From (big)data to information visualization with birdhouse

a collection of Web Processing Services

Session A3: FROM DATA TO INFORMATION
A DISTILLATION DILEMMA

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Climate Data volume grows quickly

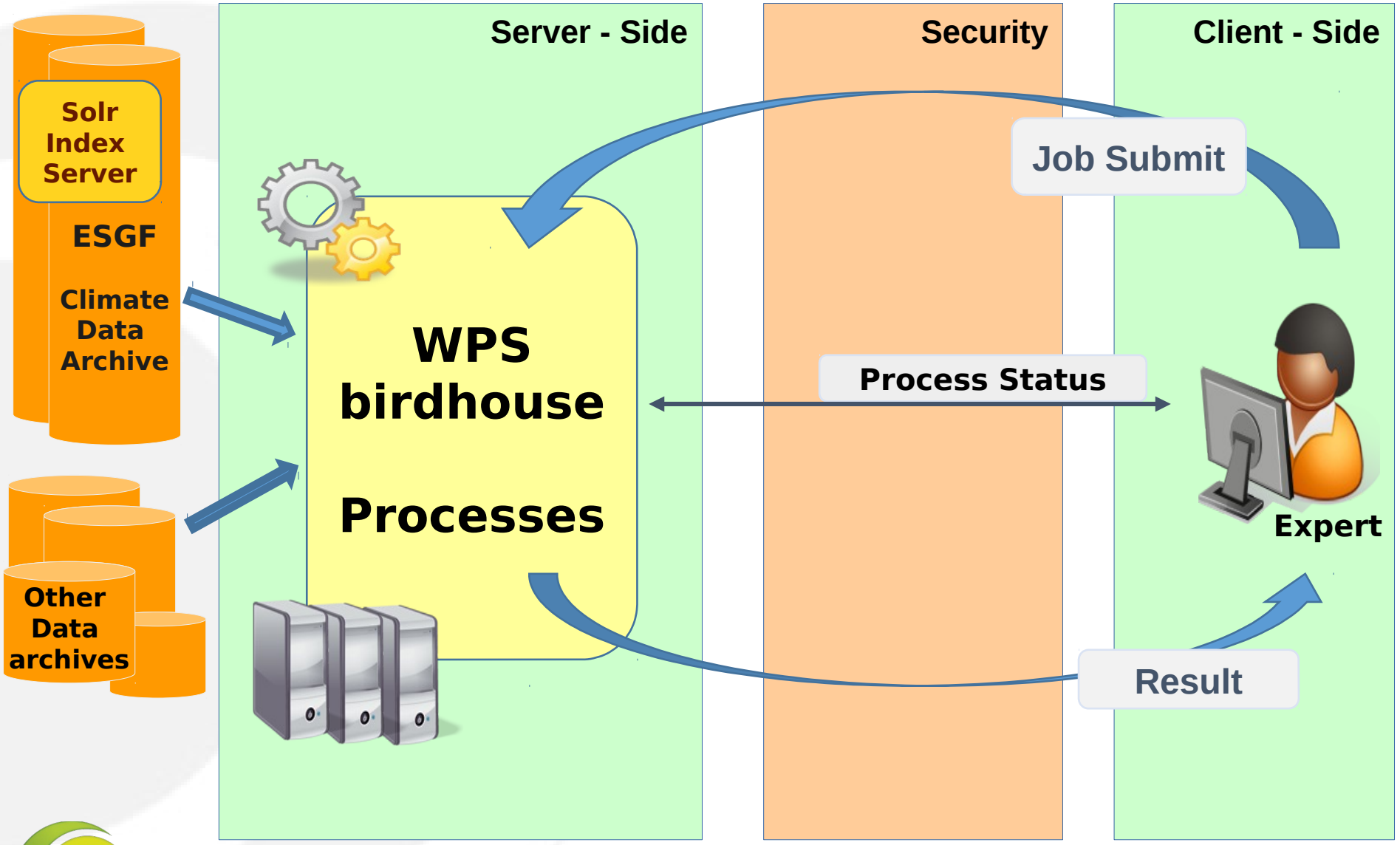
But on user side:
Limited storage/compute capacities

“download and process at home”

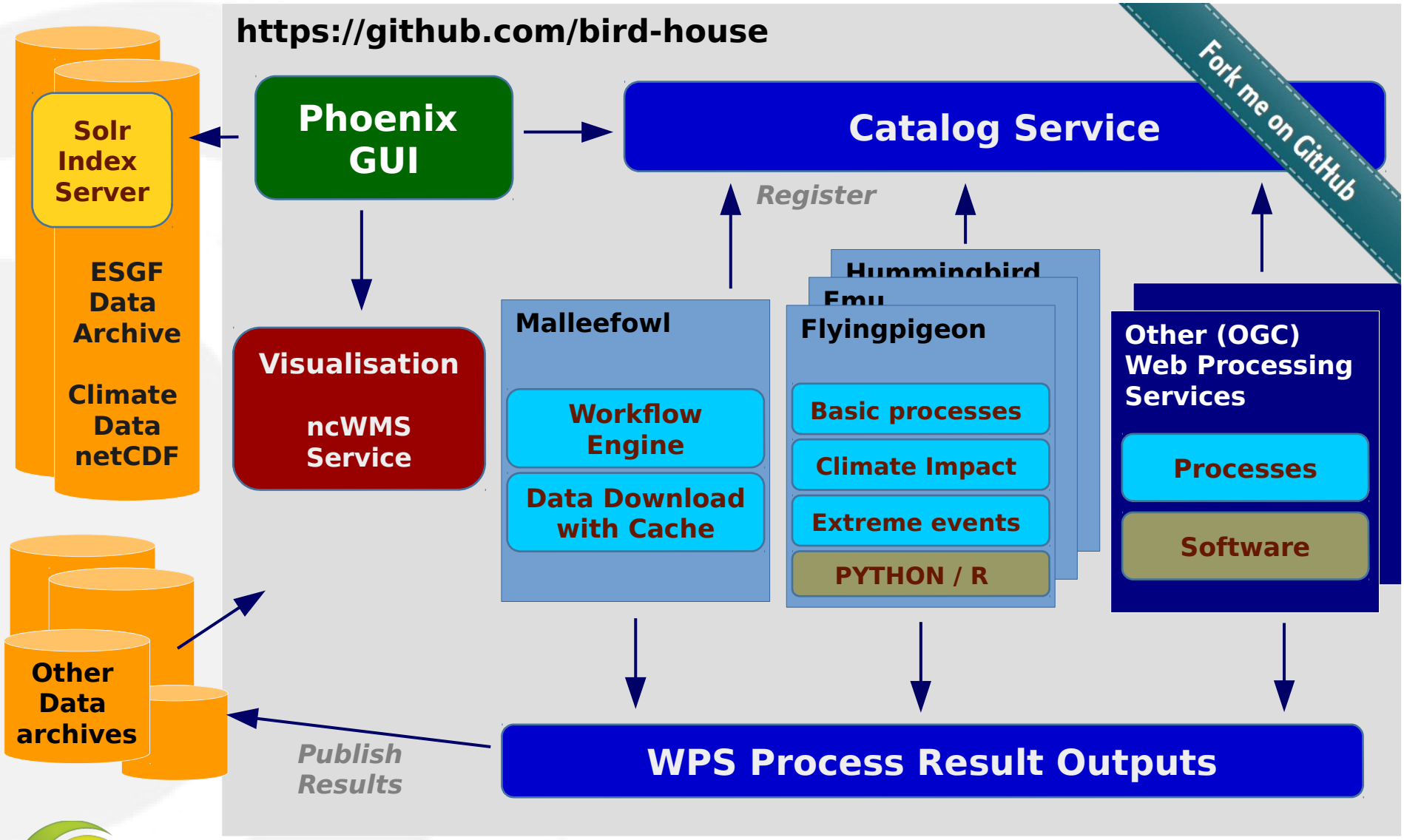
Data processing close to archives

Web Processing Service

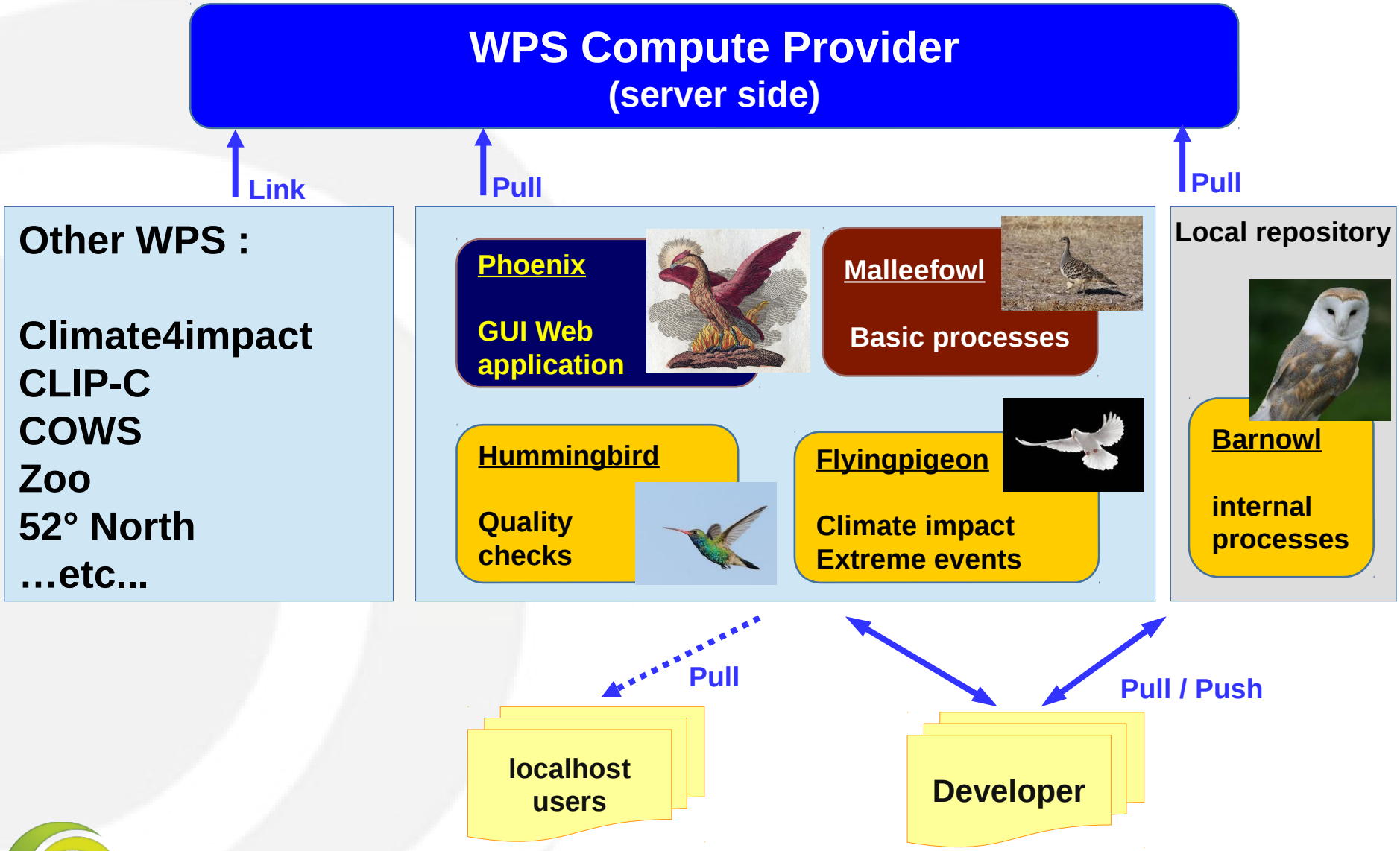
trigger computing processes remotely


Server - Side
Security
Client - Side
Solr Index Server
ESGF
Climate Data Archive
Other Data archives
WPS birdhouse
Processes
Job Submit
Process Status
Result
Expert

Organisation

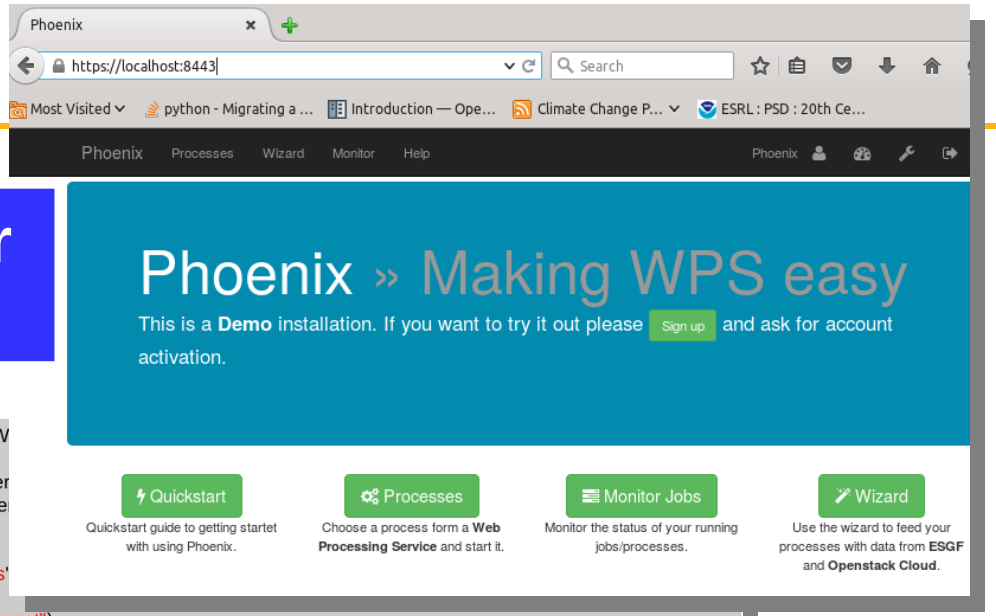


Ecosystem of WPS



Client Side

Web Browser GUI



Python Script

```
from owslib.wps import W

wps = WebProcessingSer
                      ve

    ute = wps.execute(
    entifier="niceprocess"
    puts=[
   ("parameter_1", "argument"),
   ("parameter_2", "42"),
#    ("parameter_3", "0.987"), # use the default value
   ("file_identifier", "https://thredds/fileServer1/test/file1.nc"),
   ("file_identifier", "https://thredds/fileServer1/test/file2.nc"),
   ("file_identifier", "https://thredds/fileServer2/test/file3.nc")],
   output=[("output", True)])

# time for a coffee

for o in execute.processOutputs:
   print o.reference

https://mouflon.dkrz.de:8090/wpsoutputs/flyingpigeon/output_graphic-697dee76-d722-93ae-9789bf75cf44.png
https://mouflon.dkrz.de:8090/wpsoutputs/flyingpigeon/output_netCDF-697dee76-d722-93ae-9789bf75cf44.nc
https://mouflon.dkrz.de:8090/wpsoutputs/flyingpigeon/output_text-697dee76-d722-93ae-9789bf75cf44.txt
```

Terminal Call

```
[nhempel@lsce3199 ~]$ export WPS_S

[nhempel@lsce3199 ~]$ birdy -h

usage: birdy [<options>] <command> [<args>]

                esses for climate data, indices and
                s:
                show this help message and exit
                enable debug mode

command:
  List of available commands (wps processes)

  {visualisation,sdm,segetalflora,indices_single,subset_countries,eobs_to_cordex,ensembleRobustness,analogs,fetch}
                    Run "birdy <command> -h" to get additional help.

    visualisation       Visualisation of netcdf files:                  Just testing a nice script to visualise some variables
    sdm                 Species distribution model:                     Species distribution model
    segetalflora        Segetal Flora:                                  Species biodiversity of segetal flora.  Imput files: variable:tas , domain: EUR-
                                                                        11 or EUR-44
    indices_single      Calculation of climate indice (single variable): This  process calculates climate indices based on one single variable.
    subset_countries    Subset netCDF files:                            This process returns only the given polygon from input netCDF files.
    eobs_to_cordex      EOBS to CORDEX:                                 downloads EOBS data in adaped CORDE format
    ensembleRobustness  Calculation of the robustness of an ensemle:    Calculates the robustness as the ratio of noise to
                                                                          signal in an ensemle of timeseries
    analogs             Days with analog pressure pattern:              Search for day with analog pressure pattern
    fetch               Download Resources:                             This process downloads resources (limited to 50GB) to the local file system
                                                                        and returns a textfile with appropriate pathe
```

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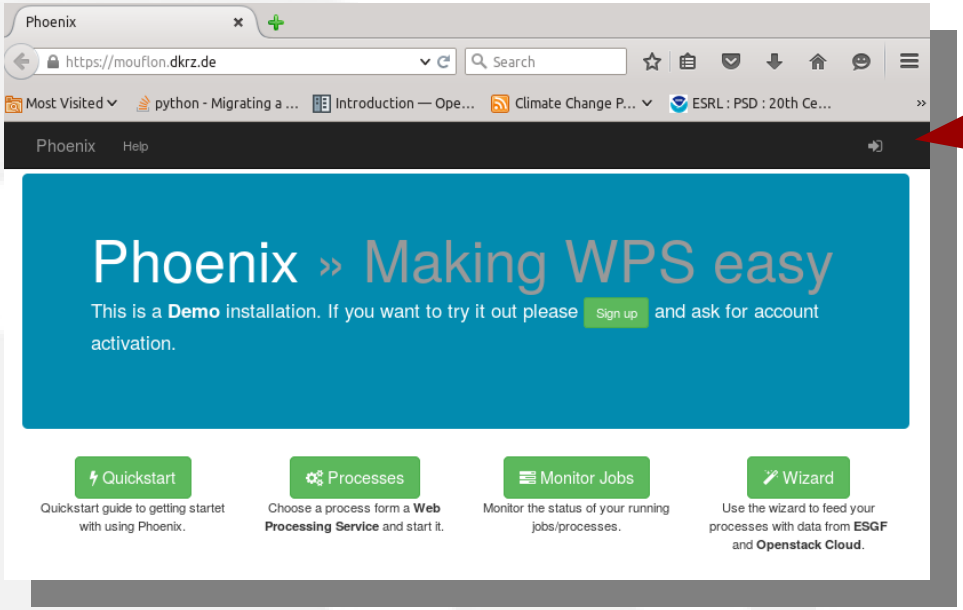
birdhouse

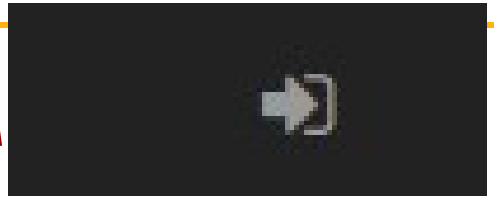
- Based on Open Source
- Open Geospatial Consortium (OGC) Standards
- Climate Data processing

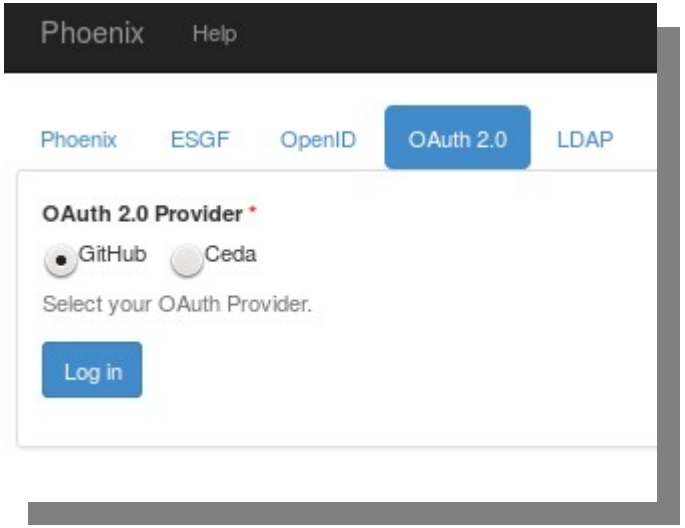
- **https://github.com/bird-house**
- **http://birdhouse.readthedocs.org/en/latest/**
- **https://lists.dkrz.de/mailman/listinfo/wps**
- **https://lists.dkrz.de/mailman/listinfo/wps-dev**

- **DEMO GUI: https://mouflon.dkrz.de**

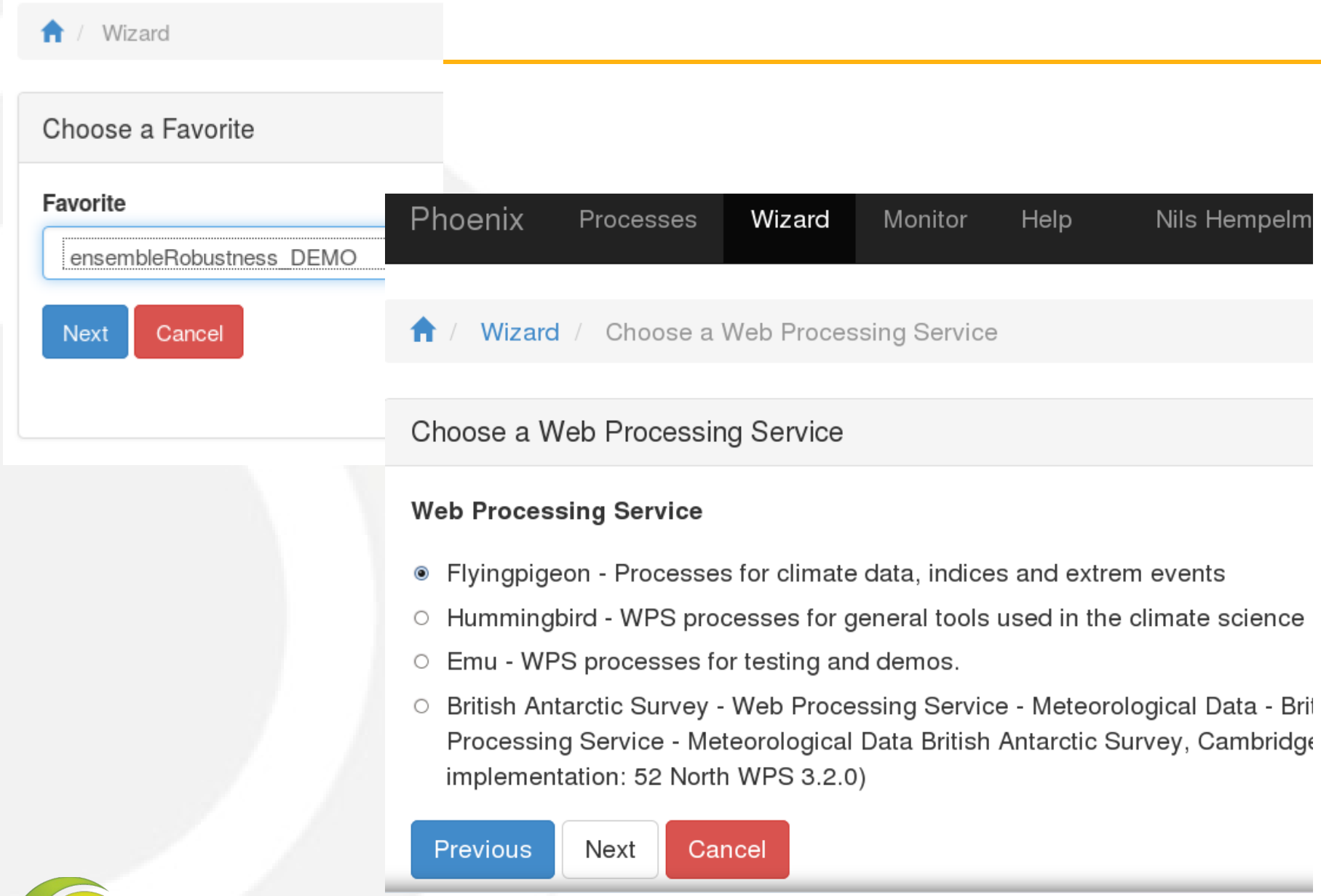
Login







http://pyramid-phoenix.readthedocs.io/en/latest/user_guide.html#login


Wizard
Choose a Favorite
Favorite
ensembleRobustness_DEMO
Next
Cancel
Phoenix
Processes
Wizard
Monitor
Help
Nils Hempelm
Wizard / Choose a Web Processing Service
Choose a Web Processing Service
Web Processing Service
Flyingpigeon - Processes for climate data, indices and extrem events
Hummingbird - WPS processes for general tools used in the climate science
Emu - WPS processes for testing and demos.
British Antarctic Survey - Web Processing Service - Meteorological Data - Brit
Processing Service - Meteorological Data British Antarctic Survey, Cambridge
implementation: 52 North WPS 3.2.0)
Previous
Next
Cancel

Process

- ○ Visualisation of netcdf files - Just testing a nice
- ○ Species distribution model - Species distributi
- ○ Weather Regimes - Weather Regimes based
- ○ Extract Coordinate Points - Extract Timeseries
- ○ Segetal Flora - Species biodiversity of segetal
- ○ Calculation of climate indice (single variable) -
- ○ Calculation of percentile based climate indices percentils of a referece period.
- ◉ Subset netCDF files - This process returns onl
- ○ EOBS to CORDEX - downloads EOBS data ir
- ◉ Calculation of the robustness of an ensemle -
- ○ Days with analog pressure pattern - Search fo
- ○ Download Resources - This process downloac

Previous | Next | Cancel

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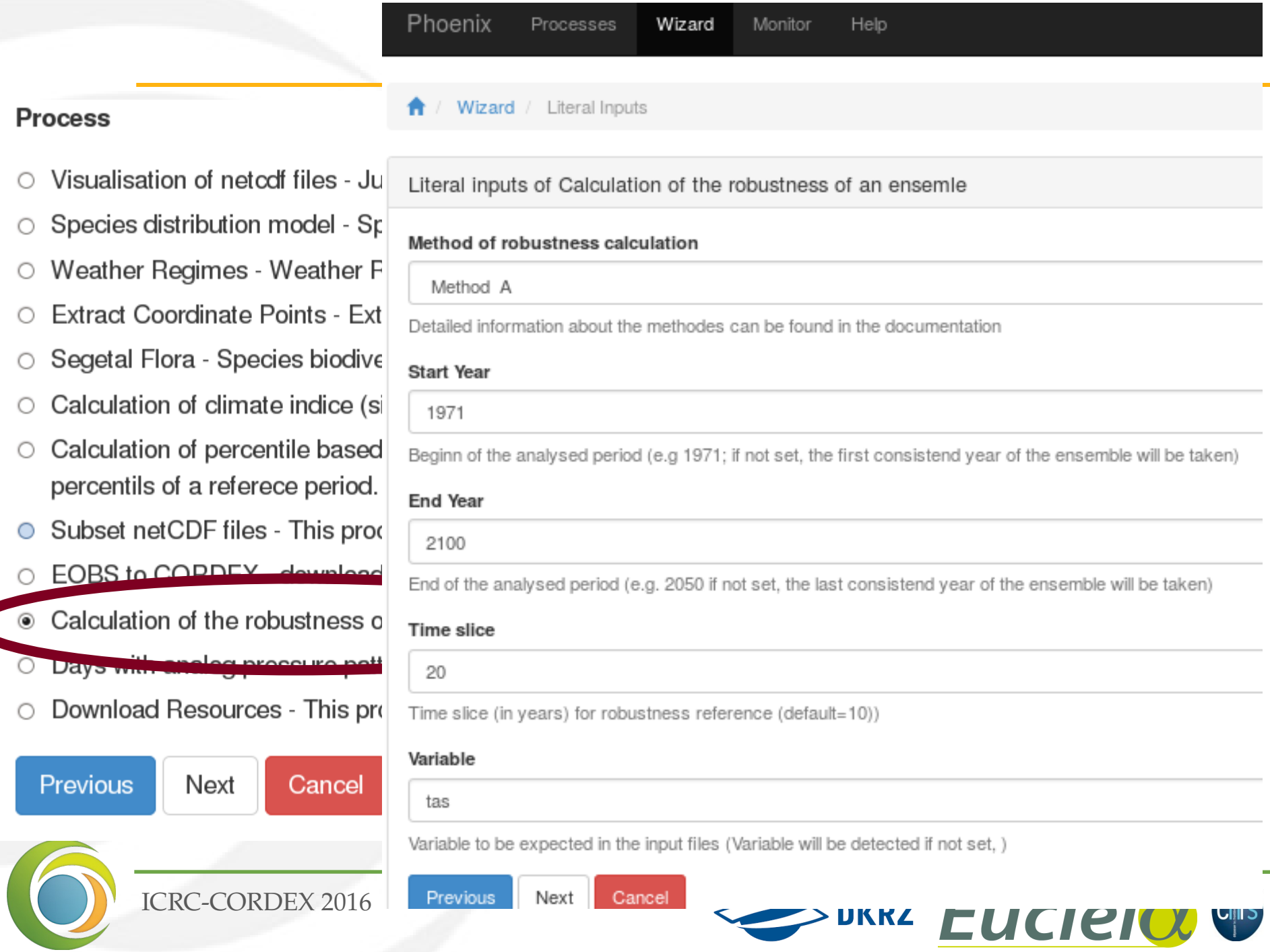
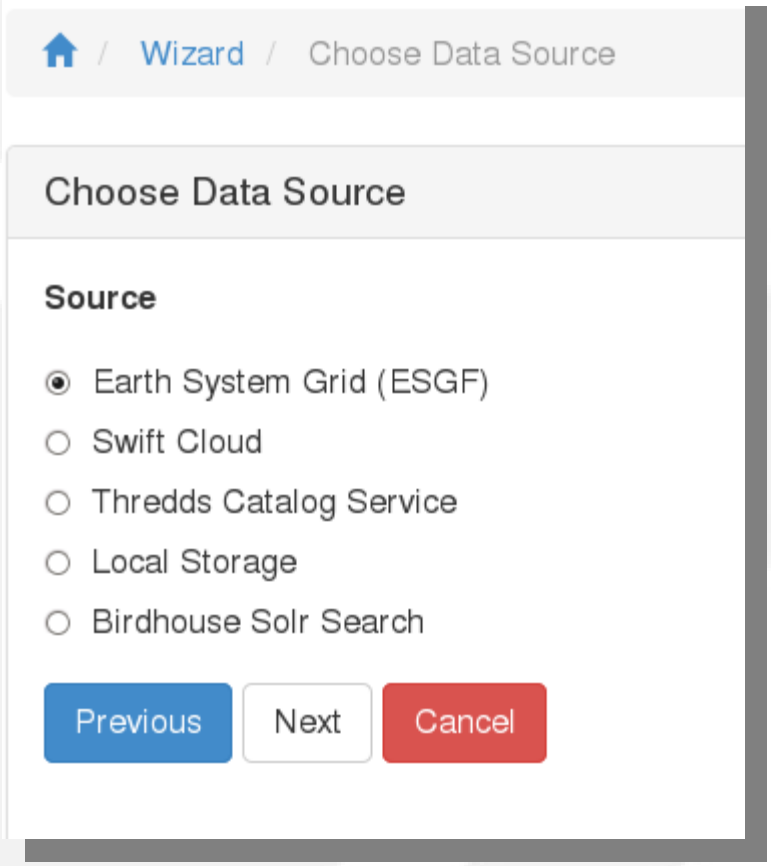
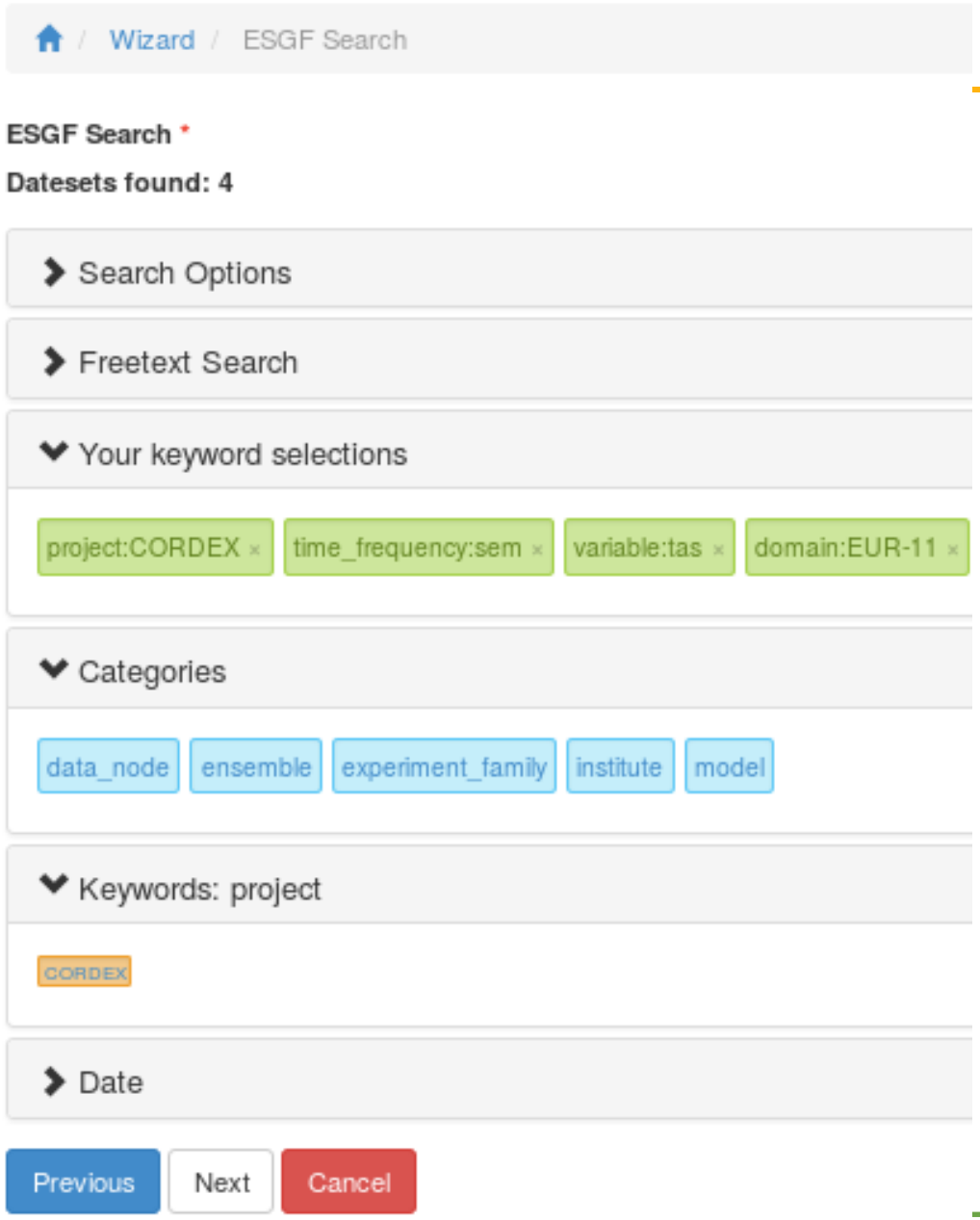
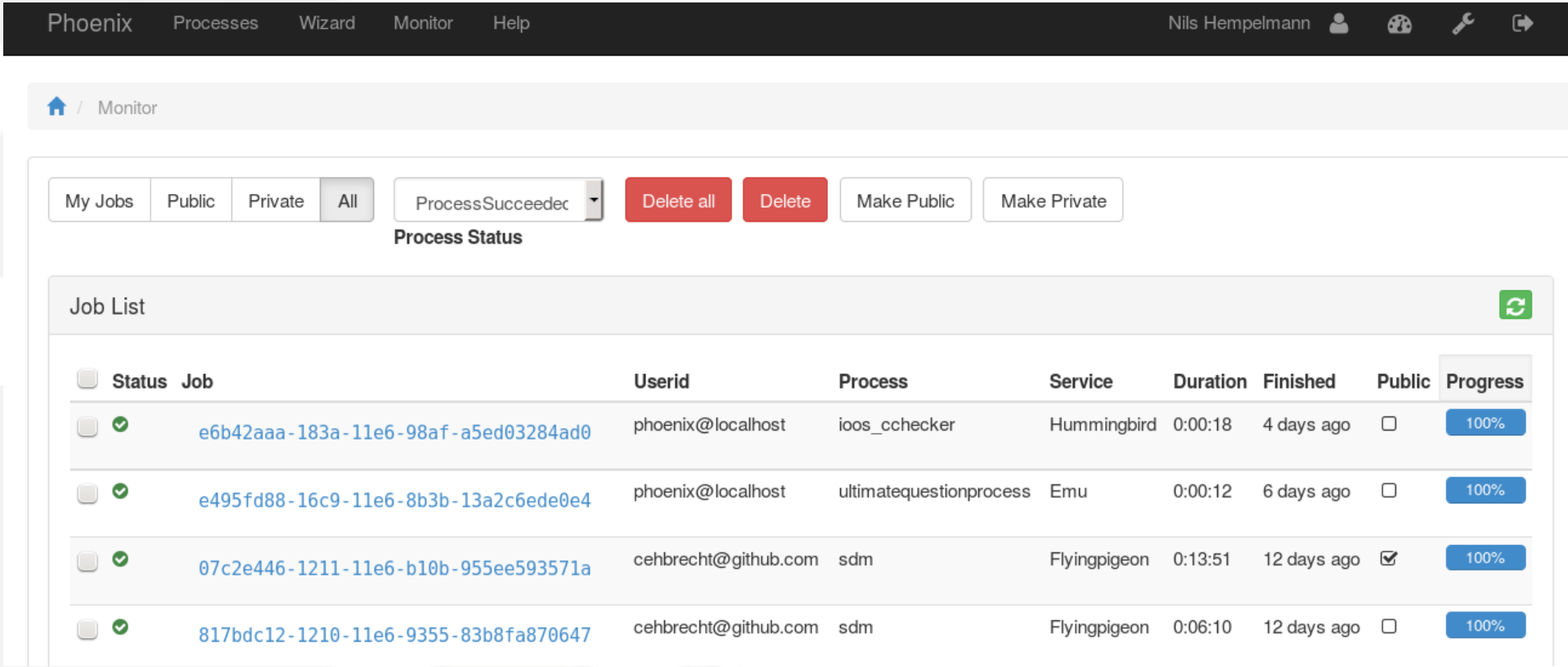
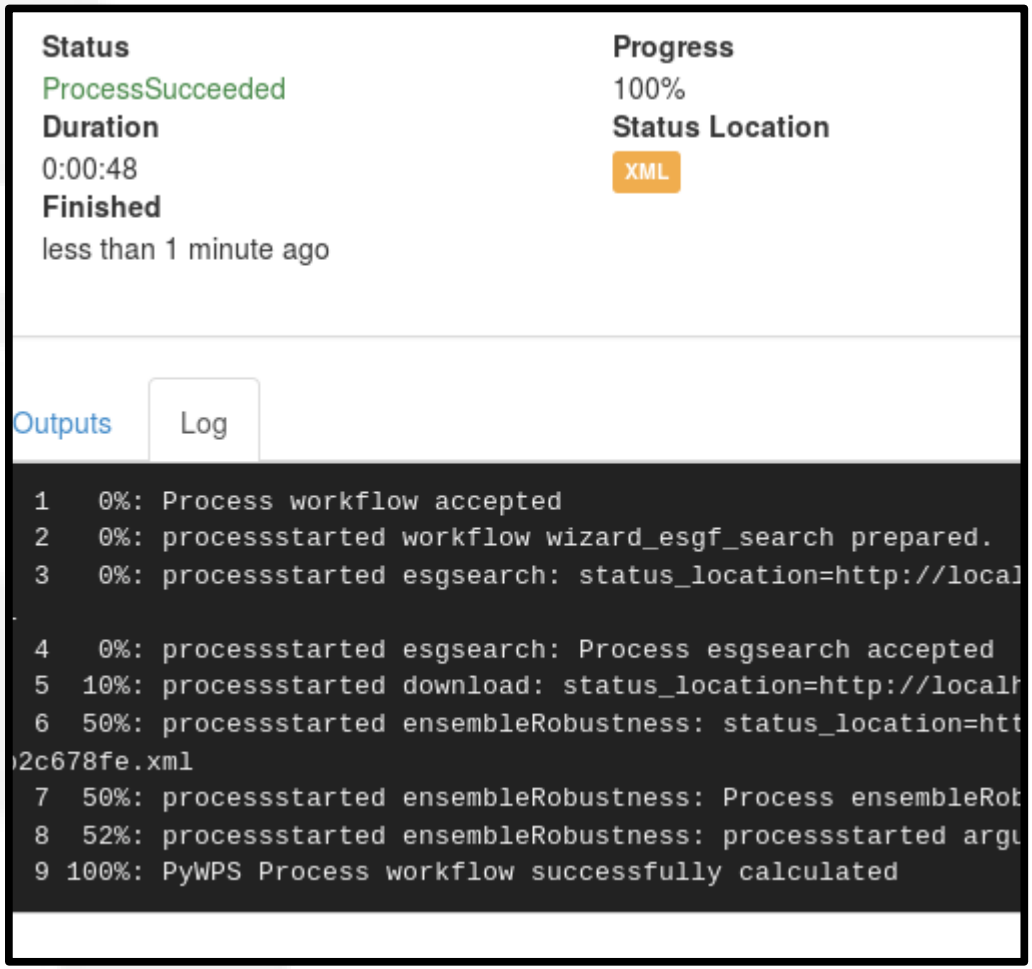

Phoenix
Processes
Wizard
Monitor
Help
Process
Visualisation of netcdf files - Ju
Species distribution model - Sp
Weather Regimes - Weather F
Extract Coordinate Points - Ext
Segetal Flora - Species biodive
Calculation of climate indice (si
Calculation of percentile based
percentils of a referece period.
Subset netCDF files - This proc
EOBS to CORDEX - download
Calculation of the robustness o
Days with analog pressure patt
Download Resources - This pro
Previous
Next
Cancel
Wizard / Literal Inputs
Literal inputs of Calculation of the robustness of an ensemle
Method of robustness calculation
Method A
Detailed information about the methodes can be found in the documentation
Start Year
1971
Beginn of the analysed period (e.g 1971; if not set, the first consistend year of the ensemble will be taken)
End Year
2100
End of the analysed period (e.g. 2050 if not set, the last consistend year of the ensemble will be taken)
Time slice
20
Time slice (in years) for robustness reference (default=10))
Variable
tas
Variable to be expected in the input files (Variable will be detected if not set,)
Previous
Next
Cancel


Wizard / Choose Data Source
Choose Data Source
Source
Earth System Grid (ESGF)
Swift Cloud
Thredds Catalog Service
Local Storage
Birdhouse Solr Search
Previous
Next
Cancel


Wizard / ESGF Search
ESGF Search *
Datesets found: 4
Search Options
Freetext Search
Your keyword selections
project:CORDEX ×
time_frequency:sem ×
variable:tas ×
domain:EUR-11 ×
Categories
data_node
ensemble
experiment_family
institute
model
Keywords: project
CORDEX
Date
Previous
Next
Cancel


Phoenix
Processes
Wizard
Monitor
Help
Nils Hempelmann
Monitor
My Jobs
Public
Private
All
ProcessSucceedec
Process Status
Delete all
Delete
Make Public
Make Private
Job List
Status
Job
Userid
Process
Service
Duration
Finished
Public
Progress
e6b42aaa-183a-11e6-98af-a5ed03284ad0
phoenix@localhost
ioos_cchecker
Hummingbird
0:00:18
4 days ago
100%
e495fd88-16c9-11e6-8b3b-13a2c6ede0e4
phoenix@localhost
ultimatequestionprocess
Emu
0:00:12
6 days ago
100%
07c2e446-1211-11e6-b10b-955ee593571a
cehbrecht@github.com
sdm
Flyingpigeon
0:13:51
12 days ago
100%
817bdc12-1210-11e6-9355-83b8fa870647
cehbrecht@github.com
sdm
Flyingpigeon
0:06:10
12 days ago
100%

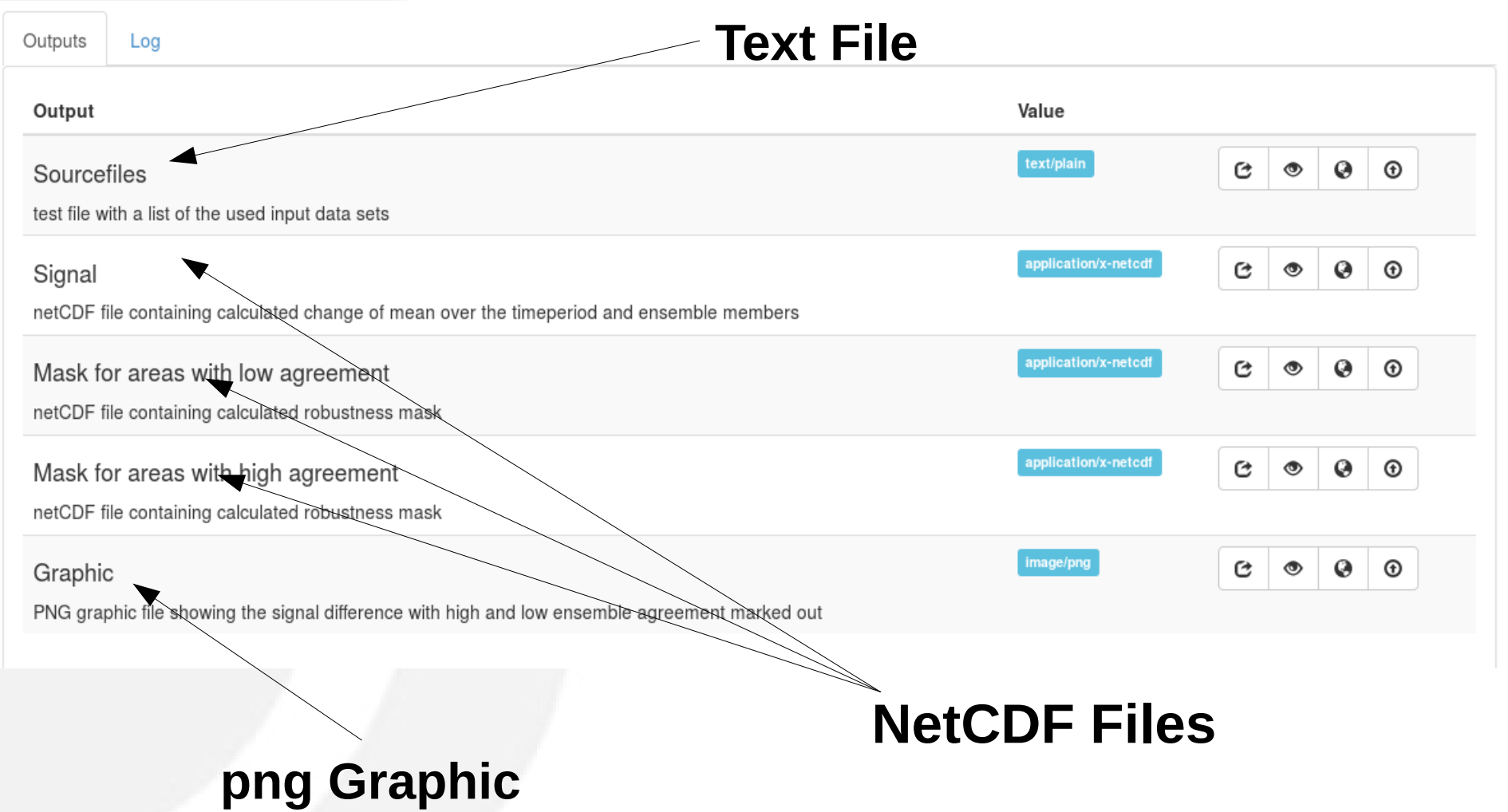

Status
ProcessSucceeded
Duration
0:00:48
Finished
less than 1 minute ago
Progress
100%
Status Location
XML
Outputs
Log
1 0%: Process workflow accepted
2 0%: processstarted workflow wizard_esgf_search prepared.
3 0%: processstarted esgsearch: status_location=http://local
4 0%: processstarted esgsearch: Process esgsearch accepted
5 10%: processstarted download: status_location=http://localh
6 50%: processstarted ensembleRobustness: status_location=htt
)2c678fe.xml
7 50%: processstarted ensembleRobustness: Process ensembleRob
8 52%: processstarted ensembleRobustness: processstarted argu
9 100%: PyWPS Process workflow successfully calculated

Output files

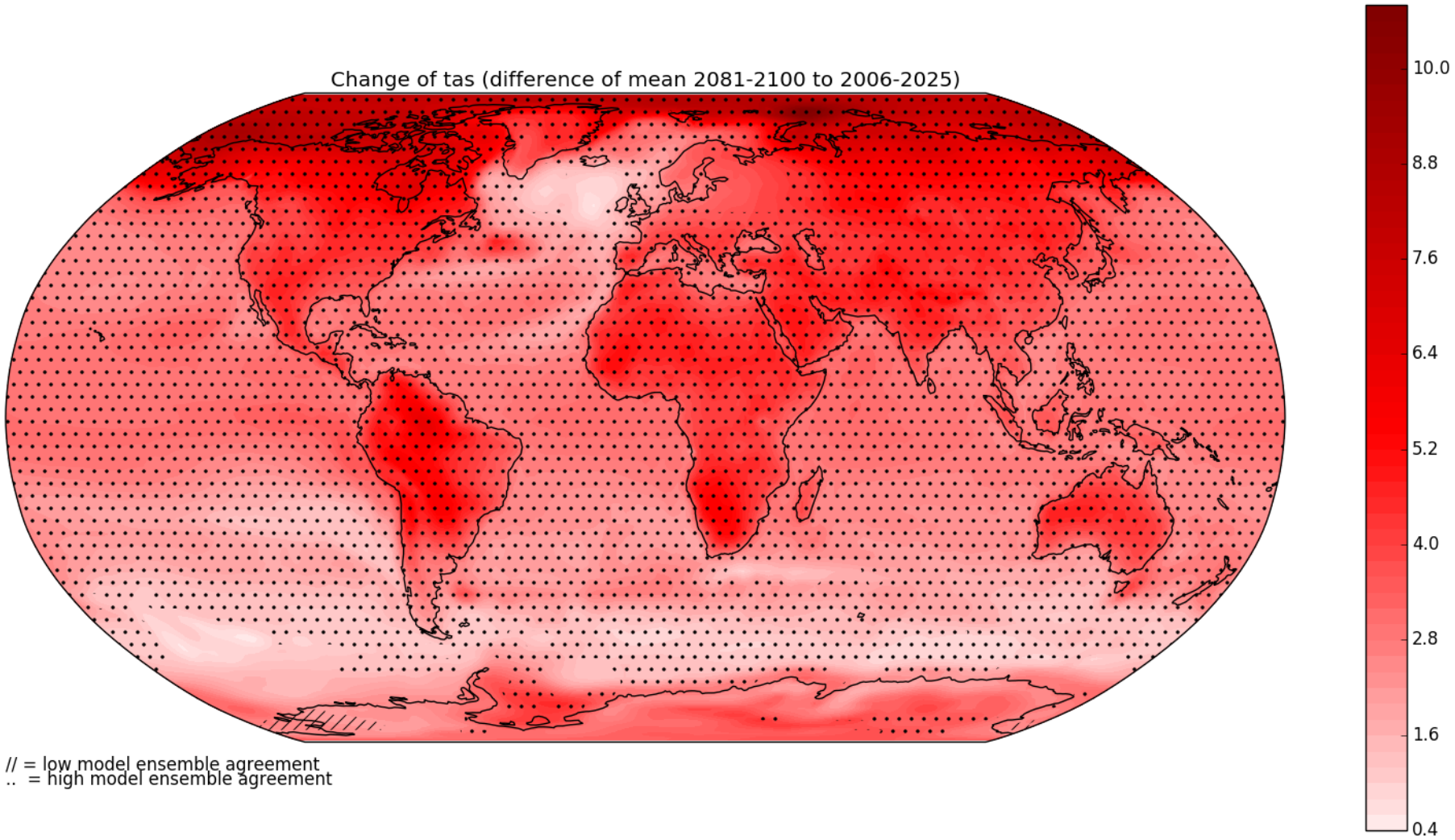
Outputs | Log

Output	Value
Sourcefiles test file with a list of the used input data sets	text/plain
Signal netCDF file containing calculated change of mean over the timeperiod and ensemble members	application/x-netcdf
Mask for areas with low agreement netCDF file containing calculated robustness mask	application/x-netcdf
Mask for areas with high agreement netCDF file containing calculated robustness mask	application/x-netcdf
Graphic PNG graphic file showing the signal difference with high and low ensemble agreement marked out	image/png

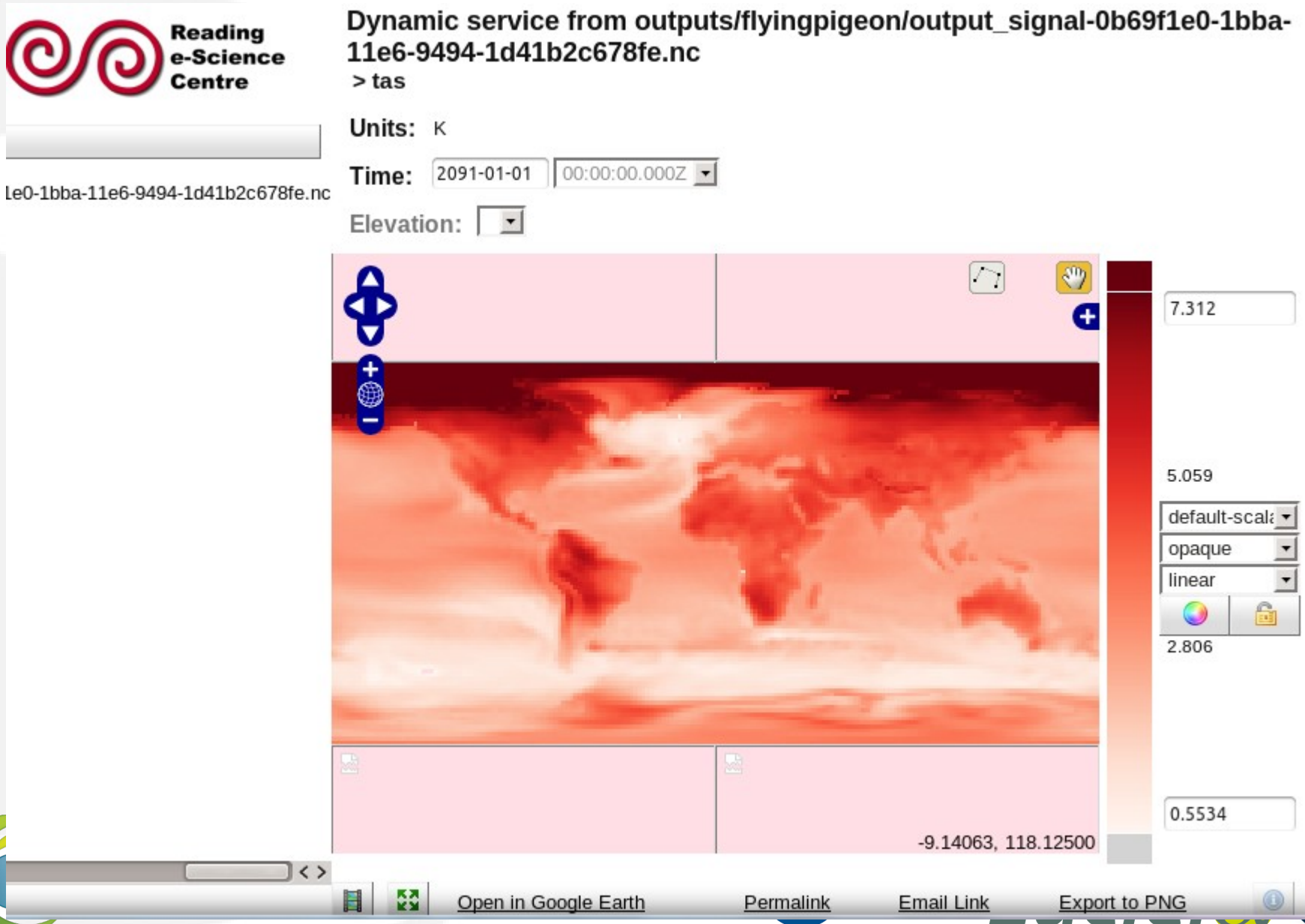
Output files



png Graphic


Change of tas (difference of mean 2081-2100 to 2006-2025)
// = low model ensemble agreement
.. = high model ensemble agreement
10.0
8.8
7.6
6.4
5.2
4.0
2.8
1.6
0.4

Web Mapping Server



Thanks

Contact :
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