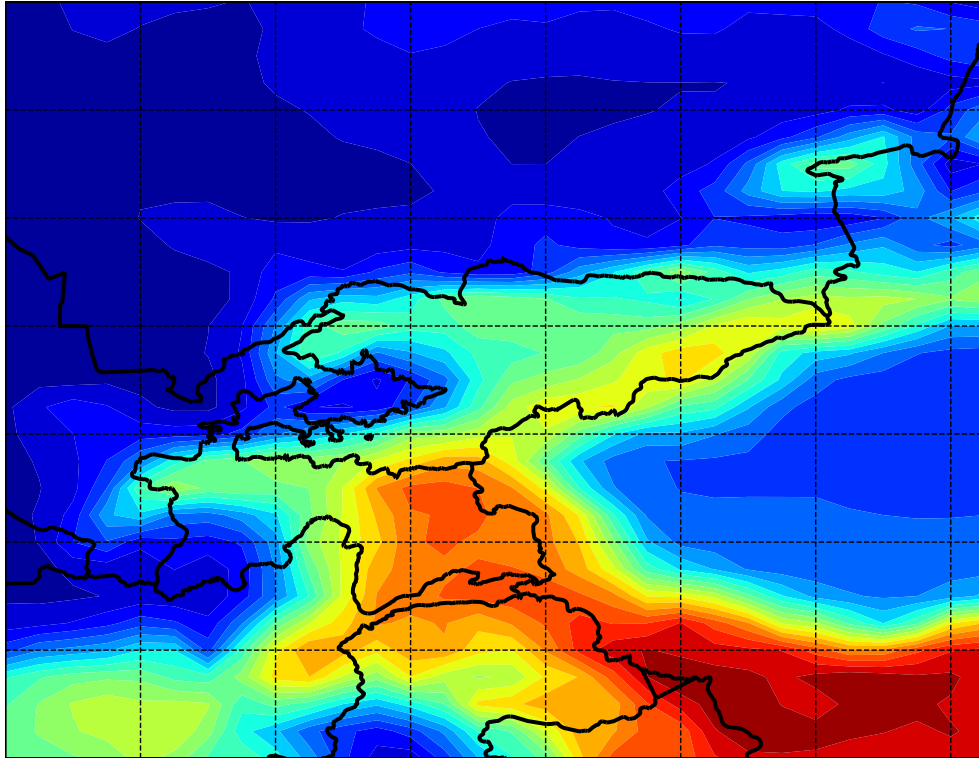

American University of Central Asia

Internship Report



Place of Internship
Research Station
of the Russian Academy of Sciences, Bishkek

Program
Applied Mathematics and Informatics

Student
Moritz M. Konarski

Group
2017

October 28, 2020 – Bishkek

Contents

1	Introduction	3
1.1	The Research Station	3
1.2	The Tasks	3
1.2.1	Educational	3
1.2.2	Industrial	3
2	NASA Earth Remote Sensing Data	3
3	NASA Earthdata	3
3.1	NASA Earthdata Registration	4
4	NetCDF	4
4.1	NetCDF File Format	4
5	NetCDF Libraries	4
6	Data Processing Library	4
7	Plotting Library	4
8	GUI	4
9	Conclusion	4
	References	5
A	Code Listings	6
B	Supplemental Graphs	6
C	Tables	6

1 Introduction

My internship from 07.09.2020 to 07.10.2020 at the research station, working with satellite data and python and plotting. My tasks were ...

1.1 The Research Station

What it is and what it does

1.2 The Tasks

1.2.1 Educational

The educational part of the internship had the following associated with it:

1. Familiarization with web resources providing access to NASA Earth Remote Sensing Data,
2. Familiarization with the NetCDF format intended for scientific data storage,
3. Studying libraries for working with the NetCDF format, in various computing environments.

1.2.2 Industrial

This section covers the tasks of the industrial part of the internship

1. Registration on NASA Earthdata platform to access satellite data;
2. Practical development of the library for working with the NetCDF format in Python environment using satellite data as an example
3. Development of a computer application for data visualization reanalysis of NASA MERRA2 satellite data

2 NASA Earth Remote Sensing Data

3 NASA Earthdata

What is it? Where can we get it? How can we get it (`wget`)? What is its use? What is it used for at the RS RAS?

- NASA GIS DISC
- wget manual
- the download protocol
- how to select the data you want to download

3.1 NASA Earthdata Registration

Why do you need to register? What is the point of it? What do you gain if you do it?

4 NetCDF

4.1 NetCDF File Format

What is NetCDF? Who created it? How does it work? What is its use? Why would you use it?

- unidata source
- diagram of the data format
- specifications
- advantages and drawbacks

5 NetCDF Libraries

Why do you need them? What is their advantage? Fortran, C, Python versions. What do they allow you to do?

- Unidata `netCDF4`
- documentation for those libraries

6 Data Processing Library

What does it do? How does it do it? What are the implementation details?

7 Plotting Library

What does it do? How does it do it? What are the implementation details?

8 GUI

What does it do? How does it do it? What are the implementation details?

9 Conclusion

- what did I learn during the internship
- which skills did I receive

References

- [1] “NumPy reference,” 06.2020. Release 1.19.0. Retrieved from: <https://numpy.org/doc/1.19/numpy-ref.pdf>.
- [2] W. KcKinney and Pandas Development Team, “Pandas: powerful python data analysis toolkit,” 08.2020. Release 1.1.3. Retrieved from: <https://pandas.pydata.org/docs/pandas.pdf>.
- [3] “The netcdf user’s guide,” Accessed 23.10.2020. URL: https://www.unidata.ucar.edu/software/netcdf/docs/user_guide.html.
- [4] “Netcdf4 module documentation,” Release 1.5.4. Accessed 23.10.2020. URL: <https://unidata.github.io/netcdf4-python/netCDF4/index.html>.
- [5] J. Hunter, D. Dale, E. Firing, M. Droettboom, and the matplotlib development team, “Matplotlib,” 09.2020. Release 3.3.2. Retrieved from: <https://matplotlib.org/3.3.2/Matplotlib.pdf>.
- [6] “Cartopy documentation,” Release 0.18.0. Accessed 23.10.2020. URL: <https://scitools.org.uk/cartopy/docs/latest/>.
- [7] “Python documentation: json – json encoder and decoder,” Release 3.9.0. Accessed 23.10.2020. URL: <https://docs.python.org/3/library/json.html>.
- [8] “Python documentation: Built-in types – dict,” Release 3.9.0. Accessed 23.10.2020. URL: <https://docs.python.org/3/library/stdtypes.html#typesmapping>.
- [9] “Python documentation: datetime – basic date and time types,” Release 3.9.0. Accessed 23.10.2020. URL: <https://docs.python.org/3/library/datetime.html>.
- [10] “Ipython documentation,” Release 7.18.1. Accessed 23.10.2020. URL: <https://ipython.readthedocs.io/en/stable/>.

Appendices

A Code Listings

What does it do? How does it do it? What are the implementation details?

B Supplemental Graphs

put graphs here that don't fit into the main body

C Tables

tables that contain data values for illustration maybe