EARTH OBSERVATION MISSION CFI SOFTWARE

Release Notes – Version 4.20

This document describes the changes introduced in this release of the Earth Observation Mission CFI Software.

Visit us at http://eop-cfi.esa.int/index.php/mission-cfi-software/eocfi-software for more.

1 USER SUPPORT

For any question related to the usage of the EOCFI or to report a problem, please contact:

EOCFI Software Support Team

e-mail: cfi@eopp.esa.int

2 NEW FEATURES & IMPROVEMENTS

Ref./EOCFI-ANR-	Description
0789	Updated/Added support for existing/new ESA missions (CIMR, ROSE-L, CHIME, CRISTAL, CO2M, LSTM, FORUM, Aeolus)
0809	Added support for Sentinel 6 mission
0828	Upgraded EOCFI dependencies (libxml-2.9.7, libproj-5.2.0, libtiff-4.1.0, libgeotiff-1.4.3)
0843	Modernized generation of Swath Control Files -- *Warning: API breaking change*
0853	Replaced static sized arrays (XF_MAX_ARRAY_SIZE) with dynamic arrays -- *Warning: API breaking change*
0856	Added support for CCSDS Attitude Ephemeris Message (AEM) TXT and XML
0866	Updated computation of satellite altitude to improve support for MEO satellites
0867	Updated maximum allowed time gap between OSVs for MEO satellites
0876	Enabled the use of SP3 files for LEO satellites

3 SOLVED PROBLEMS

Ref./EOCFI-ANR-	Description
0845	Corrected generation of Mean Keplerian elements from TLE
0857	Enabled to statically set `throwWarn = true` to allow warnings in object constructors – only C++ API
0858	Enabled use of `XO_SEL_TIME` when initializing Orbit using Doris Navigator files without J2000 packets
0860	Corrected `const` qualification of `OrbitId::osvCompute` – only C++ API
0864	Optimized `#includes` in public headers (e.g. remove unnecessary `#includes` and `#include` guards, sort `#includes`) – only C API
0868	Corrected memory leaks when calling xp_target_extra_vector
0869	Corrected segmentation fault/internal error when initialising orbit with specific MLST drift values
0871	Correct EO_OPER_INT_DEMCGF_03*.XSD to avoid demanding presence of optional fields
0872	Corrected memory leaks when assigning CfiId derived objects – only C++ API
0873	Corrected the internal convention of DEM tiles (Column Major vs Row Major) – only C++ API
0874	Corrected calculation of ANX_MLST when calling xo_orbit_info with ROF
0875	Corrected segmentation fault/internal error when calling xv_stationvistime_compute

4   RELEASE DESCRIPTION

4.1   Software

Earth Observation Mission CFI Software 4.20 is composed of the following libraries:

Library Name	Version	Issue Date
File Handling		
Data Handling		
Lib		
Orbit	4.20	30/11/2020
Pointing		
Visibility		
EECommon (*)		

(*) only C++ and JAVA APIs

The core API of the above libraries is written in C and provides an API for C, C++ and Java.

The libraries installation packages are available for download at the following URL (registration required):

http://eop-cfi.esa.int/index.php/mission-cfi-software/eocfi-software/branch-4-x/eocfi-v4x-download

4.2   Documentation

The following documents are available:

Type	Document Name	Version
General	Mission Conventions Document	
	General Software User Manual	
C API	Quick Start Guide	
	File Handling Software User Manual	
	Data Handling Software User Manual	4.20
	Lib Software User Manual	
	Orbit Software User Manual	
	Pointing Software User Manual	
	Visibility Software User Manual	

The documentation is available for download (with C++ and Java APIs also available on-line) at the following URL:

http://eop-cfi.esa.int/index.php/mission-cfi-software/eocfi-software/branch-4-x/eocfi-v4x-documentation

The Earth Observation Mission CFI Software file formats are specified in the EO Mission Software File Format Specification document, which is available at the following URL:

http://eop-cfi.esa.int/Repo/PUBLIC/DOCUMENTATION/SYSTEM_SUPPORT_DOCS/PE-ID-ESA-GS-584-1.5-EO_Mission_SW_File_Format_Specs.pdf

Note: In Section 3.2 of EO CFI File Format Specification (Orbit Scenario File), the element <ANX_Longitude_Drift> and its contents are not supported by the latest EOCFI SW version.

4.3 Supported platforms

The following platforms are supported by this release of the CFI (the following are requirements for the **C API**):

Designation	Platform/ Architecture	Minimum Platform Requirements	Software Requirements
LINUX64_LEGACY	Linux 64-bit	x86_64 based PC Linux Operating System (Kernel version 2.6.x)	GCC compiler version 4.5.x glibc (C Library) version 2.12 (*)
LINUX64	Linux 64-bit	x86_64 based PC Linux Operating System (Kernel version 4.10.x)	GCC compiler version 6.3.x glibc (C Library) version 2.24
WINDOWS64	Windows 64-bit	x86_64 based PC Microsoft Windows 7	Microsoft Visual C++ Compiler (Visual Studio 2017 Express or Professional edition, 64-bit)
MACIN64	MacOS/Intel 64-bit	x86_64 based Mac Computer Mac OS X version 10.12.x (Sierra)	Xcode 9.2/Clang compiler frontend

(*) According to gcc documentation, forward compatibility is ensured up to gcc/g++ version 4.9.x.

NOTE for MACIN64 distribution:
As of version 5 of Xcode the default compiler is Clang (see http://clang.llvm.org/). Clang is a compiler front end for C and C++ and can build an application linking against the EOCFI C/C++ libraries. The gcc and g++ program provided within Xcode are aliases for clang.
OpenMP is not supported in AppleClang. Therefore, the –fopenmp compiler option cannot not be used. Functions using parallelized computations, e.g. xp_target_list… functions will operate in single-threading mode.

The following are additional requirements for the **C++ API** (a C++ compiler is required):

- g++ compiler version 4.5.x for LINUX64_LEGACY (*)
  (in MACIN64, g++ is an alias for clang) and g++ compiler version 6.3.x for LINUX64 (*)

- Microsoft Visual C++ Compiler (Visual Studio 2017 Express or Professional edition) for WINDOWS

The following are additional requirements for the **JAVA API** (a JAVA SDK is required):

- Java Standard Edition (SE) version 8 for all platforms

4.4 Distribution Packages

The Earth Observation Mission CFI Software libraries are provided as Zip archives:

API	Package Name	MD5 Checksum
C	EOCFI-4.20-CLIB-LINUX64.zip	235f48181843519094 72849d7d0f8294
C	EOCFI-4.20-CLIB-LINUX64_LEGACY.zip	e392e9a636f49819e4dc6aefc804eac2
C	EOCFI-4.20-CLIB-MACIN64.zip	0498f0dc21ad14b00d0d39c870a6184d
C	EOCFI-4.20-CLIB-WINDOWS64.zip	0861f20c3d5482569ab996d405d0a1fe
C++	EOCFI-4.20-CPPLIB-LINUX64.zip	b71119d8f1cee76c34eae6f1660737e2
C++	EOCFI-4.20-CPPLIB-LINUX64_LEGACY.zip	0c679f29bf0d529c1518a3f134fd0fbb
C++	EOCFI-4.20-CPPLIB-MACIN64.zip	aee04bbe80c4c17399bfa651ba10ccd7
C++	EOCFI-4.20-CPPLIB-WINDOWS64_DLL.zip (*)	a9e90c6175fac3412c1119c61ed94c33
C++	EOCFI-4.20-CPPLIB-WINDOWS64_STA.zip (**)	36d685779bdabb6ff54852c600f3d0bc
JAVA	EOCFI-4.20-JAVALIB-LINUX64.zip	40c89f11e9e0c01d0d791870f044ad99
JAVA	EOCFI-4.20-JAVALIB-LINUX64_LEGACY.zip	315a92a076c893747220bddfb2a04685
JAVA	EOCFI-4.20-JAVALIB-MACIN64.zip	13ff04a4b3587f621592d77927bd6d7d
JAVA	EOCFI-4.20-JAVALIB-WINDOWS64.zip	06ef102ca77cff8e1ce188fcf1f66864

(*) Dynamic libraries (DLLs) / (**) Static libraries

Information on how to get and use the supported DEM datasets can be found at the following URL:

http://eop-cfi.esa.int/index.php/mission-cfi-software/eocfi-software/support-files

4.5 Installation Hints

To install Earth Observation Mission CFI Software libraries, simply extract the contents of the distribution package in the desired installation directory. More information on how to install and use the libraries can be found on:

- Section 6 "CFI LIBRARIES INSTALLATION" of the General SUM;
- Section 6 "LIBRARY USAGE" of each Library User Manual.

The Earth Observation Mission CFI Software makes use of the following third-party libraries:

- pthreads (POSIX threads): this library is normally pre-installed in Linux and Mac OS X systems.
  For Windows, the library is provided in the cfi_tools directory within the distribution package.
  Pthreads is covered by the GNU Lesser General Public License.
  (see https://www.sourceware.org/pthreads-win32/copying.html).
- libxml2 (see http://xmlsoft.org/): for reading and writing XML files.
- libgeotiff (see http://trac.osgeo.org/geotiff/)
- libtiff (see http://www.libtiff.org/)
- libproj (see http://trac.osgeo.org/proj/): for reading ASTER GDEM files.

Terms and conditions for usage of such libraries are detailed in the text file (included in the distribution package) TERMS_AND_CONDITIONS.TXT.

The libraries libxml2, libgeotiff, libtiff and libproj are provided:

- in the C API distribution packages: as separated static libraries (see Section 6 of each User Manual for instruction on how to link them to the application program).
- in the C++ / Java APIs distribution packages: as separated dynamic libraries (see Section 6 of each User Manual for instruction on how to link them to the application program). In the Java API for MAC OS X platform, due to incompatibilities with system libraries, they are instead embedded in the EOCFI libraries.

User applications using the Pointing library need to be built with OpenMP support (adding –fopenmp switch in gcc, see Section 6 of the Pointing User Manual).

OpenMP is not supported in AppleClang (Mac OS X) and Visual C++ (Windows), therefore no additional switch is required. In these platforms the library will operate in single-threading mode.

The XML validation function and tool in the Data Handling library uses the libxml2 library. For Windows platforms, it is required to link the user application with the ws2_32.lib.

5   KNOWN PROBLEMS

The updated list of known issues that will be resolved in a future release can be found at the following URL:

http://eop-cfi.esa.int/index.php/mission-cfi-software/eocfi-software/branch-4-x/known-issues-branch-4