov_test/run_example_hydro_mw_file_fwd.sh	src/mw_scatt_coef/
rttov_test/run_example_hydro_param_fwd.sh	src/mw_scatt_coef/artsdb/
rttov_test/run_example_hydro_visir_file_fwd.sh	src/mw_scatt_coef/artsdb/6-BulletRosette.rssp
rttov_test/run_example_k.sh	src/mw_scatt_coef/artsdb/8-ColumnAggregate.rssp
rttov_test/run_example_pc_fwd.sh	src/mw_scatt_coef/artsdb/ColumnType1.rssp
rttov_test/test_brdf_atlas.1/	src/mw_scatt_coef/artsdb/EvansSnowAggregate.rssp

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rttov_test/test_brdf_atlas.1/profiles_visnir
rttov_test/test_brdf_atlas.2/*
rttov_test/test_brdf_atlas.sh
rttov_test/test_camel_atlas.sh
rttov_test/test_camel_clim_atlas.sh
rttov_test/test_cnrm_mw_atlas.sh
rttov_test/test_core.sh
rttov_test/test_emis_atlas.1/
rttov_test/test_emis_atlas.1/profiles_ir
rttov_test/test_emis_atlas.1/profiles_mw
rttov_test/test_emis_atlas.2/*
rttov_test/test_example.1/
rttov_test/test_example.1/aer_opt_param_avhrr.dat
rttov_test/test_example.1/aer_prof.dat
rttov_test/test_example.1/hydro_mw_prof.dat
rttov_test/test_example.1/hydro_opt_param_avhrr.dat
rttov_test/test_example.1/hydro_visir_prof.dat
rttov_test/test_example.1/prof_aer_file.dat
rttov_test/test_example.1/prof_atlas.dat
rttov_test/test_example.1/prof.dat
rttov_test/test_example.1/prof_mfasis.dat
rttov_test/test_example.1/prof_mw.dat
rttov_test/test_example.1/prof_pc.dat
rttov_test/test_example.1/radrec.dat
rttov_test/test_example.2/*
rttov_test/test_fwd.2/*
rttov_test/test_fwd.sh
rttov_test/test_get_sea_emis_brdf.sh
rttov_test/test_model_alloc.sh
rttov_test/test_multi_instrument.2/*
rttov_test/test_multi_instrument.sh
rttov_test/test_pc.2/*
rttov_test/test_pc.sh
rttov_test/test_rttov14.2/*
rttov_test/test_rttov14_hires.2/*
rttov_test/test_rttov14_hires.sh
rttov_test/test_rttov14.sh
rttov_test/test_rttovscatt.1/
rttov_test/test_rttovscatt.1/example_rttovscatt.asc
rttov_test/test_rttovscatt.1/profiles2_fmt
rttov_test/test_rttovscatt.2/*
rttov_test/test_rttovscatt.sh
rttov_test/tests.0/*
rttov_test/test_solar.2/*
rttov_test/test_solar.sh
rttov_test/test_telsem2_atlas.sh
rttov_test/test_uwiremis_atlas.sh
src/
src/brdf_atlas/
src/brdf_atlas/Makefile
src/brdf_atlas/mod_brdf_atlas.F90
src/brdf_atlas/rttov_brdf_atlas_mod.F90
src/brdf_atlas/rttov_brdf_atlas_test.F90
src/brdf_atlas/rttov_deallocate_brdf_atlas.F90
src/brdf_atlas/rttov_get_brdf.F90
src/brdf_atlas/rttov_setup_brdf_atlas.F90
src/coef_io/
src/coef_io/Makefile
src/coef_io/rttov_channel_extract_aertable.F90
src/coef_io/rttov_channel_extract_coef.F90
src/coef_io/rttov_channel_extract_hydrotable.F90
src/coef_io/rttov_channel_extract_mfasis_nn.F90
src/coef_io/rttov_channel_extract_pccoef.F90
src/coef_io/rttov_channel_extract_sublist.F90
src/coef_io/rttov_check_channels_pc.F90
src/coef_io/rttov_cmpuc.F90
src/coef_io/rttov_coeffname.F90
src/coef_io/rttov_coef_io_mod.F90
src/coef_io/rttov_conv_coef.F90
src/coef_io/rttov_dealloc_coef.F90
src/coef_io/rttov_dealloc_coef_mfasis_nn.F90
src/coef_io/rttov_dealloc_coef_pccomp.F90
src/coef_io/rttov_dealloc_coef_scatt.F90
src/coef_io/rttov_dealloc_coefs.F90
src/coef_io/rttov_deletecomment.F90
src/coef_io/rttov_findnextsection.F90
src/coef_io/rttov_get_pc_predictindex.F90
src/coef_io/rttov_hydro_aer_table_io_mod.F90
src/coef_io/rttov_init_coef.F90
src/coef_io/rttov_init_coef_mfasis_nn.F90
src/coef_io/rttov_init_coef_pccomp.F90
src/coef_io/rttov_init_coef_scatt.F90
src/coef_io/rttov_init_coefs.F90
src/coef_io/rttov_nullify_coef.F90
src/coef_io/rttov_nullify_coef_mfasis_nn.F90
src/coef_io/rttov_nullify_coef_pccomp.F90
src/coef_io/rttov_nullify_coef_scatt.F90
src/coef_io/rttov_nullify_coefs.F90
src/coef_io/rttov_nullify_optp_data.F90
src/coef_io/rttov_read_ascii_aertable.F90
src/coef_io/rttov_read_ascii_coef.F90
src/coef_io/rttov_read_ascii_hydrotable.F90
src/coef_io/rttov_read_ascii_mfasis_nn_file.F90
src/coef_io/rttov_read_ascii_mw_pol_coef.F90
src/coef_io/rttov_read_ascii_pccoef.F90
src/coef_io/rttov_read_binary_aertable.F90
src/coef_io/rttov_read_binary_coef.F90
src/coef_io/rttov_read_binary_hydrotable.F90
src/coef_io/rttov_read_binary_mfasis_nn_file.F90
src/coef_io/rttov_read_binary_pccoef.F90
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src/mw_scatt_coef/artsdb/Flat3-BulletRosette.rssp
src/mw_scatt_coef/artsdb/GemGraupel.rssp
src/mw_scatt_coef/artsdb/IconCloudIce.rssp
src/mw_scatt_coef/artsdb/IconHail.rssp
src/mw_scatt_coef/artsdb/IconSnow.rssp
src/mw_scatt_coef/artsdb/LargeBlockAggregate.rssp
src/mw_scatt_coef/artsdb/LargeColumnAggregate.rssp
src/mw_scatt_coef/artsdb/LargePlateAggregate.rssp
src/mw_scatt_coef/artsdb/LiquidSphere.rssp
src/mw_scatt_coef/artsdb/Perpendicular4-BulletRosette.rssp
src/mw_scatt_coef/artsdb/PlateType1.rssp
src/mw_scatt_coef/artsdb/SectorSnowflake.rssp
src/mw_scatt_coef/arts_scat.F90
src/mw_scatt_coef/channels.dat_all
src/mw_scatt_coef/channels.dat_all_13.2
src/mw_scatt_coef/channels.dat_all_phase
src/mw_scatt_coef/channels.dat_debug
src/mw_scatt_coef/convert_hydrotable.F90
src/mw_scatt_coef/density_all.F90
src/mw_scatt_coef/get_dia.F90
src/mw_scatt_coef/hydro_table_generation.ksh
src/mw_scatt_coef/ice_density.F90
src/mw_scatt_coef/liu_dda.F90
src/mw_scatt_coef/liu_density.F90
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src/mw_scatt_coef/perm_water.F90
src/mw_scatt_coef/perm_water_liebe_89.F90
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