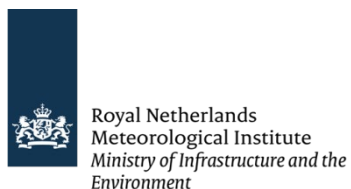# EUMETSAT OSI SAF
OCEAN AND SEA ICE

CWDP Release Note

CFOSAT Wind Data Processor

Version 1.0
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Environment

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Change record			
Version	Date	Author	Remarks
1.1	14-03-2018	Zhen Li	Initial draft
0.9	21-03-2018	Anton Verhoef	For pre-check beta release
0.9.01	02-05-2018	Anton Verhoef	Modified according to comments from release pre-check
1.0	18-05-2021	Zhen Li, AV	For v1.0 release, pre-checked
1.0.01	23-08-2021	AV	Modified according to DRR RIDs

Table of contents

1. Introduction

The CFOSAT Wind Data Processor (CWDP) is a software package written mainly in Fortran 90 with some parts written in C for handling HDF5, NetCDF, and BUFR data.

CWDP generates surface winds based on CFOSAT SCAT L1B data. It is able to perform the ambiguity removal with the Two-dimensional Variational Ambiguity Removal (2DVAR) method. It also supports the Multiple Solution Scheme (MSS). The output consists of wind vectors which represent surface winds within the ground swath of the scatterometer.

The input for CWDP is Normalized Radar Cross Section (NRCS) data along with their geometries from the L1B data. Output is written using a modified SeaWinds BUFR template and can also be converted into NetCDF format. Numerical Weather Prediction (NWP) model winds are also needed for the first guess of the Ambiguity Removal step and they are provided by ECMWF.

If you have any questions concerning CWDP, please contact the KNMI scatterometer team: scat@knmi.nl

2. Package contents

The tar file contains all the necessary files to install CWDP in a UNIX/Linux environment. Contents of the cwdp directory:

l1b_l2a	Programs to convert L1B to L2A output HDF file, data are organized in rows.
hdf2bufr	Programs to convert HDF file to BUFR file, data are organized in WVCs.
data	All the data needed for the processor, such as LUT, antenna gain, etc.
execs	Link to cwdp executable, shell script for running CWDP, and data generated by CWDP
src	Source code directory for CWDP program and supporting routines

Contents of the genscat directory:

ambrem	Ambiguity removal routines
ambrem/twodvar	KNMI 2DVAR ambiguity removal routines
inversion	Inversion and quality control routines
support	General purpose routines sorted in subdirectories
support/BFGS	Minimization routines needed in 2DVAR
support/Compiler_Features	Compiler specific routines, mainly command line handling
support/convert	Conversion between wind speed/direction and u and v
support/datetime	Date and time conversion routines
support/eccodes	BUFR and GRIB file handling routines
support/ErrorHandler	Error handling routines
support/hdf5	Interface routines for calling HDF GROUP hdf5 routines in C
support/netcdf	Interface routines for calling UCAR/UNIDATA NetCDF routines in C
tools/bufr2nc_cfosat_L2A	Convert L2A data from BUFR to NetCDF
tools/bufr2nc_cfosat_L2B	Convert L2B data from BUFR to NetCDF

3. Applicable documents

In directory cwdp/doc:

- CWDP release note, this document.

- CWDP L2A processor Specification and User Manual (SAF/OSI/CDOP3/KNMI/TEC/MA/319), a document that describes the input and output specifications, functionality and how to install the L2A processor.

- CWDP User Manual and Reference Guide (SAF/OSI/CDOP3/KNMI/TEC/MA/320), a document that describes how to install and run the package.

Delivered separately / to be obtained from the NWP SAF web site (https://nwp-saf.eumetsat.int/):

- CWDP test plan and test report (SAF/OSI/CDOP3/KNMI/TEC/PL/322), a document that contains all undertaken tests and their results.

- CWDP top level design (SAF/OSI/CDOP3/KNMI/TEC/TN/321), a document that contains the design of CWDP and its module design.

4. Installation

Detailed instruction on how to install CWDP is described in section 3 of the CWDP User Manual and Reference Guide, (see Applicable documents in section 3), a shortened version is given here.

1. Copy the package tar file (CWDP<version>.tar.gz) in the chosen directory and unzip and untar it.
2. Go to directory `genscat/`:
   a) `make clean`
   b) set compiler options at the command line by:

   `. ./use_gfortran.bsh` (type 'dot' 'space' 'dot' 'slash' before the script name)

   `./Set_Makeoptions`

   c) `make`
3. Go the directory `cwdp/` and type `make`

   The '`Makefile`' in this directory is for the entire software package, which is used to generate executable files (`cfosat_l1b_l2a, cfosat_hdf2bufr, cwdp`). Now CWDP is ready for use with proper settings of the environment variables.
4. Run the script `test_cwdp` in directory `cwdp/test_data`, a BUFR output file containing CFOSAT winds should be generated from the BUFR input file and the ECMWF GRIB data in this directory.

5. Detailed list of changes

Changes in CWDP v1.0.01, March 2021

- Replaced the old NetCDF-3 library in genscat by the latest NetCDF-4 library. Default format for writing is still NetCDF-3, but NetCDF-4 files can now be read as well.

- Use official BUFR descriptor 312034 in D-table for CFOSAT from now on.

- Implemented processing of real CFOSAT data, including backscatter corrections.

- Bug fixes resulting from testing with real data.

- (Re)compute start and end orbit numbers in the L1B-L2A processor since they are often missing in the input data.

- Excluded the simulation modules in the distribution. Simulation modules are not delivered any more to external users.

- Implemented first version of Bayesian ice screening.

- Updated NWP Ocean Calibration to the new instrument calibration since end of October 2019.

- Improved the assignment of L1B slices to WVCs, to reduce the overlapping of slices between neighboring WVCs.

- Moved from GRIB API to ecCodes, software version is 2.17.0.

- Implemented new NOC for L1b v3.0.

- Use ecCodes instead of BUFRDC for reading and writing of BUFR files.

- Several fixes for use of gcc and gfortran version 10 compilers (it is also back compatible with gcc 8, 9 etc.).

6. Questionnaire for user experience

For this version CWDP, user experience is important for us to further update our software. Here is a questionnaire for users who is using or testing this software. Please kindly fill it in and send it back to our scatterometer team (scat@knmi.nl). We appreciate your valuable input.

QUESTIONNAIRE

General

Which operating system did you use?

Which Fortran compiler did you use?

Did you have any trouble downloading the source code?

Do you have any suggestion for improvement of the software?

Do you have any suggestion for improvement of the documentation?

Did you contact KNMI (scat@knmi.nl) with any questions about the software? If so, what are your experiences with the help desk?

Installation

Were you able to install the software by yourself or did you need help?

Is the installation guide clear?

Use

Have you tried different command line options?

Is the meaning of the command line options clear?

Did you do the test runs? If so, how did you check their outcome?

Did you miss any option?

Did you find any bugs in the software? If so, which ones?