Deutsches Geodätisches Forschungsinstitut
Ingenieurfakultät Bau Geo Umwelt
Technische Universität München

EUROLAS Data Center (EDC) – Recent developments of the EDC

Christian Schwatke (christian.schwatke@tum.de)

Introduction

In 2015, the “Deutsches Geodätisches Forschungsinstitut” (DGFI) maintaining the EUROLAS Data Center (EDC) became part of the “Technische Universität München” (TUM), now DGFI-TUM. In this process, the complete IT infrastructure of the EDC was moved to the local computing center (“Leibniz Supercomputing Centre”, LRZ) which leads to an improved internet connection and backup system. Furthermore, the website of the EDC (http://edc.dgfi.tum.de) also has to be revised with respect to the corporate design of the TUM. In this poster, the updated website and their functionalities are presented.

In addition to the new design, also an updated functionality of the application programming interface (API) accessing the data holding of the EDC is introduced. The new EDC-API for example allows SLR stations to access the current satellite list, station list, CPF predictions, etc. directly by using their own scripts. Also an access of the data holding to get information about the most-recently submitted SLR data is possible. In this poster, the new functionality of the improved EDC-API is shown in detail.

New IT-Infrastructure of the EDC

In 2016, the complete IT-Infrastructure of the EDC has been moved to the “Leibniz Supercomputing Centre of the Bavarian Academy of Sciences and Humanities” (LRZ) which operates the Munich Scientific Network (MWN).

Figure 1 shows the changes of the IT-infrastructure with respect to the former and new EDC servers. The internet connection improved significantly from 1GB/s to 10GB/s with an additional backup internet connection. The data backup system improved also by using RAID systems and the daily archiving of the LRZ.

Former IT-Infrastructure

- Daily backup on 2nd server
- No RAID system for hard disks
- Internet connection: 1GBit/s
- Hardware: 2x desktop computer

New IT-Infrastructure:

- Daily backup on tapes
- Raid system for hard disks
- Daily security updates for operating system
- Internet connection: 10GBit/s (incl. backup)
- Hardware: Scalable virtual server

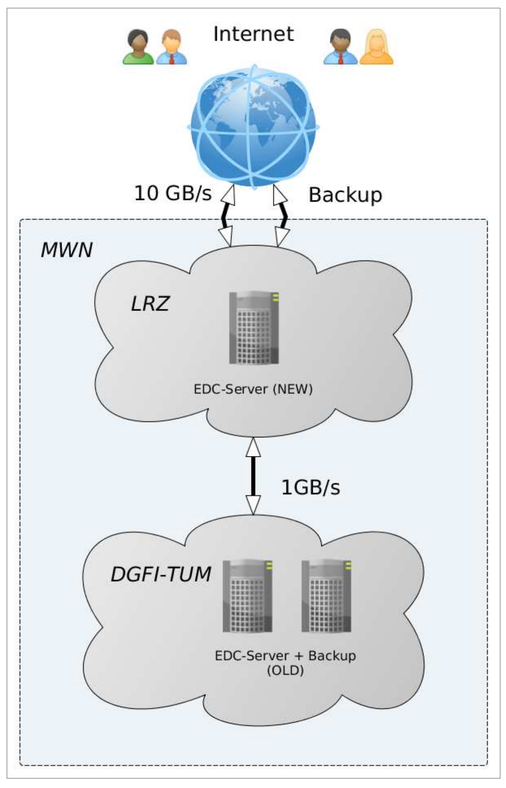

Figure 1: Former and new IT-Infrastructure at the EDC

The changeover to the new system is an important step to preserve the system stability of the SLR data management at the EDC for the ILRS community.

The EDC website

In 2016, the EDC website was redesigned using the corporate design of the “Technische Universität München”. Figure 2 shows a screenshot of the EDC`s welcome page.

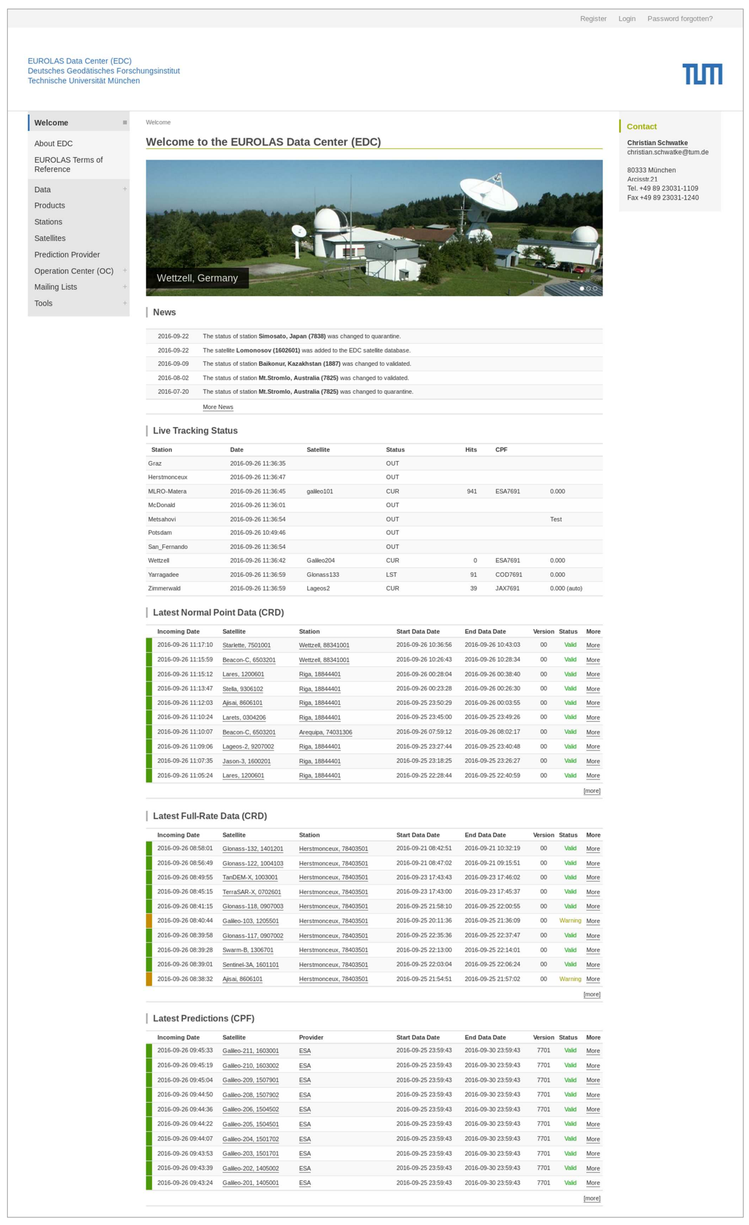

Figure 2: Screenshot of the redesigned EDC website

The new EDC website now provides new information about the SLR data holding and its products for the ILRS community.

- The current lists of satellites and stations can now be accessed directly in the machine-readable ASCII format which is helpful for station managers or analysts.

```
18248101 V GLSL EDC   12356S001 2000-02-15 2016-09-19 Golosiiv, Ukraine
18685901 V KOML EDC   12411S001 1992-06-19 2016-09-26 Komsomolsk-na-Amure, Russia
18734901 V SIML EDC   12337S003 1989-03-09 2016-09-26 Simeiz, Ukraine
18748301 V MDVS EDC   12309S003 2013-02-20 2016-09-01 Mendeleevo 2, Russia
18799401 V ALTL EDC   12372S001 2008-11-19 2016-09-26 Altay, Russia
18869601 V ARKL EDC   12373S001 2010-12-03 2016-09-27 Arkhyz, Russia
18879701 V BAIL EDC   25603S001 2011-10-17 2016-09-26 Baikonur, Kazakhstan
18889801 V SVEL EDC   12350S002 2012-02-03 2016-09-20 Svetloe, Russia
18899901 V ZELL EDC   12351S002 2012-01-06 2016-09-26 Zelenchukskya, Russia
18900901 V BADL EDC   12338S004 2012-01-03 2016-09-17 Badary, Russia
18915301 V IRKL EDC   12313S007 2014-08-26 2016-09-26 Irkutsk, Russia
18931801 V KTZL EDC   12337S006 1989-01-20 2016-09-27 Katzively, Ukraine
70459501 V APOL CDDIS 49447S001 2006-04-07 2016-01-03 Apache Point, NM
70802419 V MDOL CDDIS 40442M006 1993-06-11 2016-09-21 McDonald Observatory, Texas
70900513 V YARL CDDIS 50107M001 1992-07-21 2016-09-28 Yarragadee, Australia
71050725 V GODL CDDIS 40451M105 1999-02-10 2016-09-28 Greenbelt, Maryland
71100412 V MONL CDDIS 40497M001 2003-05-28 2016-09-28 Monument Peak, California
71191402 V HAAT CDDIS 40445M004 2011-03-29 2016-09-28 Haleakala, Hawaii
71248802 V THTL CDDIS 92201M007 2000-02-02 2016-09-27 Tahiti, French Polynesia
72371901 V CHAL EDC   21611S001 1991-08-10 2016-09-27 Changchun, China
72496102 V BEIL EDC   21601S004 2012-01-12 2016-09-23 Beijing, China
73942601 V SEJL EDC   23907S002 2016-01-11 2016-09-25 Sejong City, Republic of Korea
74031306 V AREL CDDIS 42202M003 2010-09-22 2016-09-28 Arequipa, Peru
74072701 V BRAL EDC   48081S001 2014-05-12 2016-09-01 Brasilia, Brazil
75010602 V HARL CDDIS 30302M003 2000-08-02 2016-09-23 Hartebeesthoek, South Africa
78106801 V ZIML EDC   14001S007 1997-07-09 2016-09-28 Zimmerwald, Switzerland
78113802 V BORL EDC   12205S001 1988-05-13 2016-09-28 Borowiec, Poland
78212801 V SHAZ EDC   21605S010 2005-12-14 2016-09-25 Shanghai, China
78259001 V STL3 EDC   50119S003 2004-08-14 2016-09-27 Mt Stromlo, Australia
78272201 V SOSW EDC   14201S045 2014-04-17 2016-09-27 Wettzell, Germany (SOSW)
78286903 V PARF EDC   None      2013-09-15 2013-10-31 Paris, France (FTLRS)
78296906 V GRAF EDC   10002S017 2012-02-22 2013-08-27 Grasse, France (FTLRS)
78393402 V GRZL EDC   11001S002 1988-08-01 2016-09-26 Graz, Austria
```

Figure 3: List of stations in ASCII format

- The EDC website now provides a live tracking status of SLR stations on the welcome page.
- For stations with quarantine status, a new view is available on the website which provides information about the validation process. It provides statistics about the tracking activities in the validation process.

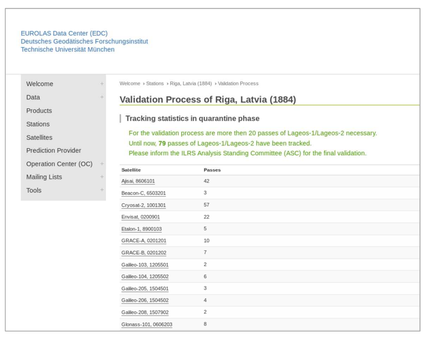

Figure 4: Validation process of station „Riga“

- An “Application Programming Interface” (EDC-API) was implemented which allows users to access the EDC data holding directly by using their own scripts.

EUROLAS Data Center – Application Programming Interface (EDC-API)

The new EDC-API enables the ILRS community to access the EDC data holding by using their own scripts. The EDC-API is realized by sending POST or GET requests to the EDC server (http://edc.dgfi.tum.de/api/v1/). The response of the EDC-API is sent in JSON (JavaScript Object Notation) format. The advantage of this implementation is that sending requests and receiving responses can be realized language-independent on the client-side (e.g Python, cURL, etc).

Until now, the following types of requests are implemented:

- *“list-stations”* – Returns a list of the stations
- *“list-satellites”* – Returns a list of the satellites
- *“list-predictions”* – Returns a list of the current valid CPF predictions
- *“data-query”* – Search in the data holding using user-defined criteria
- *“data-info”* – Get detailed information about a certain dataset of the EDC data holding
- *“data-download”* – Download data from the EDC data holding directly

The following selected example shows the usage of EDC-API for the action *“list-predictions”*.

```python
import requests
import json

url = 'http://dahiti.dgfi.tum.de/api/v1/'

args = {}

""" required options """
args['username'] = 'username'
args['password'] = 'password'
args['action'] = 'list-predictions'

""" send request as method POST """
response = requests.post(url, data=args)

""" convert json string in python list """
data = json.loads(response.text)
```

Figure 5: Example of using the EDC-API in Python

The response of the EDC-API server provides a status code which tells the user if the request was successful or not. Furthermore, the response data is delivered as JSON string which is programming language independent and can be simply converted.

The response of the example in Figure 5 provides a list with a dictionary for each record which is shown in Figure 6.

```
[
    {
        'id': '495214',
        'satellite': '1501901',
        'eph_seq': '7621',
        'start_data_date': '2016-09-18 00:00:00',
        'end_data_date': '2016-09-29 22:40:00',
        'provider': 'SHA‘
    },
    … ,
    {
        'id': '496471',
        'satellite': '0000100',
        'eph_seq': '7721',
        'start_data_date': '2016-09-28 00:00:00',
        'end_data_date': '2016-10-02 23:45:00',
        'provider': 'UTX'
    }
]
```

Figure 6: Example of a EDC-API response

A detailed documentation with examples in Python and cURL for the EDC-API is available on the EDC-website under *http://edc.dgfi.tum.de/en/api/doc/*.

References

- *Pearlman M.R., Degnan J.J., Bosworth J.M.:* “The International Laser Ranging Service”, Advances in Space Research, Vol.30, No. 2, 135-143, 2002