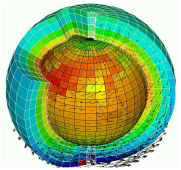
MC-Toolkit meetings

Mickaël Lalande

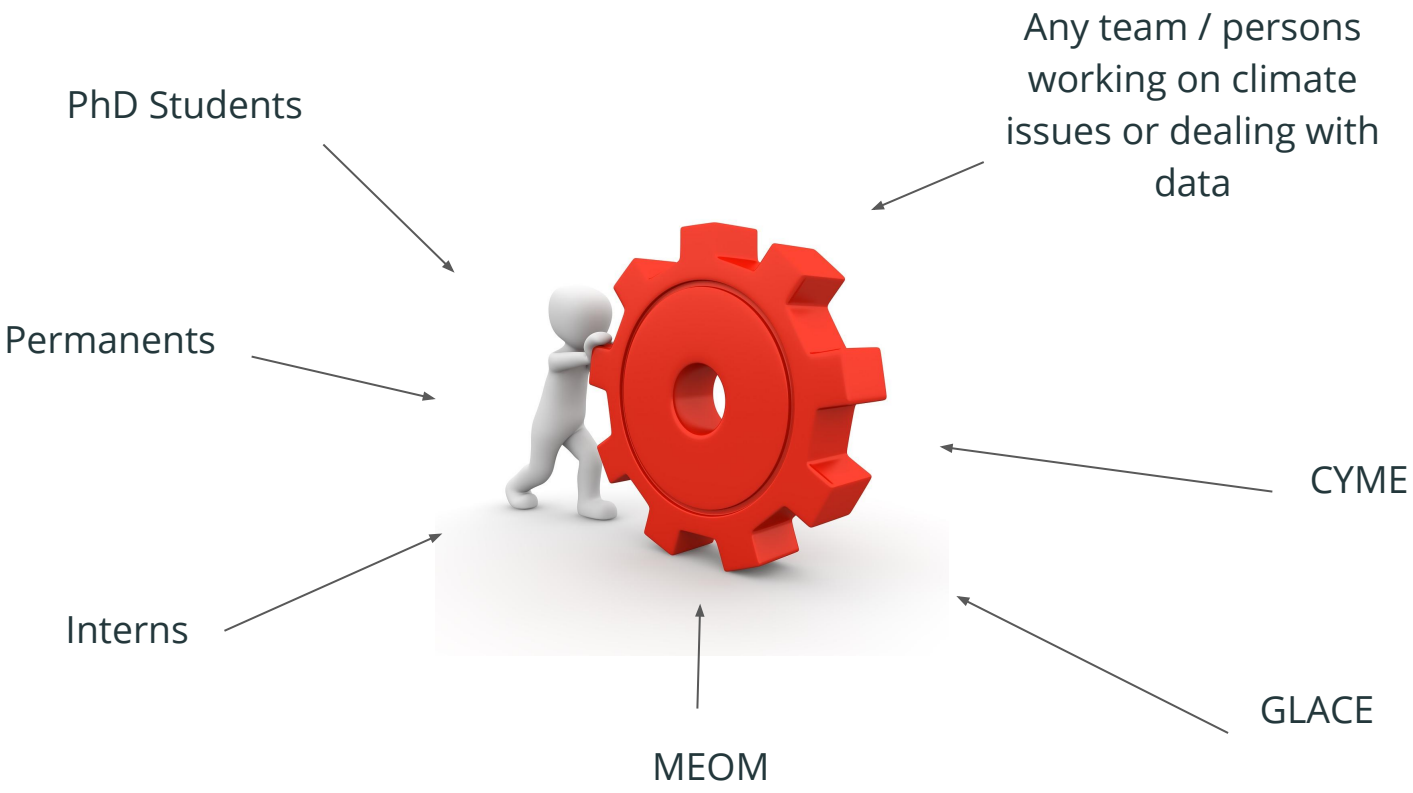


Thèse 2019-2022

Directeurs : Gerhard Krinner et Martin Ménégoz

Institut des Géosciences de l'Environnement (IGE)

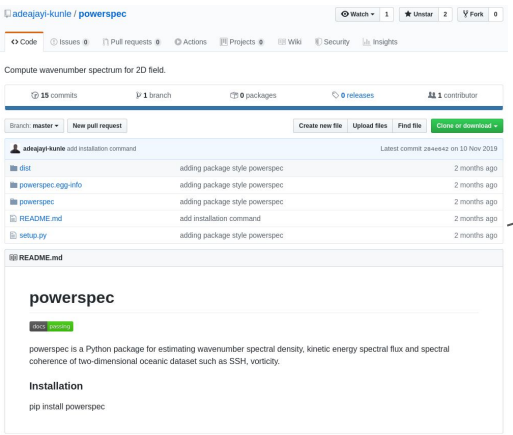
Why this meeting?



My personal experience in MEOM's team -> SATIM meetings

SOSIE

[brodeau/sosie: SOSIE is Only a Surface Interpolation Environment]



[adeajayi-kunle/powerspec: Compute wavenumber spectrum for 2D field.]

UNIVERSITÉ Grenoble Alpes

IGE

cnrs

M2 RESEARCH INTERNSHIP REPORT

Identification and filtering of oceanic chaos by Machine Learning

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Atmosphere-Climate-Continental Landmass Programme
UFR PhITEM - Grenoble Alpes University

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Institute of Environmental Geosciences (IGE), Grenoble, France
MEOM Research Group

04/02/2019 - 28/06/2019 (5 months)

Ideas of topics

In the context of Mardi Café:

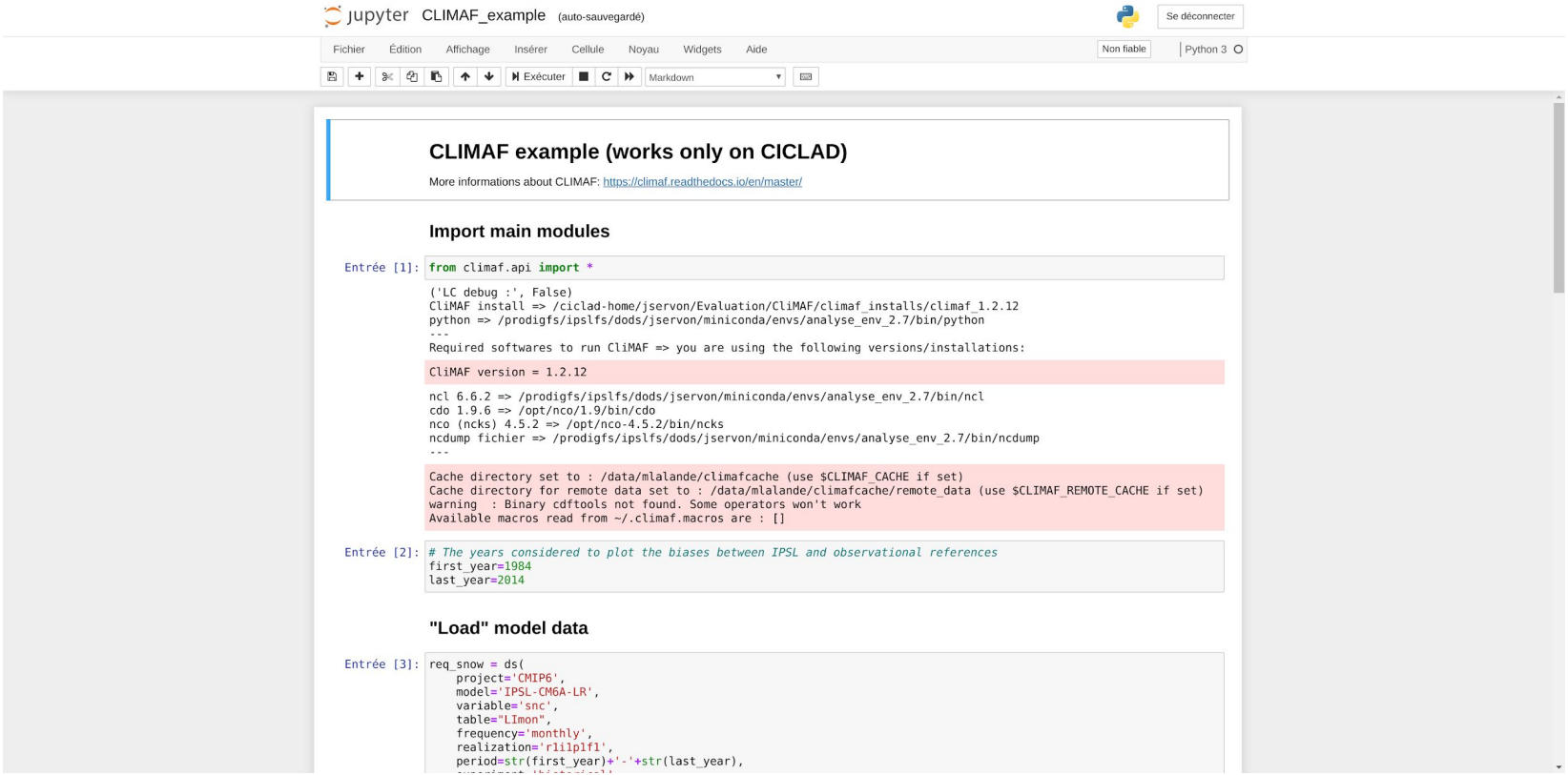
- xarray / cdo / climaf (netcdf, climatologies)
- cartopy / ferret / ncl / basemap / proplot (plot)
- cdo, basemap, scipy/stats, ESMx, climaf, sosie (regrid)
- Jupiter Notebook / Jupyter lab (pont ssh, Jupiter lab, plots interactifs)
- Github / Gitlab / svn / bitbucket
- dask (parallelization or MemoryError issues)
- Machine Learning ? (gpu, slack, gricad) -> ml-at-ige slack
- régression linéaire / tendances / analyses statistiques
- EOF
- analyses spectrales
- cmip6 data / reanalyses / obs
- MAR / LMDZ (how to install and launch a simulation?)

More general:

- How to write a paper (latex, overleaf, texmaker, etc.)
- How to deal with the bibliography (mendeley, zotero, etc.)
- How to publish an article (what journals, etc.)

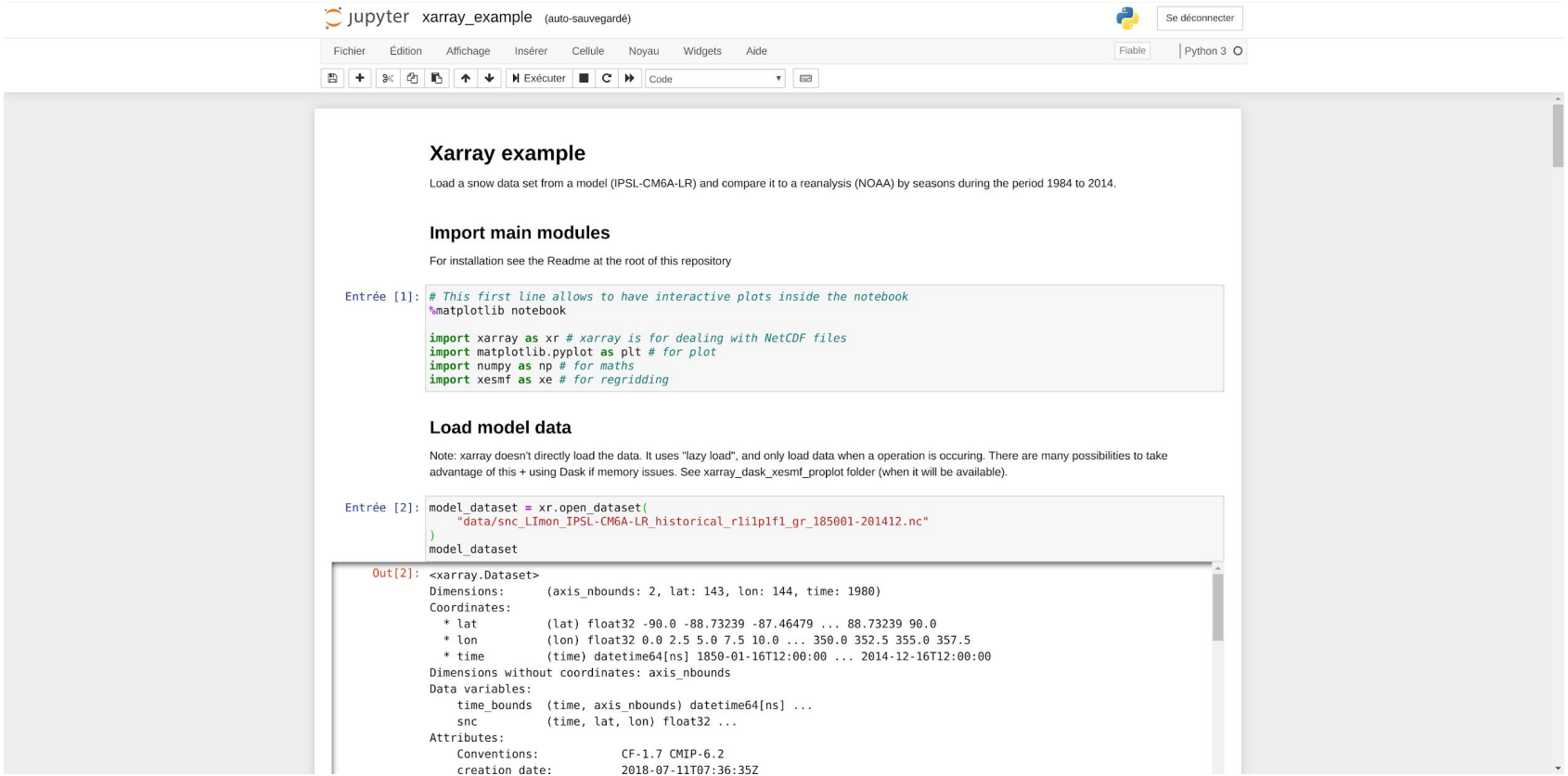
Example of CLIMAF

https://github.com/mickaellalande/MC-Toolkit/blob/master/Presentation/CLIMAF_example.ipynb



Example for xarray

https://github.com/mickaellalande/MC-Toolkit/blob/master/Presentation/xarray_example.ipynb



Example “ma cuisine”

https://github.com/mickaellalande/MC-Toolkit/blob/master/Presentation/ma_cuisine.py

jupyter ma_cuisine.py✔ il y a quelques secondes — Se déconnecter

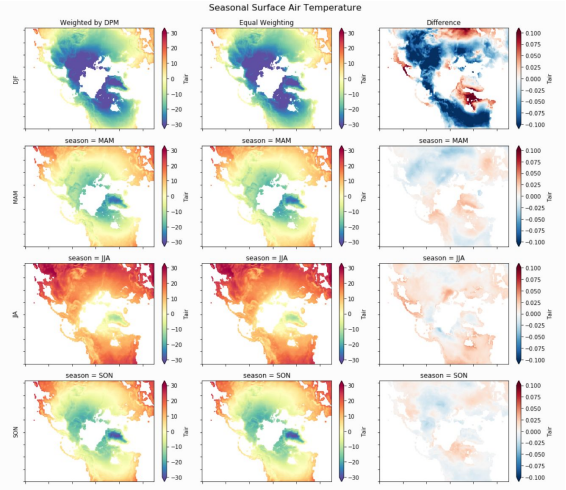
Fichier Édition Affichage Langage — Python

```python
# ================================================================================
# Compute monthly weighted data
# ================================================================================
# http://xarray.pydata.org/en/stable/examples/monthly-means.html
dpm = {'noleap': [0, 31, 28, 31, 30, 31, 30, 31, 31, 30, 31, 30, 31],
       '365_day': [0, 31, 28, 31, 30, 31, 30, 31, 31, 30, 31, 30, 31],
       'standard': [0, 31, 28, 31, 30, 31, 30, 31, 31, 30, 31, 30, 31],
       'gregorian': [0, 31, 28, 31, 30, 31, 30, 31, 31, 30, 31, 30, 31],
       'proleptic_gregorian': [0, 31, 28, 31, 30, 31, 30, 31, 31, 30, 31, 30, 31],
       'all_leap': [0, 31, 29, 31, 30, 31, 30, 31, 31, 30, 31, 30, 31],
       '366_day': [0, 31, 29, 31, 30, 31, 30, 31, 31, 30, 31, 30, 31],
       '360_day': [0, 30, 30, 30, 30, 30, 30, 30, 30, 30, 30, 30, 30]}

def leap_year(year, calendar='standard'):
    """Determine if year is a leap year"""
    leap = False
    if ((calendar in ['standard', 'gregorian',
        'proleptic_gregorian', 'julian']) and
        (year % 4 == 0)):
        leap = True
        if ((calendar == 'proleptic_gregorian') and
            (year % 100 == 0) and
            (year % 400 != 0)):
            leap = False
        elif ((calendar in ['standard', 'gregorian']) and
                (year % 100 == 0) and (year % 400 != 0) and
                (year < 1583)):
            leap = False
    return leap

def get_dpm(time, calendar='standard'):
    """
    return a array of days per month corresponding to the months provided in `months`
    """
    month_length = np.zeros(len(time), dtype=np.int)

    cal_days = dpm[calendar]

    for i, (month, year) in enumerate(zip(time.month, time.year)):
        month_length[i] = cal_days[month]
        if leap_year(year, calendar=calendar) and month == 2:
            month_length[i] += 1
    return month_length


# Seasonal climatology (on monthly data set)
def season_clim(ds, calendar='standard'):
    # Make a DataArray with the number of days in each month, size = len(time)
    month_length = xr.DataArray(get_dpm(ds.time.to_index(), calendar=calendar),
```

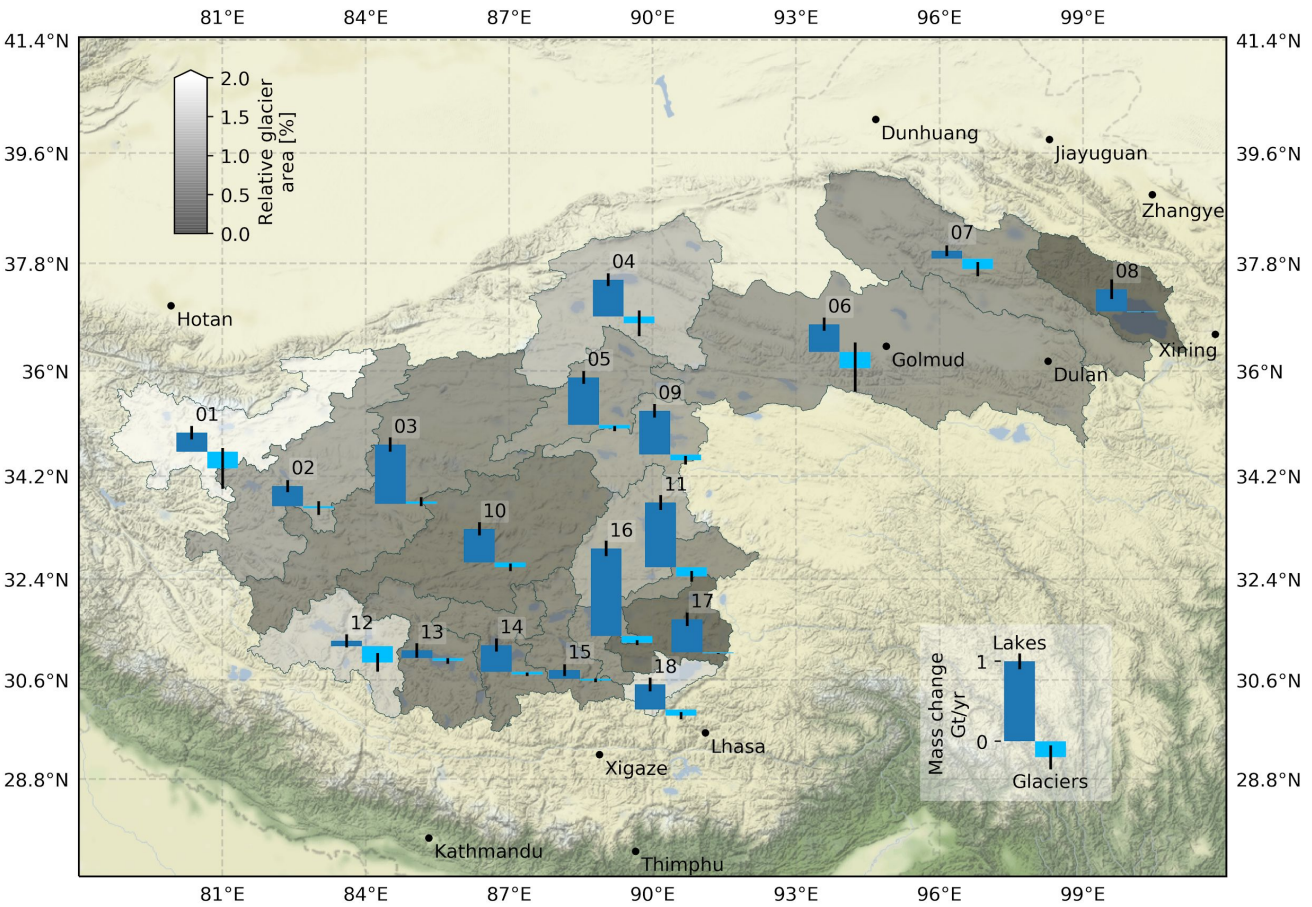
How to take into account the number of days in a month for monthly data analyse?

Code inspired from:

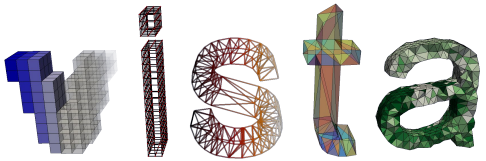
Calculating Seasonal Averages from Timeseries of Monthly Means — xarray 0.14.1 documentation



Example plots Fanny (with Cartopy)

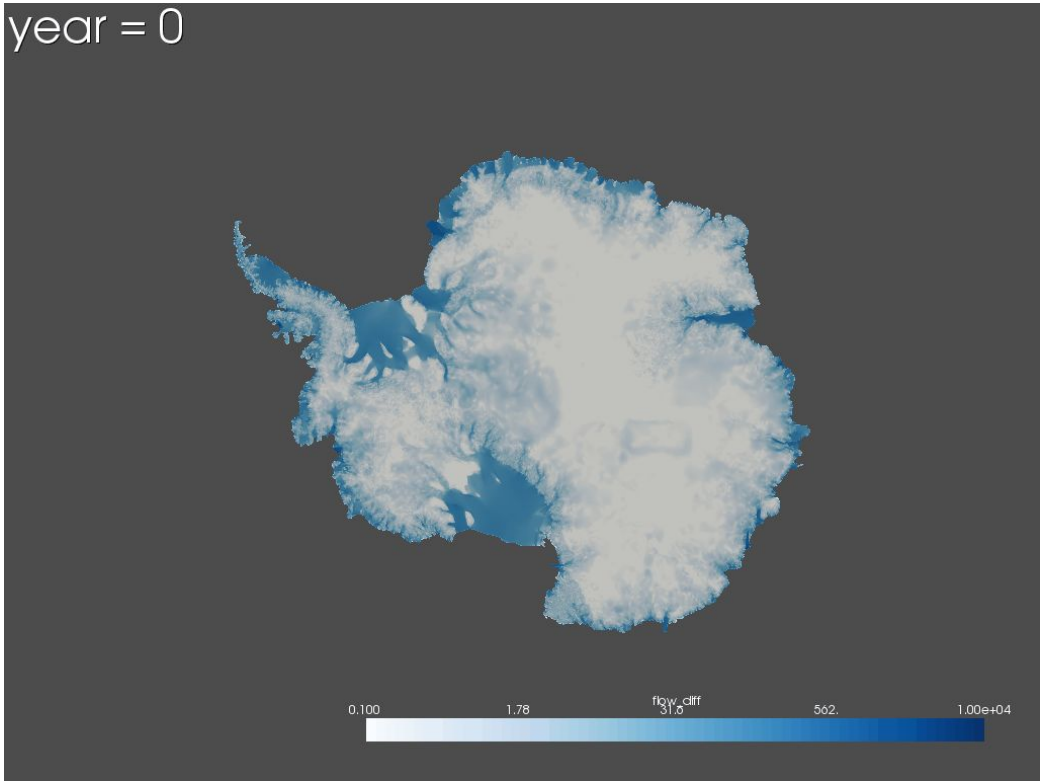


Example Benoit: Velocity differences over Antarctica (with PyVista)



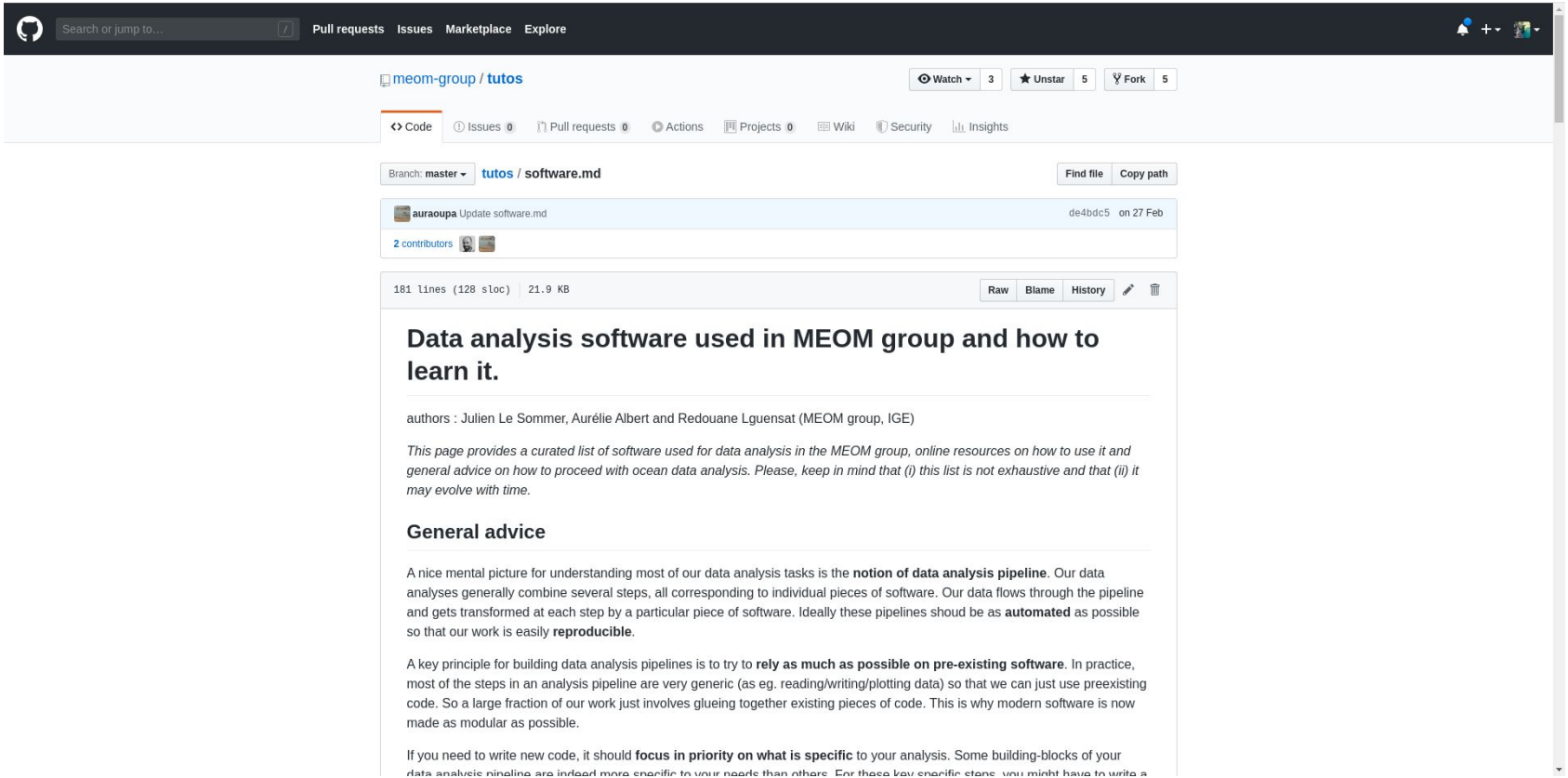
3D plotting and mesh analysis through a streamlined interface for the Visualization Toolkit (VTK)

https://docs.pyvista.org/



MEOM's tuto

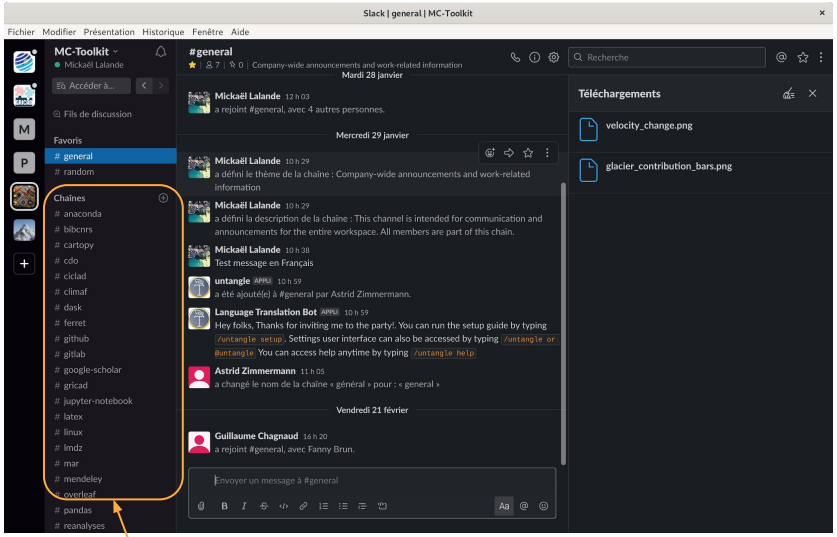
https://github.com/meom-group/tutos/blob/master/software.md



Slack + github

Lien d'invitation **Slack**:

https://join.slack.com/t/mc-toolkit-ige/shared_invite/zt-dc3fgldi-wFNV9_AJbXzWb9dd0gdJHg



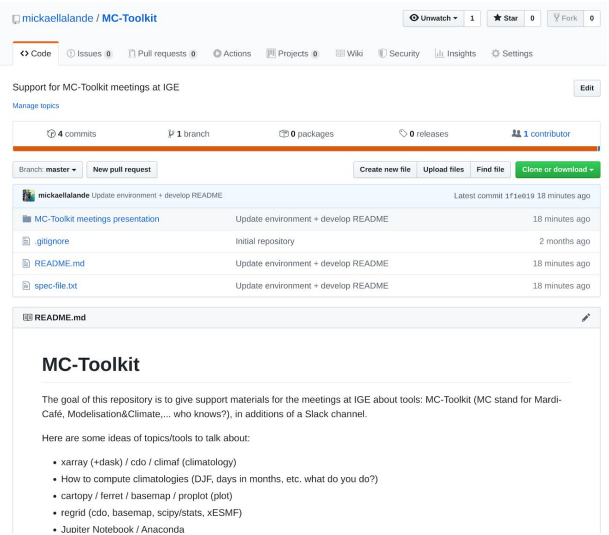
Add the channels that you are interested

So that we can ask question and help each other with the regarding tool

Github

(to find back the code examples shown during these meetings):

https://github.com/mickaellalande/MC-Toolkit



Next meeting?

Same time?
In the context of Mardi Café or other?
MC for Mardi Café / Modélisation Climat / ??

I can start with xarray, climato (ma cuisine), proplot, xesmf
(+ anaconda/jupyter-noteboks/github ? May be before ?)

Possible next meetings:

0. Anaconda/Miniconda + Jupyter-Notebook?
1. Martin: CLIMAF + R tool
2. Mickaël: xarray + “ma cuisine”
3. Mickaël / Fanny: plots (cartopy/proplot)
4. Benoit: GeoPandas / PyVista
5. Aurélie: Dask+xarray / Pangeo
6. visit / FlowVR (Basile HECTOR)
7. …