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Final Report for ESA Validation Data Centre, EVDC

5 May 2015

Ann Mari Fjæraa

Scientific report

Contents

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1 Introduction

The current document is the final report of the EVDC project carried out at NILU on behalf of ESA in March 2012 - March 2015. The report is covering both the initial contract in 2012 and the contract change notice (CCN) in 2014. 10 formal progress reports and 6 weekly reports on the mitigation plan have been submitted to ESA in the project period. In addition to these, there has been a large number of e-mails and skype- and telephone meetings during the project period. This report is a technical report. All figures are for practical reasons presented collectively in Annex A of this report.

2 Management status

The Project Management Plan (PMP) was originally agreed upon between ESA and NILU in March 2012 with an initial foreseen project period for years 2012 and 2013. Due to circumstances beyond the contractors control the contract was prolonged and updated in the CCN in March 2014, with a final deadline of 1st April 2015. The PMP describes the management status and plans of the contract. All deliverables with reference to the initial contract are listed in Chapter 4 of the current document, while the deliverables with reference to the CCN are listed in Chapter 5. There was a change of project manager in February 2013, beyond this, there is no major changes in personnel planned in, and/or working on, the project. A complete list of team members and theirs CVs are available in the project contract.

3 Technical Status of the project at delivery date.

The work is divided into five work packages (WPs) corresponding to the five overall tasks specified in the Statement of Work (SoW) and the Project Management Plan (PMP), plus an additional work package for management and reporting. The number of WPs has been kept constant throughout the project period. The work package descriptions and their deliverables were, however, changed and updated in the CCN in conjunction with the prolongation of the contract in March 2014, in agreement with ESA. All deliverables of the initial contract were either completed or brought onward to the CCN. The acceptance of a number of the initial tasks were confirmed by ESA in February 2014.

Chapter 4 and Chapter 5 of this report summarises the final status of the six WPs at the end of the initial phase and at the end of the CCN, respectively.

4 Technical status of the project at the delivery of the initial phase

4.1 Deliverables planned in the project

Deliverable	Title	Due date
D1.1	Report on upgrading of the EVDC web pages to Liferay	November 2012
D3.1	GEOMS conversion report	November 2012
D4.1	DCIO Meeting minutes	Meeting dates + 1 week
D6.1	Project Management Plan	August 2012
D6.2	ESA-NILU Meeting minutes	Meeting dates + 1 week
D6.3	Bi-monthly reports	August 2012, October 2012, etc.
D6.4	EVDC Newsletter	Nov 2012, May 2013
D6.5	Final report and delivery of all software and data	May 2013

Table 1: Deliverables planned in the project.

4.2 WP1 Maintenance of the ESA Validation Data Centre

This WP covers the maintenance and upgrade of the EVDC system and service, evolving from the old CDB system to the new EVDC system. This include the EVDC data service, the data archive, the data processing facility, the data dissemination system, user support and any other related service. Work has proceeded as planned within this WP and the old pages located at http://nadir.nilu.no/cdb have been maintained during the course of the project, until the final shut-down at 1st April 2015, in agreement with ESA. In addition to keeping the old system operational, the new interface on http://evdc.nilu.no is developed and set in operation. The front page of EVDC is shown in Figure 1, Annex A. The setup for the relational database is shown in Figure 2, Annex A. All software related to the EVDC service is regularly upgraded and kept up-to-date. The EVDC relational database is running on a dedicated database server while the rest of the EVDC system runs on virtual Linux Ubuntu servers. The uptime of the system has been kept above 98%, and only taken down for scheduled and announced maintenance. The complete data system is backed up on a daily basis. This includes hourly snapshots of the whole file-system (built-in functionality of the ZFS) and mirroring of the whole file-system to a remote location in a neighbour building every night.

Regular contact with the Cal/Val community has been maintained. Compared with the beginning of the project, when the user activity was relatively low (2012), there has in 2013 to 2015 been an increasing amount of activity related to users requests for user support with GEOMS and its changes in metadata, assistance with file formatting, etc. In 2011 and 2012 we had 5 and 3 major

support cases, respectively, while the number of major support cases increased to 7 in 2013, 8 in 2014 and 7 in the period Jan-Mar 2015. First hand user support has been given and the EVDC team has responded to all request for support within a few working days. Support has been provided both in context of extraction of ECMWF data and the routines for plotting these data, and for setting up and running conversion routines for GEOMS.

Two user protocols are defined in the project; the EVDC user protocol and the ECMWF data protocol. Both are attached in Annex B.

Updates on Deliverable D1.1, Report on upgrading of the EVDC web pages to Liferay, was delivered in the periodically progress reports to ESA. WP1 was kept open from the initial phase throughout the CCN.

4.3 WP2 Support to Cal/Val activities.

User support for specific Cal/Val campaigns were not requested during the project. Specific pages for campaigns were for this reason not set up, but the EVDC team has been to the Agency's disposal for request for such pages and general campaign service. This WP was kept open from the initial phase throughout the CCN.

4.4 WP3 Implementation of GEOMS standard

The EVDC system is upgraded to be compliant with the GEOMS standard. The system utilise NASA/AVDC developed tools for file creation and reading, and EVDC personal has during the course of the project worked actively to contribute to the GEOMS discussions and provided support and recommendations for developing format templates for all different measurement principles.

The original EVDC data file tree is available via http or ftp to zardoz.nilu.no (/viper/nadir/esa/data/) and contains 343328 data files by 1st April 2015.
The majority of files in the old system are converted to GEOMS compatible files and made available in the new and upgraded system. The aim is to convert up to 95% of the files. 88% of the files are converted by the time of the current reporting. We are working closely with the GEOMS group for solutions for the remaining 12% of files, but this alone is outside EVDC control. The files that did not pass the conversion phase is archived and waiting for further investigation and actions. The complete documentation for the technical details of the conversion of old data into the new format, which is built around the AVDC-developed geoms_qa program and we run the geoms_qa.sav file, is available in the 7.th EVDC progress report, delivered to ESA in February 2013. The "old" and the new systems have been run in parallel during the file conversion phase. No interruptions in the system and file availability has been encountered as result of the conversion to GEOMS. The development and implementation of the GEOMS quality assurance system can been seen as completed and is in operation at NILU.

The access to /viper/nadir/esa/data/ is now closed for external users. All data are archived for later. There are currently more than 335000 correlative data files available in EVDC. The new data file tree is /viper/nadir/evdc/data/. A snapshot

of the file tree is shown in Figure 3 in Annex A. A daemon runs continuously in the background of the data system and identifies new files that are uploaded to the /viper/nadir/evdc/incoming/ folder (submission via ftp to zardoz.nilu.no or via web at http://evdc.nilu.no/web/evdc/upload-data). New files are checked with the geoms_qa tool and the file content is read into memory with the idlcr8ascii.pro tool if it passes the first compliance check. Besides the above mentioned checks, the program checks if the submitted file already exists in the EVDC file catalogue and also if the file version is higher than existing (if any) versions of the data file.

If a data file is correctly formatted and passes all checks in the QA software, the file is inserted in the EVDC file tree and metadata are inserted in the relational database to enable file searching through the web interface. No information is sent out to the data submitter as long as everything works out fine. Whenever there is an error in the overall QA process, an email is sent to the data submitter and information on the error is provided. The daemon (the QA program) will run continuously as long as it has access to the mail server and the relational database, but the process will stop if any of these connections fails. An email is then sent to NILU EVDC administrators and no further file processing will happen as long as any of these connections are missing. A number of system error conditions are also reported to the EVDC administrators and the system is developed to handle various exceptions related to the server and its interfaces. In principle, as long as the email server connection is open, there should be no situation that is not alerted to the administrators.

Deliverable D3.1, GEOMS conversion report, was delivered in the periodically progress reports to ESA. This WP was kept open from the initial phase throughout the CCN.

4.5 WP4 DCIO demonstration, evolution and maintenance

NILU supports ESA in their ongoing work on the DCIO initiative, and has actively contributed to the DCIO group and played a role as coordinator towards the other project partners. In the first phase of the project the DCIO interface running at http://nadir.nilu.no:8080/oaicat/ was updated to become GEOMS compliant as the rest of the EVDC system was converted to GEOMS. The CEOS Cal/Val Portals runs harvesting jobs on a daily basis, controlled by a cron Job. A dedicated software is being employed that connects to http://evdc.nilu.no/oaicat/OAIHandler, fetches metadata that features the prefix ‘dcio’, validates the metadata against the DCIO standard, and finally writes the harvested metadata to the Cal/Val Portal database. A system for monitoring this web link from NILUs side is set up, and if the system goes down an alert is sent to the NILU IT group and further actions are taken. Monitoring shows that the system is stable and performs as expected. Based on this conclusion, the WP covering DCIO was accepted by ESA and closed before the CCN was put into action. Delivery D4.1, DCIO meeting minutes, was delivered to ESA after each meeting.

4.6 WP5 ECMWF Metadata Flow re-Establishment

This WP was originally conceived as a pure recovery task, where NILU should re-establish the data flow of ECMWF data from NILU via met.no, a data flow which was stopped in May 2011 due to a combination of a change in the data formats from ECMWF and to lack of funding. In addition, both the routines for data extraction and the plotting routines were planned to be updated to cope with the new data standard, and the ESA logo were to be included in plots. The exact strategy for how ECMWF data should be acquired to NILU was discussed with ESA, and it was decided to open for a data transfer through a direct contract with ECMWF, and no longer through met.no. A cron job to retrieve data was set up, and gaps in data were filled in the first phase of the contract. The data flow is monitored and maintained on a daily basis by NILU.

The plotting routines and data extraction routines (metmars) currently available for visualising and extracting ECMWF data are updated to handle any input data in terms of levels and format. However, as this work progressed it became more and more clear that the two changes in the ECMWF data that had taken place since 2011 (from Grib format to Grib2 format and from 91 to 157 vertical levels) had a greater impact for the source code than the first was taken into account in PMP. The issue and its consequences were pointed out to ESA, and a delayed delivery of WP5 was accepted. Weekly progress reports were submitted during the most critical phase. The programs are now re-written, compiled and executable. Pre-generated plots for a number of defined parameters and levels are produced on a daily basis. Figure 4, Annex A gives examples of such plots. The plots are available to users via the web, located at http://ecmwf.nilu.no and both plots and data are available to the users via ftp from zardoz.nilu.no. Both systems requires user identification and signature on the ECWMF data protocol. It is also possible for registered users to log in to the system and specify their own area or data of interest and generate the plots themselves. This WP was kept open from the initial phase throughout the CCN.

4.7 WP6 Project management and reporting.

All project planning, progress monitoring and reporting were done in this work package. This includes both contact with ESA and other external organisations (such as collaborating projects), and internal project management. Bi-monthly reports covering progress, plans and progress on all project activities were provided as stated in the SOW.

There was a change of project manager during the initial project phase, but beyond this no changes in project personnel have taken place. The exact timing of the delivery of some tasks were shifted forward in time, but only after clarification with ESA and justified in reports. All documents are delivered electronically by email.

Deliverable D6.1 Project Management Plan (PMP) was delivered to ESA in September 2012. This WP was kept open from the initial phase throughout the CCN.

5 Technical status of the project at the delivery of the CCN and formal end of the project.

The following sub section gives the complete and final status of the six WPs at the time of the project delivery (1.April 2015).

5.1 Deliverables included in the CCN

Table 2: Deliverables planned in the CCN

Deliverable	Title	Due date
D1.1	Release of new EVDC web portal	October 2014
D3.1	Switch to GEOMS	October 2014
D5.1	EVDC Newsletter	September 2014
D6.1	Bi-monthly reports	May, July, October 2014
D6.2	Final report and delivery of the project	December 2014

5.2 WP1 Maintenance of the ESA Validation Data Centre

The deliverable D1.1 of WP1, Delivery of the web portal, was formally delivered to ESA 1st April 2015. The timing of the delivery was agreed upon with ESA. The technical work was carried out in the initial phase of the project and thus described in detail in Chapter 4.2 of the current report. Progress related to regular system maintenance and performance during the CCN are described in the bi-monthly reports delivered under WP6.

5.3 WP2 Support to Cal/Val activities.

There was no activity in this WP during the CCN, for reasons described in Chapter 4.3 of the current report. The WP was held open throughout the CCN in case any type of campaign service was requested.

5.4 WP3 Implementation of GEOMS standard

The EVDC system is upgraded to be compliant with the GEOMS standard, as described in detail in Chapter 4.4. The technical solution was in place in the initial phase of the project, but the work with defining the data reporting templates and the work with converting old files to new GEOMS compatible format has been ongoing until the end of the CCN. Progress related to detailed progress of file conversion during the CCN are described in the bi-monthly reports delivered under WP6. The deliverable D3.1 of WP3, Switch to GEOMS, was formally delivered to ESA 1st April 2015.

5.5 WP4 Finalisation of tools and Collection of ERA-Interim data.

The plotting routines and data extraction routines are updated and made available to users. The work on finalising these tools are described in detail in Chapter 4.5, and further details are provided in the bi-monthly reports delivered under WP6. A change from the initial contract was the extension of work to also collect the ERA Interim data from 2002-2014. All available data is collected and made available to

users who have signed ECWMF data protocol of the system under the directory /viper/nadir/era_interim/ on zardoz.nilu.no.

5.6 EVDC Newsletter

This WP is added to the CCN as an extension of the initial contract.
A dedicated newsletter which summarise all functionalities of EVDC was delivered to, and accepted by, ESA in March 2015. (D5.1) The document describes the important changes to the EVDC system and its metadata standard, explains to users how they need to adapt and provides general guidance on the switch. It describes the ECMWF data and the available extraction and plotting tools.

5.7 WP6 Project management and reporting

All project planning, progress monitoring and reporting were done in this work package, which for natural reasons was kept open from the initial phase throughout the CCN. The technical work carried out concerning all project management is described in Chapter 4.7 of the current document. Deliverable D6.1, Bi-monthly reports, June, August and October 2014. Deliverable D6.2, Final report, is the current report, and was delivered to ESA in April 2015, as the formal finalisation of the project.

6 Delays identified

Delays were identified during the course of the project. Due to factors beyond ESA and NILUs control, related to the change in format of ECMWF input data from GRIB to GRIB2, the work package covering the ECMWF data flow, the data extraction and the plotting tools could not be closed in the initial phase of the contract. The suggested approach and the effort needed to meet the requirements defined by the Agency were implemented through the contract change notice.

7 Problems encountered

Small problems related to converting up to 95% of the files from old format to GEOMS compatible files were encountered. The problems are related to definitions of required metadata templates, following a larger context of discussion and thus are out of EVDC direct control. The implementation of required metadata templates will continue within the GEOMS consortium in the future.

8 Evaluation / Planning

This is the final and closing report for the current EVDC project. Planning for a new project is ongoing.

9 Public dissemination

EVDC was presented at the ADM Aeolus workshop in Frascati in Italy in February 2015.

Appendix A

Figures

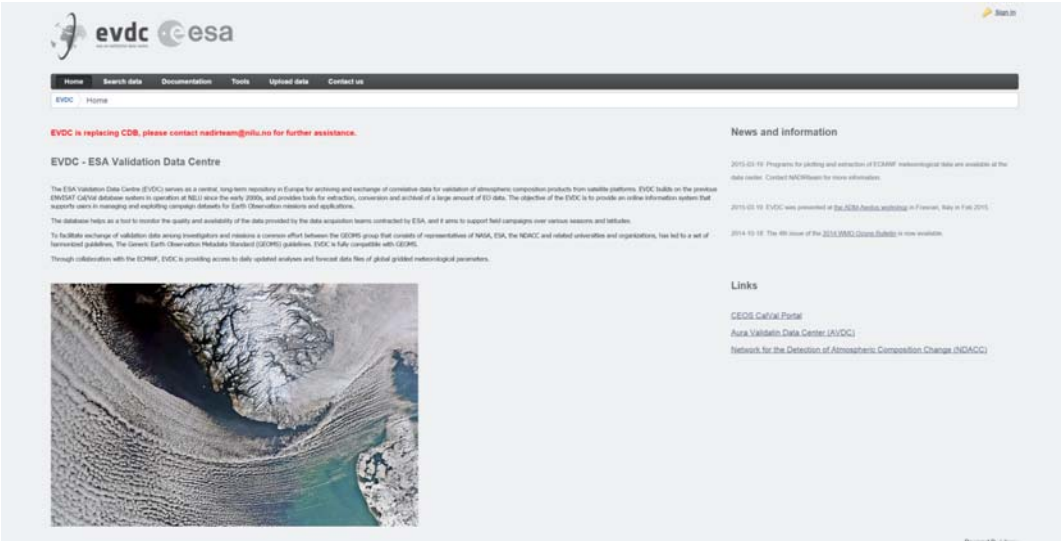

Figure 1: Front page of EVDC.

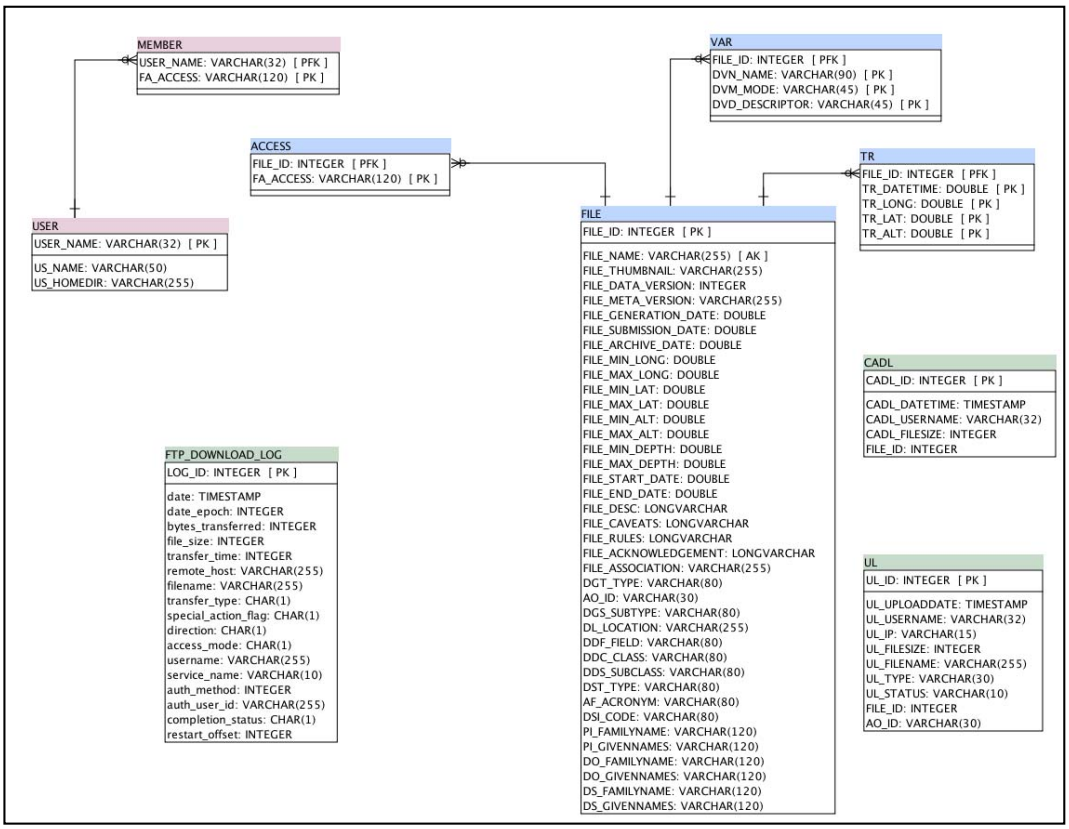

Figure 2. The diagram for the current version of the EVDC database.

```
evdcadm@prod-evdc:/viper/nadir/evdc/data$ ls -l
total 28
drwxrwxr-x 12 evdcadm evdc 4096 Nov 13 10:27 aircraft
drwxrwxr-x  3 evdcadm evdc 4096 Nov 11  2013 assimilation
drwxrwxr-x 13 evdcadm evdc 4096 Nov  3 13:42 balloon
drwxrwxr-x 35 evdcadm evdc 4096 Mar 30 11:50 groundbased
drwxrwxr-x  8 evdcadm evdc 4096 Apr  7 10:34 platform
drwxrwxr-x  9 evdcadm evdc 4096 Apr  7 13:21 satellite
drwxrwxr-x 14 evdcadm evdc 4096 Apr  7 13:11 ship
evdcadm@prod-evdc:/viper/nadir/evdc/data$
```

Figure 3: The EVDC data file tree. All data are located at /viper/nadir/evdc/data/. Currently, more than 335000 datasets from 7 categories are available.

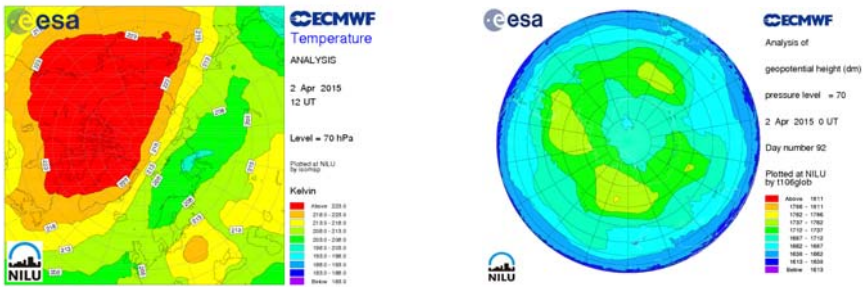

Figure 4: Examples of plots of ECMWF data produced on a daily basis at EVDC.

Appendix B

Data protocols

Protocol for exchange of data for the EO Validation Data Centre - EVDC

The aims of this protocol are to encourage rapid dissemination of results for scientists involved in ESA funded measurement campaigns and to respect the rights of the individual scientists:

i) Preliminary data should be made available to the EVDC data centre at NILU as soon as possible.

ii) Old data should be replaced as soon as possible by corrected data in the EVDC database. The descriptive information in the data file shall also reflect such an update.

iii) All EVDC data are to be submitted in the HDF version 4 or 5 formats. All files should be in conformity with the GEOMS metadata guidelines.

iv) The ownership of data remains with the data originator.

v) Each Principal Investigator has access to the database, but any publication resulting from its use requires prior written permission from the owner.

vi) Access to the EVDC data hosted at NILU is granted only after having signed this protocol. Re-distribution of data is nominally not allowed and requires written permission from ESA.

If you need to upload data, please indicate which sub-project/AO you need to upload data for. If you do not require access to upload data, the entry is not required.

The undersigned agrees to the conditions of this data protocol (PLEASE PRINT CLEARLY)

Name : ……

Position (PI, Student, etc) : ……

Project or AO (Name, Number). : ……

E-mail : ……

Address : ……

: ……

: ……

Date : ……

Signature : ……

Please return to:

NILU
P.O. Box 100
N-2027 Kjeller
NORWAY
Attention: NADIR team

Tel: (+47) 63 89 80 00
Fax: (+47) 63 89 80 50
E-mail: nadirteam@nilu.no

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previsioni meteorologiche a medio termine

Data is supplied by ECMWF subject to the following conditions:

1. The supplied data will not be transmitted in whole or in part to any third party without the authorization of ECMWF.
2. Articles, papers, or written scientific works of any form, based in whole or in part on data supplied by ECMWF, will contain an acknowledgement concerning the supplied data.
3. Access to the data is restricted to the scientists within the organisation of the data recipient working on the same computer installation.
4. The recipient of the data will accept responsibility for informing all data users of these conditions.
5. Data will not be provided to commercial organisations, nor will it be put to commercial use within the organisation of the recipient.
6. Data or plots of data will not be posted on the World Wide Web.

This is to certify that I/we agree to the above conditions with respect to the supply of data by ECMWF.

Date :..... Signed …….....

Name : ……..…….....

Address : …….....

: …….....

E-mail : …….....

I am involved in the following EU funded project(s), in the ESA funded Envisat Validation Data Centre (EVDC), in NDACC or in any other international collaboration:

.....…….

Please return the filled in and signed form to NILU by email: nadirteam@nilu.no or
by fax to +47 63 89 80 50 with attention to NADIR-team.

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