Climate science at high latitudes: Modeling and model evaluation

Example for writing your report

Author:
Anne Fouilloux
authors@email.com

Supervisors:
First Supervisor
Second Supervisor

A tagline for the report.

Institution1
Institution2

November 4, 2018

Contents

1 General structure . . . 3

2 How to generate pdf report . . . 4
- 2.1 Markdown . . . 4
- 2.2 Add a report title . . . 4
- 2.3 Hide a cell output . . . 4
- 2.4 Add a latex reference . . . 4
  - 2.4.1 Figures . . . 4
  - 2.4.2 cite a paper . . . 5
- 2.5 Generate pdf with nbpublish . . . 5

3 Import python packages . . . 6

4 Data and Methods . . . 7
- 4.1 Read Data . . . 7
  - 4.1.1 Select the nearest date . . . 7

5 Results . . . 8

6 Discussion . . . 10

7 Acknowledgments . . . 11

8 References . . . 12

List of Figures

- 5.1 A Nice plot. . . . 8
- 5.2 Simple time serie over Oslo . . . 9

List of Tables

List of Codes

1 General structure

- Project title
- Name, email, course title, date, group assistant
- Abstract (1/2 page max)
- Introduction (1 page)
- Method
  - Packages used
  - Datasets (models and observations)
  - Analysis method
  - ...
- Results
- Discussion and outlook (1 page)
- Conclusions (1/2 page)
- References
- Acknowledgments

2 How to generate pdf report

2.1 Markdown

- Select Markdown cell instead of code cell
- Markdown cheatsheet

2.2 Add a report title

- Edit --> Edit Notebook Metadata

```
"ipub": {
   "bibliography": "/mnt/data/teachers/annefou/test_report.bib",
   "titlepage": {
     "author": "Anne Fouilloux",
     "email": "authors@email.com",
     "institution": [
       "Institution1",
       "Institution2"
     ],
     "logo": "/mnt/data/teachers/annefou/NEGI2018.png",
     "subtitle": "Example for writing your report",
     "supervisors": [
       "First Supervisor",
       "Second Supervisor"
     ],
     "tagline": "A tagline for the report.",
     "title": "Climate science at high latitudes: Modeling and model evaluation"
   }
 },
```

2.3 Hide a cell output

View --> Cell Toolbar --> Edit Metadata

And add:

```
  "ipub": {
    "ignore": true
  }
```

2.4 Add a latex reference

2.4.1 Figures

There are two ways to reference plots:

1. Use latex syntax:

- Save your figure in a code cell:

```
fig.savefig('fig_example.png') ;
```

where fig is a matplotlib figure (fig = plt.figure (figsize =[12 ,5])).

- Reference your plot in a markdown cell:

In both cases, you can reference your plots using latex syntax `\ref`

2.4.2 cite a paper

For all the paper in your bib file (added in the notebook metadata), you can use the following syntax to cite your paper:

- you can add a citation using latex citation `\cite`.

2.5 Generate pdf with nbpublish

To convert your jupyter notebook into pdf, you need to use nbpublish. See last cell of this jupyter notebook.

```
!nbpublish -f latex_ipypublish_all -pdf report_example.ipynb
```

3 Import python packages

```
import xarray as xr
import dask . array as da
import matplotlib . pyplot as plt
import cartopy.crs as ccrs
import numpy as np
import pandas as pd
%matplotlib inline
```

4 Data and Methods

4.1 Read Data

```
dset = xr.open_dataset('/mnt/data/students/evelien/Observations/air
    ↪ .mon.mean.seasonal.arctic.nc')
```

```
dset . time
```

```
<xarray.DataArray 'time' (time: 461)>
array(['1900-01-16T12:00:00.000000000', '1900-04-01T00
:00:00.000000000',
       '1900-07-01T00:00:00.000000000', ..., '2014-07-01T00
:00:00.000000000',
       '2014-10-01T00:00:00.000000000', '2014-12-01T00
:00:00.000000000'],
      dtype='datetime64[ns]')
Coordinates:
  * time     (time) datetime64[ns] 1900-01-16T12:00:00 1900-04-01 ...
2014-12-01
Attributes:
    standard_name:  time
    long_name:      Time
    bounds:         time_bnds
    axis:           T
```

4.1.1 Select the nearest date

```
x = dset["air"].sel( time ="1989-01-01T00:00:00.000000000", method =
    ↪  'nearest')
```

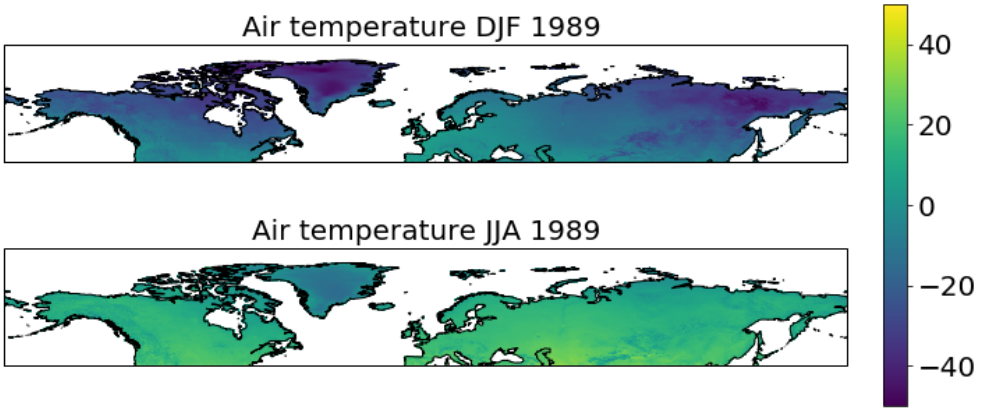

Figure 5.1: A Nice plot.

5 Results

```
# Select one location and group by year to plot
# to get your plot in your report (with a label you can reference):
# - edit cell metadata
# - Add the following (customize label for your own plot)
#
#
#"ipub": {
#    "figure": {
#      "caption": "Simple time serie over Oslo",
#      "label": "fig:oslo_timeserie"
#    }
#  }
#


# Add a semi-column at the end to suppress the output of the function
dset["air"].sel(lat=59.91,lon=10.74, method="nearest").groupby("time.year").mean(dim="time").plot();
```

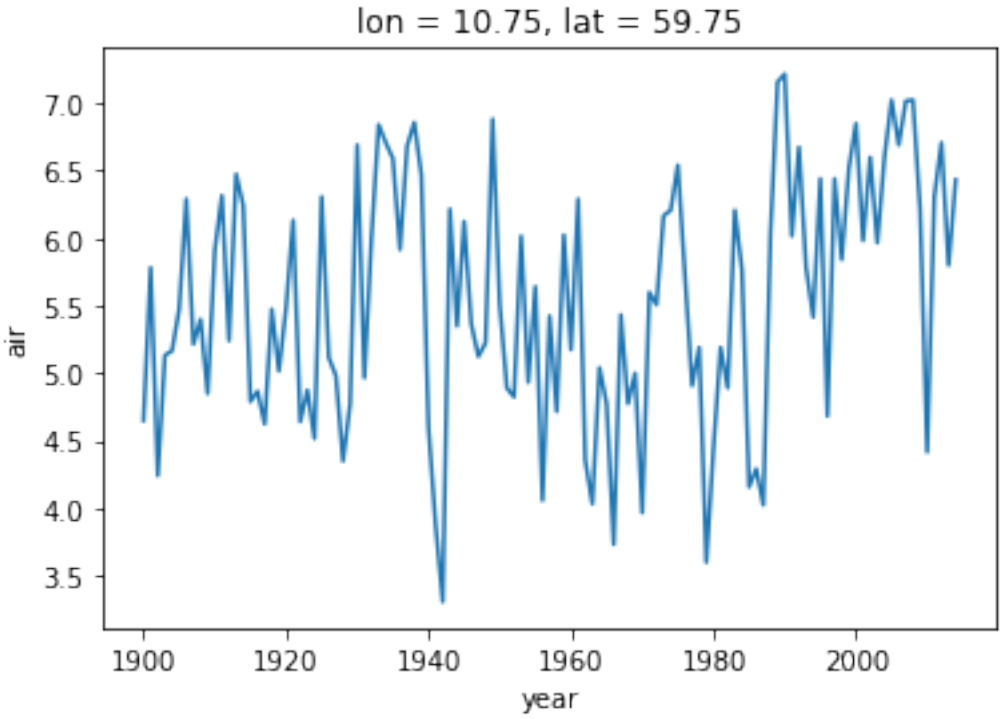

Figure 5.2: Simple time serie over Oslo

And then you can reference your previous timeserie 5.2

6 Discussion

Within a markdown cell, you can add a citation using latex citation[1].

You can also add equations:

$$\frac{\partial p}{\partial z} = -\rho g \tag{6.1}$$

The heat equation

$$\frac{dQ}{dt} \equiv F_T = c_p \frac{dT}{dt} - \frac{\alpha T}{\rho} \frac{dp}{dt} \tag{6.2}$$

The differential form of the heat equation (6.2) without heating can be combined with the hydrostatic equation (6.1) to give the temperature equation for an adiabatic ascent of a parcel.

$$\frac{dT}{dz} = -\Gamma \equiv \frac{g\alpha T}{c_p} \tag{6.3}$$

And you can make a reference to your plots. See Figure 5.1 shows a nice plot.

7 Acknowledgments

- model and data owners/providers

And make sure you acknowledge Sigma2:

- *This study was performed using jupyterhub deployed on resources provided by UNINETT Sigma2 - the National Infrastructure for High Performance Computing and Data Storage in Norway as part of NS1000K project. In particular, we would like to thank Thierry Toutain and Gurvinder Singh.*

8 References

[1] R. J. Allan. ENSO and Climatic Variability in the Last 150 years. In H. F. Diaz and V. Markgraf, editors, *El Niño and the Southern Oscillation: Multiscale Variability, Global and Regional Impacts*, pages 3–56. Cambridge University Press, Cambridge, UK, 1st edition, 2000.