Karlsruhe Institute of Technology

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Collaborative Carbon
Column Observing Network

COCCON and EM27/SUN Telecon

25th of October 2022

Outline

- **FAQ: PROFFAST2.0 and PROFFASTpylot**
  Lena Feld, Benedikt Herkommer
- **Open discussion COCCON steering committee**
  Frank Hase
- **“Using the EM27/SUN FTS for open path measurements of GHGs”**
  Frank Hase

Next telecon is planned, with reservations, at 22nd of December 2022, 18:00 UTC.

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FAQ PROFFAST(pylot)

EM27/SUN Telecon, 25 October 2022

Lena Feld, Benedikt Herkommer, Darko Dubravica, Frank Hase

Outline

- Questions about PROFFAST 2.1
  - Internal correction factors
  - *.abscos.bin files
- Questions about PROFFASTpylot
  - How to install it using Anaconda?
  - Pressure handling
- Questions to you

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Questions about PROFFAST 2.1

Correction factors

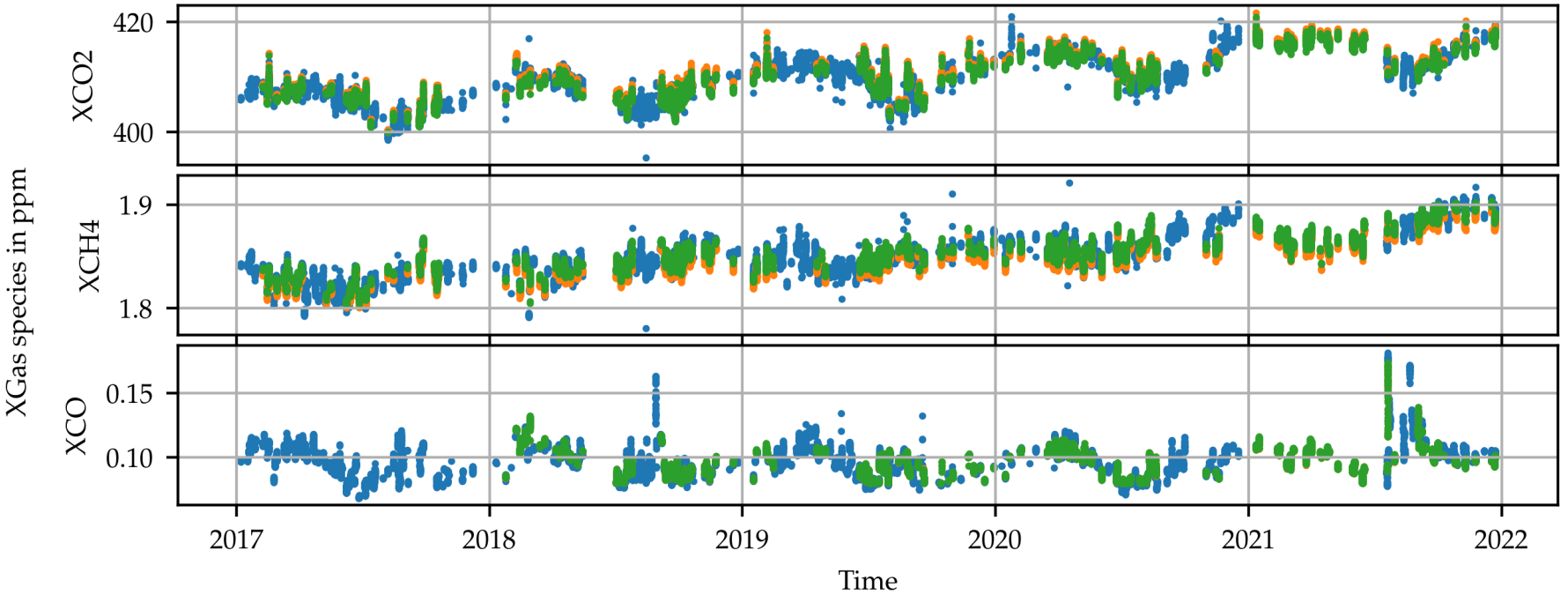
Is PROFFAST2 designed such to match with the GGG2020 results or still with the GGG2014 results?

- The internal correction factors (in invers.inp) are chosen for such for the COCCON reference (SN37) to match TCCON-KA GGG2020

Correction factors

Retrieved air mass independent correction factors:

XCO_2 = 0.9962; XCH_4 = 0.9880; XCO = 1.000



What kind of map-files are supposed to be used?

- GGG2020 map files!

Inside of the pcxs-code there is only one map file read in. But GGG2020 delivers 3-hourly map files. How is this working?

- PROFFASTpylot does an automatically interpolation to local noon.

  This generated file is used by pxcs.

- **What is the use of the *abscos.bin files produced by pcxs?**
- **Can they be deleted safely after the run?**
- **When should they be kept?**

*abscos.bin files

What is the use of the *abscos.bin files?

- Store the result of pcxs
  - Simulation of the atmosphere
- Only depend on time and coordinates, independent of instrument or pressure

Can the be deleted safely after the run?

- Yes!

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*abscos.bin files

When is it worth keeping them?

- To save calculation time if you
  - want to reprocess the data of this day (e.g. with different pressure input)
  - if you are calculating side-by-side measurements

*abscos.bin files

Can the be deleted safely after the run?

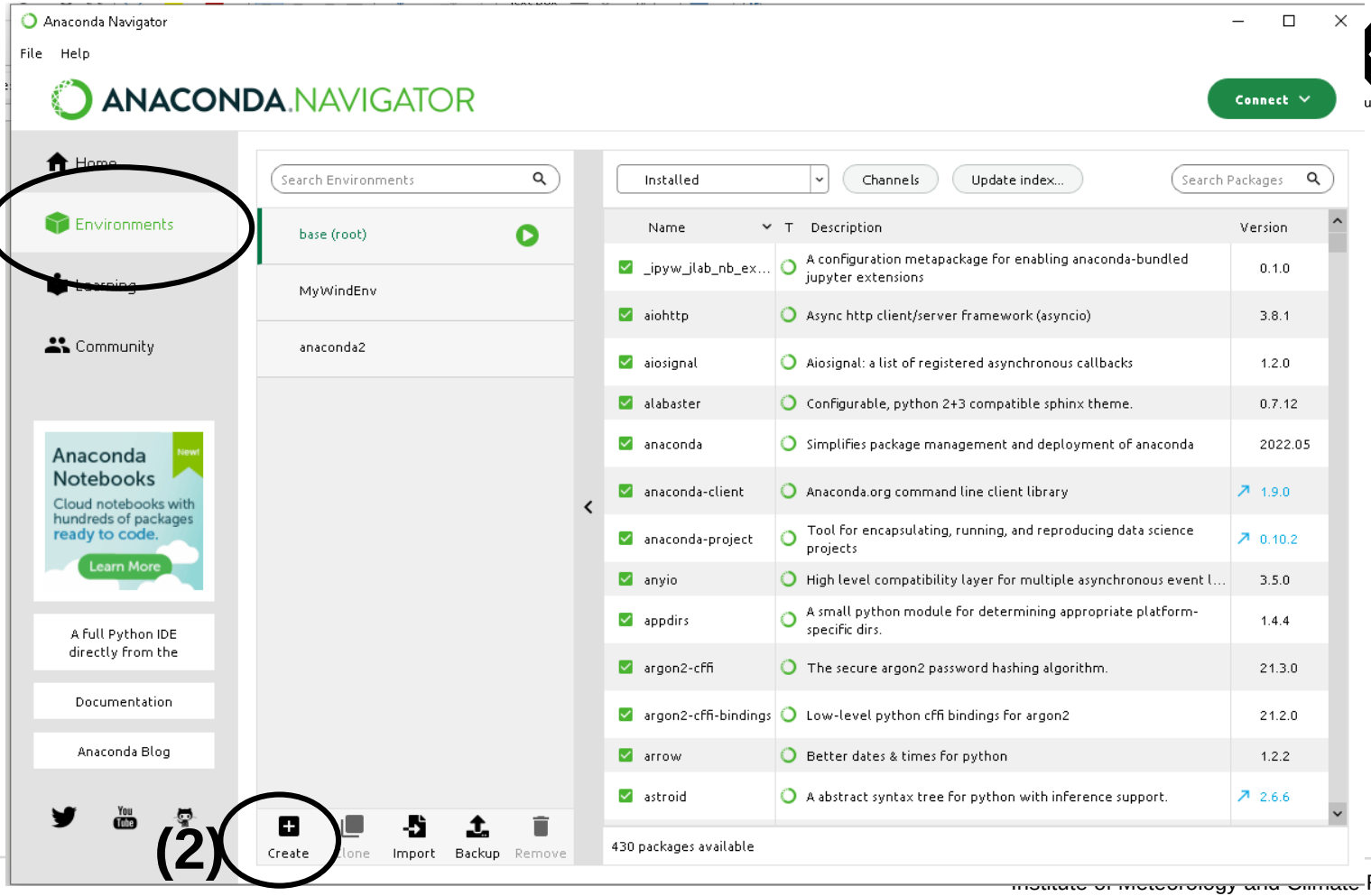
- Yes! More than 300 MB per day and site!
  - Delete at pylot run time:

```
# Delete the abscos.bin files? (True/False)    Default: False
# The abscos.bin file contains the simulation of the atmosphere which is
# the result of the 'pcxs' program part of PROFFAST.
# The pT_fast_out.dat and VMR_fast_out.dat files will be removed as well.
# The pT_fast_out.dat file contains the daily a priori height profile of
# pressure, temperature, ...
# The VMR_fast_out_dat. contains the a prior vertical mix ratios of the
# gases
delete_abscosbin_files: True
```

  - Delete files manually: `.../proffastpylot/prf/wrk_fast/*abscos.bin`

PROFFASTpylot

Use it in Spyder Installation using Anaconda


Anaconda Navigator
File Help
ANACONDA.NAVIGATOR
Connect
Home
Environments
Learning
Community
Search Environments
base (root)
MyWindEnv
anaconda2
Installed
Channels
Update index...
Search Packages
Name T Description Version
_ipyw_jlab_nb_ex... A configuration metapackage for enabling anaconda-bundled jupyter extensions 0.1.0
aiohttp Async http client/server framework (asyncio) 3.8.1
aiosignal Aiosignal: a list of registered asynchronous callbacks 1.2.0
alabaster Configurable, python 2+3 compatible sphinx theme. 0.7.12
anaconda Simplifies package management and deployment of anaconda 2022.05
anaconda-client Anaconda.org command line client library 1.9.0
anaconda-project Tool for encapsulating, running, and reproducing data science projects 0.10.2
anyio High level compatibility layer for multiple asynchronous event l... 3.5.0
appdirs A small python module for determining appropriate platform-specific dirs. 1.4.4
argon2-cffi The secure argon2 password hashing algorithm. 21.3.0
argon2-cffi-bindings Low-level python cffi bindings for argon2 21.2.0
arrow Better dates & times for python 1.2.2
astroid A abstract syntax tree for python with inference support. 2.6.6
430 packages available
Anaconda Notebooks
New!
Cloud notebooks with hundreds of packages ready to code.
Learn More
A full Python IDE directly from the
Documentation
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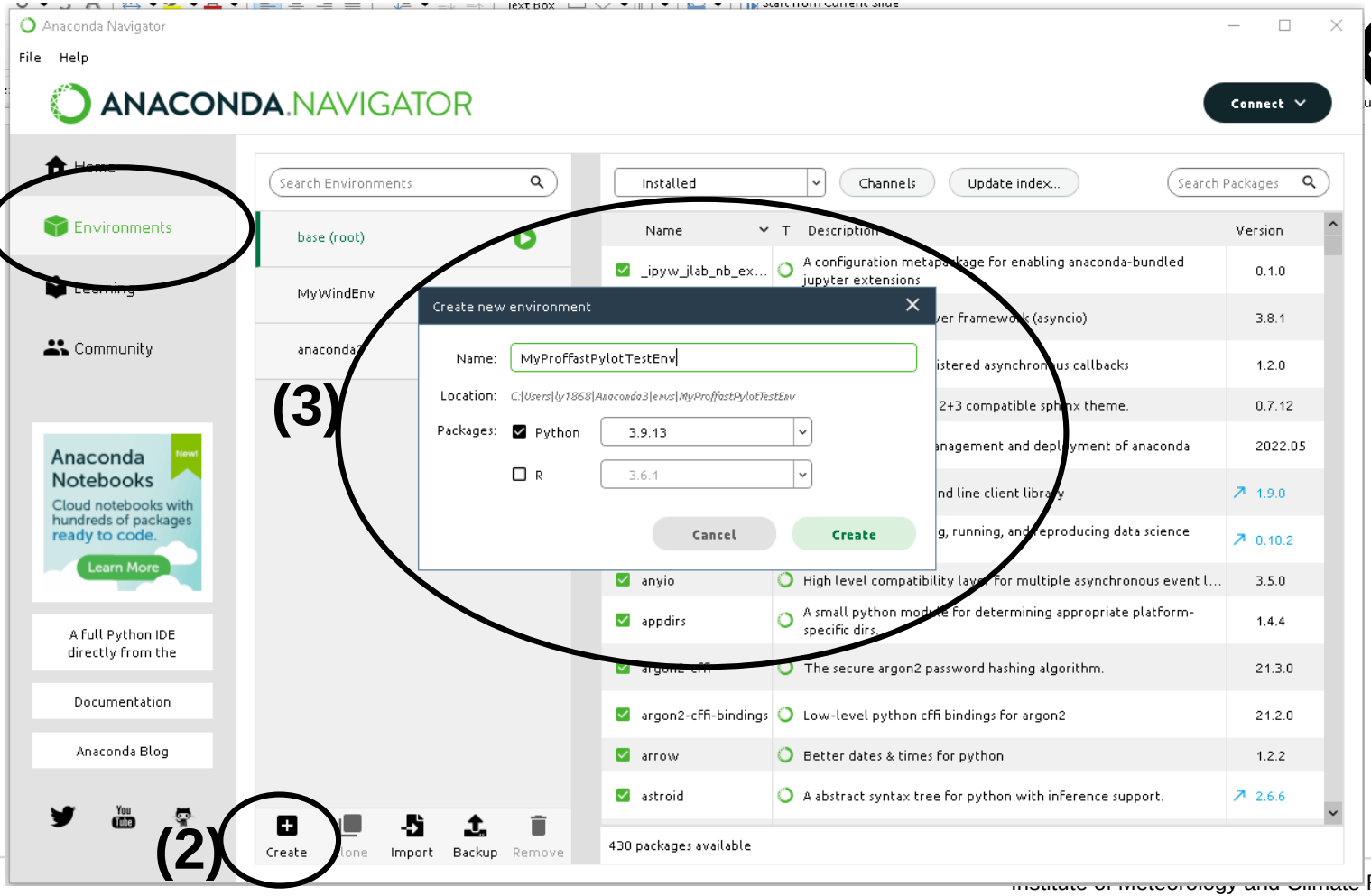
Create
Import
Backup
Remove
(1)
(2)


Anaconda Navigator
File Help
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Environments
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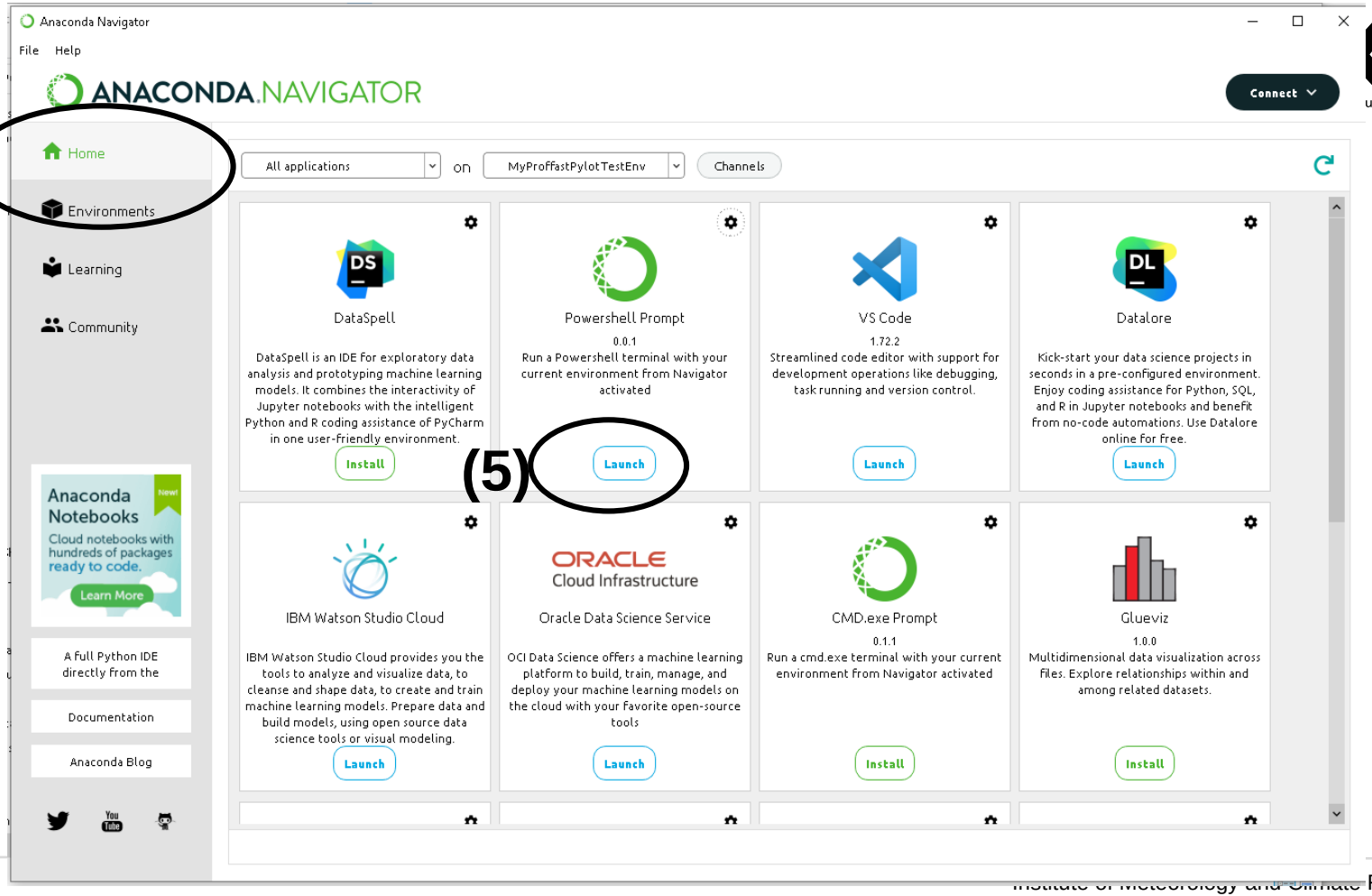
Search Environments
base (root)
MyWindEnv
anaconda7
Installed
Channels
Update index...
Search Packages
Name
T
Description
Version
_ipyw_jlab_nb_ex...
A configuration metapackage for enabling anaconda-bundled jupyter extensions
0.1.0
3.8.1
1.2.0
0.7.12
2022.05
1.9.0
0.10.2
anyio
High level compatibility layer for multiple asynchronous event l...
3.5.0
appdirs
A small python module for determining appropriate platform-specific dirs.
1.4.4
The secure argon2 password hashing algorithm.
21.3.0
argon2-cffi-bindings
Low-level python cffi bindings for argon2
21.2.0
arrow
Better dates & times for python
1.2.2
astroid
A abstract syntax tree for python with inference support.
2.6.6
Create new environment
Name:
MyProffastPylotTestEnv
Location:
C:\Users\ly1868\Anaconda3\envs\MyProffastPylotTestEnv
Packages:
Python
3.9.13
R
3.6.1
Cancel
Create
Anaconda Notebooks
New!
Cloud notebooks with hundreds of packages ready to code.
Learn More
A full Python IDE directly from the
Documentation
Anaconda Blog
Create
Import
Backup
Remove
430 packages available
(1)
(2)
(3)

(4)


Anaconda Navigator
File Help
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Channels
DataSpell
DataSpell is an IDE for exploratory data analysis and prototyping machine learning models. It combines the interactivity of Jupyter notebooks with the intelligent Python and R coding assistance of PyCharm in one user-friendly environment.
Install
Powershell Prompt
0.0.1
Run a Powershell terminal with your current environment from Navigator activated
Launch
VS Code
1.72.2
Streamlined code editor with support for development operations like debugging, task running and version control.
Launch
Datalore
Kick-start your data science projects in seconds in a pre-configured environment. Enjoy coding assistance for Python, SQL, and R in Jupyter notebooks and benefit from no-code automations. Use Datalore online for free.
Launch
Anaconda Notebooks
Cloud notebooks with hundreds of packages ready to code.
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IBM Watson Studio Cloud provides you the tools to analyze and visualize data, to cleanse and shape data, to create and train machine learning models. Prepare data and build models, using open source data science tools or visual modeling.
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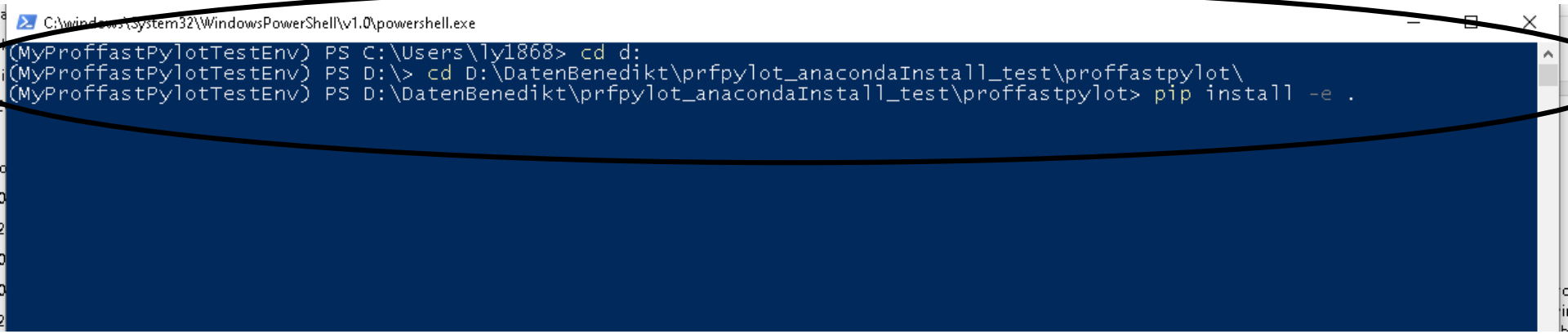
ORACLE Cloud Infrastructure
Oracle Data Science Service
OCI Data Science offers a machine learning platform to build, train, manage, and deploy your machine learning models on the cloud with your favorite open-source tools
Launch
CMD.exe Prompt
0.1.1
Run a cmd.exe terminal with your current environment from Navigator activated
Install
Glueviz
1.0.0
Multidimensional data visualization across files. Explore relationships within and among related datasets.
Install
A full Python IDE directly from the
Documentation
Anaconda Blog

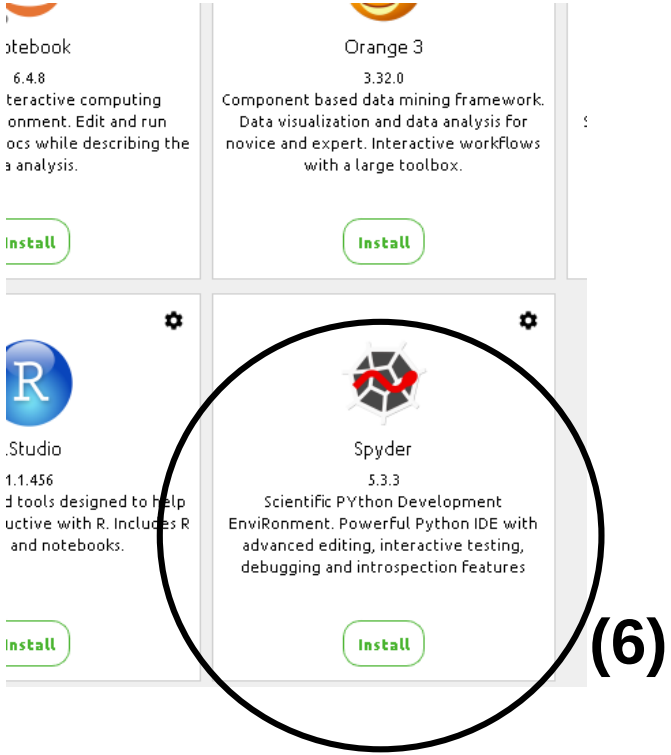
(5)

Use it in Spyder Installation using Anaconda

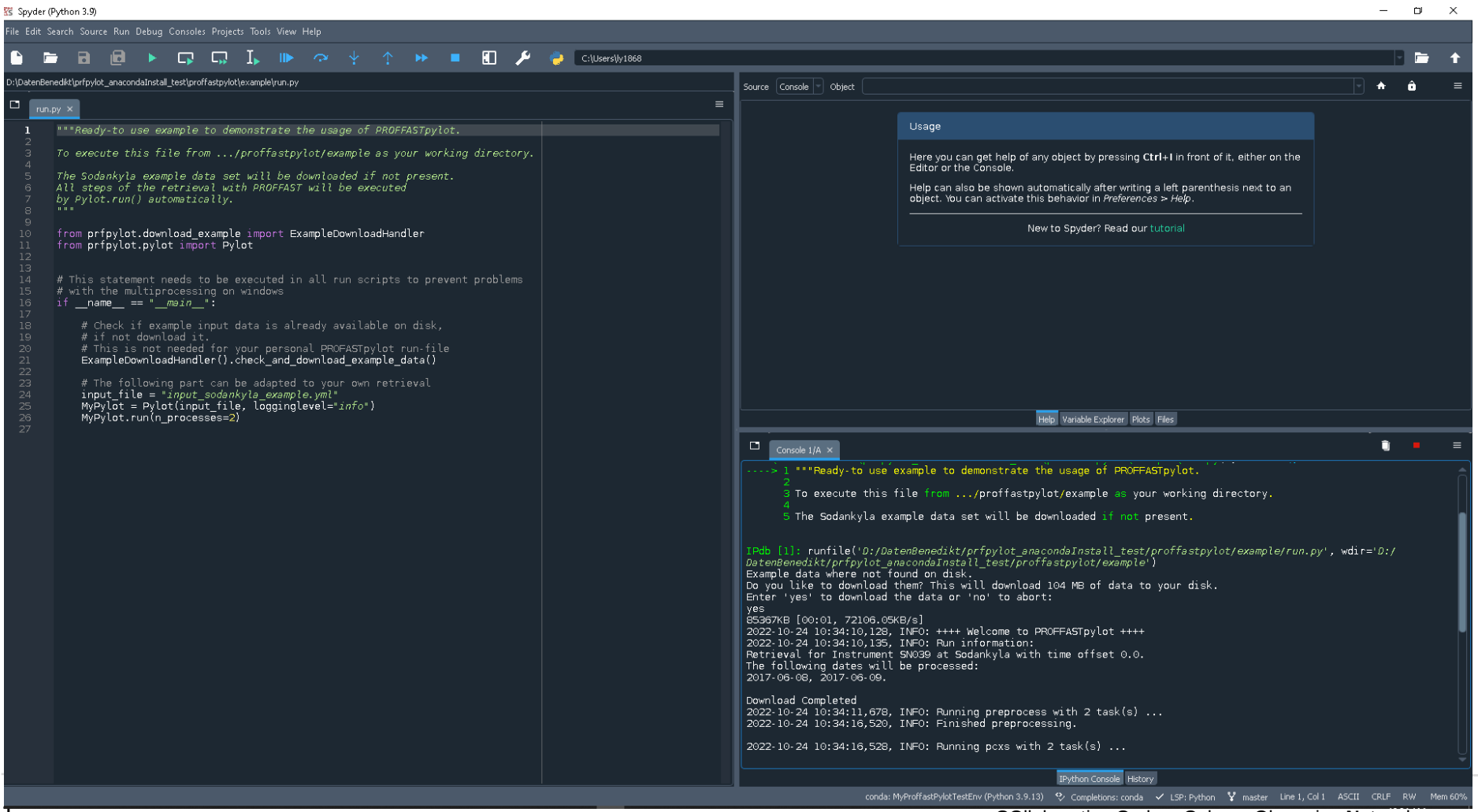
(6)



Use it in Spyder Installation using Anaconda



(6)


Spyder (Python 3.9)
File Edit Search Source Run Debug Consoles Projects Tools View Help
C:\Users\ly1868
D:\DatenBenedikt\prfpylot_anacondaInstall_test\proffastpylot\example\run.py
run.py
"""Ready-to use example to demonstrate the usage of PROFFASTpylot.
To execute this file from .../proffastpylot/example as your working directory.
The Sodankyla example data set will be downloaded if not present.
All steps of the retrieval with PROFFAST will be executed
by Pylot.run() automatically.
"""
from prfpylot.download_example import ExampleDownloadHandler
from prfpylot.pylot import Pylot
# This statement needs to be executed in all run scripts to prevent problems
# with the multiprocessing on windows
if __name__ == "__main__":
# Check if example input data is already available on disk,
# if not download it.
# This is not needed for your personal PROFFASTpylot run-file
ExampleDownloadHandler().check_and_download_example_data()
# The following part can be adapted to your own retrieval
input_file = "input_sodankyla_example.yml"
MyPylot = Pylot(input_file, logginglevel="info")
MyPylot.run(n_processes=2)
Source Console Object
Usage
Here you can get help of any object by pressing Ctrl+I in front of it, either on the Editor or the Console.
Help can also be shown automatically after writing a left parenthesis next to an object. You can activate this behavior in Preferences > Help.
New to Spyder? Read our tutorial
Help Variable Explorer Plots Files
Console 1/A
----> 1 """Ready-to use example to demonstrate the usage of PROFFASTpylot.
2
3 To execute this file from .../proffastpylot/example as your working directory.
4
5 The Sodankyla example data set will be downloaded if not present.
IPdb [1]: runfile('D:/DatenBenedikt/prfpylot_anacondaInstall_test/proffastpylot/example/run.py', wdir='D:/DatenBenedikt/prfpylot_anacondaInstall_test/proffastpylot/example')
Example data where not found on disk.
Do you like to download them? This will download 104 MB of data to your disk.
Enter 'yes' to download the data or 'no' to abort:
yes
85367KB [00:01, 72106.05KB/s]
2022-10-24 10:34:10,128, INFO: ++++ Welcome to PROFFASTpylot ++++
2022-10-24 10:34:10,135, INFO: Run information:
Retrieval for Instrument SN039 at Sodankyla with time offset 0.0.
The following dates will be processed:
2017-06-08, 2017-06-09.
Download Completed
2022-10-24 10:34:11,678, INFO: Running preprocess with 2 task(s) ...
2022-10-24 10:34:16,520, INFO: Finished preprocessing.
2022-10-24 10:34:16,528, INFO: Running pcxs with 2 task(s) ...
IPython Console History
conda: MyProffastPylotTestEnv (Python 3.9.13) Completions: conda LSP: Python master Line 1, Col 1 ASCII CRLF RW Mem 60%

Changes in pressure input

in PROFFASTpylot v1.1

- Interpolation of pressure

  is taken over by PROFFASTpylot instead of PROFFAST
- Supporting different formats

  instead fixed pT_intraday.inp format
- **Pressure type file** to adjust settings

Pressure type file

input.yml

```
...
pressure_type_file: "pressure_type.yml"
...
```

pressure_type.yml

```
...
```

Format of the pressure type file

```
# the filename used to search for the pressure file looks like:
# filename = basename + "%Y-%m-%d" + "*.dat"
filename_parameters:
  basename: ""
  time_format: "%Y-%m-%d"
  ending: "*.dat"
```

```
# the pressure file itself has the structure:
# """
#   UTCdate_____   UTCtime___   BaroTHB40  VariousOtherColumns
#   01.01.2020     HH:MM:SS     1004.23     VariousOtherData
# """"
dataframe_parameters:
  pressure_key: "BaroTHB40"
  time_key: "UTCtime___"
  time_fmt: "%H:%M:%S"
  date_key: "UTCdate_____"
  date_fmt: "%d.%m.%Y"
  datetime_key: ""
  datetime_fmt: ""
  csv_kwargs:
    sep: "\t"
```

Information about pressure recording

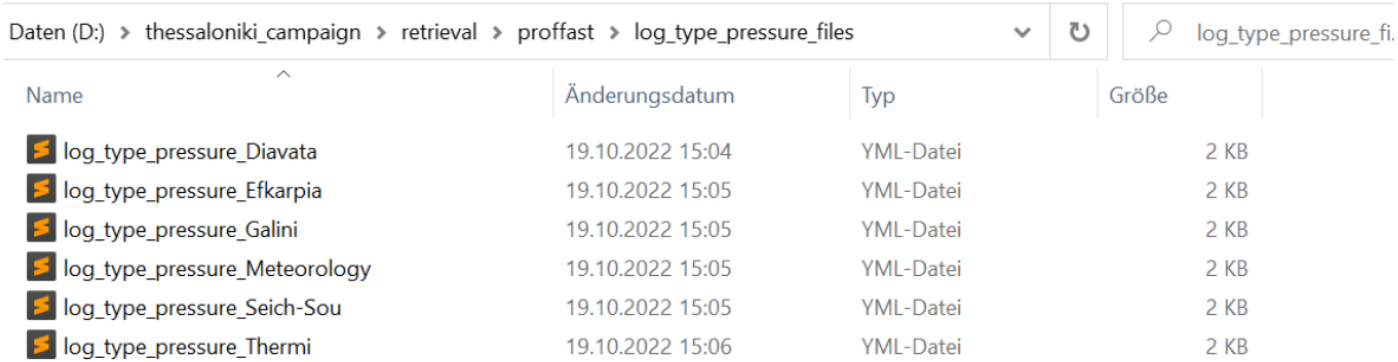
```
# UTC Offset of data:
# Have to be given even if data is processed in localtime!
utc_offset: 0.0

# pressure factor:
# The pressure column will be multiplied by this factor.
# Can be used e.g. for unit conversion or to correct for hight differences.
# The pressure column is assumed to be in hPa.
pressure_factor: 1.0

# Frequency of pressure files. Options are·
# - subdaily: Several files per day
# - daily: One single file per day
# - weekly: One single file per Week
# - monthly: One single file per month
# - yearly: One single file per year
# - unregular: Unregular spaced files.
#              Please note: Algorithm is not very stable. It does not take into
#                           account any datetime but only the basename and
#                           ending.
frequency: "subdaily"
```

Usage recommendations

- Own pressure file for each setting
- Example of our campaign data:



Questions to you

- To learn how to best distribute information
- For future development decisions about PROFFASTpylot
- Please answer in the chat for the n-th question as follows:

  Qn: Answer a)

Q1: Who is using which version of PROFFAST(+pylot)?

a)PROFFAST 1, without pylot

b)PROFFAST2.0.1, pylot 1.0

c)PROFFAST2.1, without pylot

d)PROFFAST2.1 with pylot 1.1

Q2: Are you using or will you use git for getting updates?

a)Yes

b)No

Q3: Which operating system are you using?

a) Windows

b) Linux

c) Something else?

Q4: Did you embed the retrieval into a larger system or do you intend to do it?

a) Yes

b) No

Q4: Did you encounter any other problems?