

MATLAB on EGI JupyterHub

Ingemar Häggström, EISCAT, Sweden

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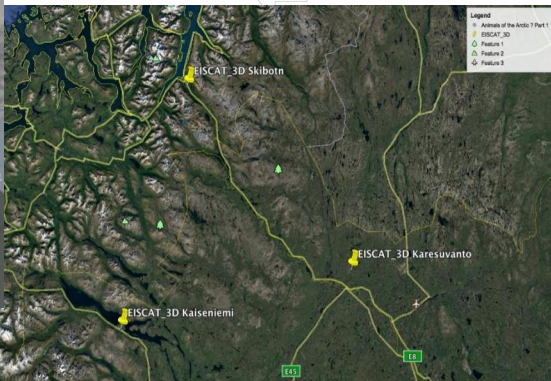
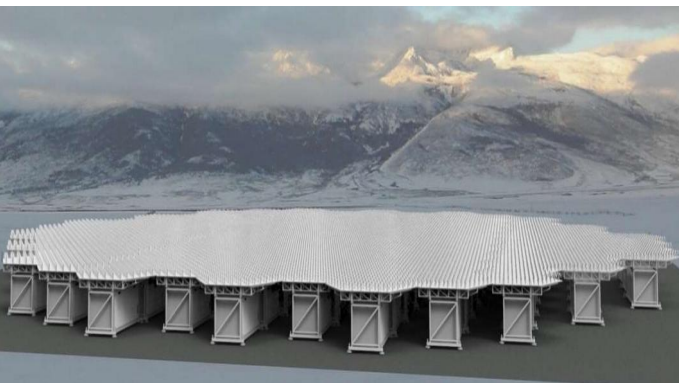


Space Physics Use Case

Incoherent scatter radar data fusion and computation

EISCAT_3D radar, EISCAT Scientific Association, Sweden

Sanya Incoherent Scatter Radar (SYISR), Institute of Geology and Geophysics, China



Menu

- Portal home
- Realtime graphs +
- Realtime analysis +
- EISCAT Schedule and Data Access
- EISCAT Experiment request (Interface)
- EISCAT Experiment request (Schedule version)
- EISCAT Monthly accounts (Access)

HQ Operations Schedule, June 2021

Select year and month

Year: 2021

Month: June

Select function

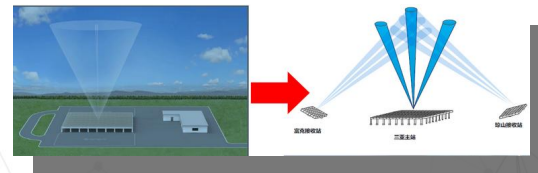
Select sites

Function: UHF radar Thematic Tromsø UHF Kiruna receiver Sodankylä receiver Svalbard radar HF receiver/trailer - SPEAR

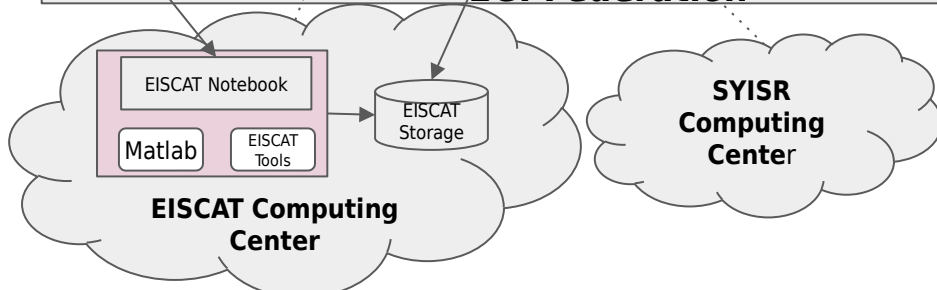
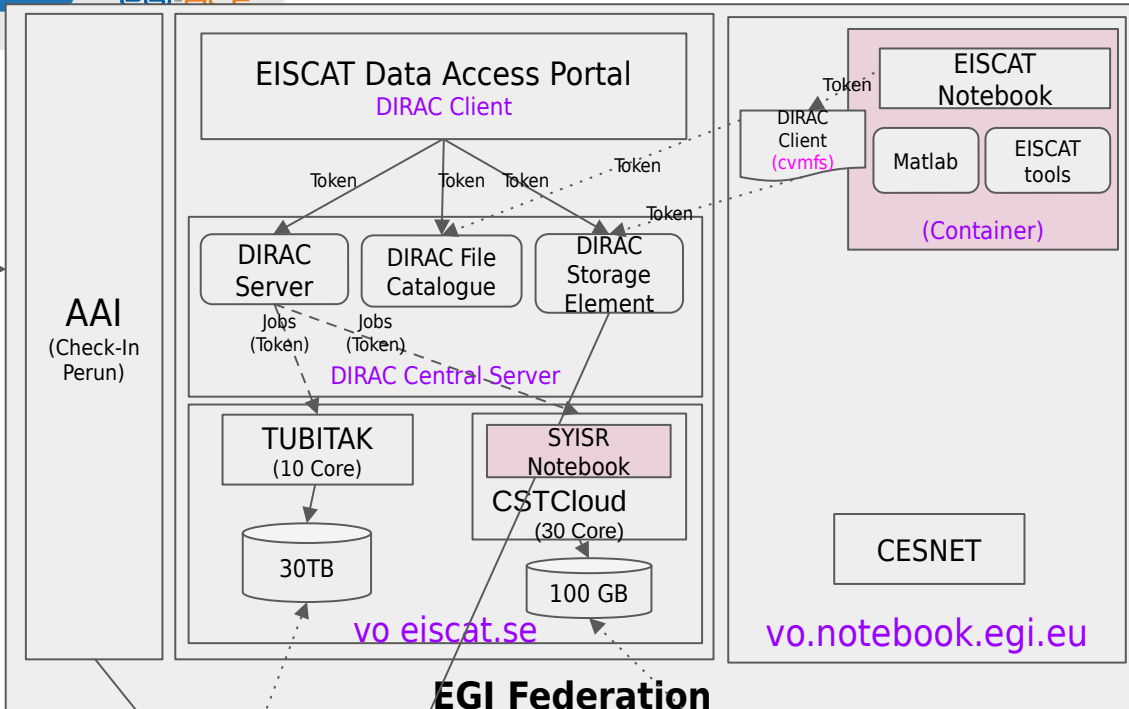
Site: Scheduled Requested Archived

Query

| Year | Month | Day | Time | Site | Function | Status | Data available |
|------|-------|-----|-------|-------------|-----------|-----------|----------------|
| 2021 | 06 | 01 | 00:00 | Skibotn | UHF radar | Scheduled | |
| 2021 | 06 | 01 | 00:00 | Karesuvanto | UHF radar | Scheduled | |
| 2021 | 06 | 01 | 00:00 | Kaiseniemi | UHF radar | Scheduled | |



System Setup

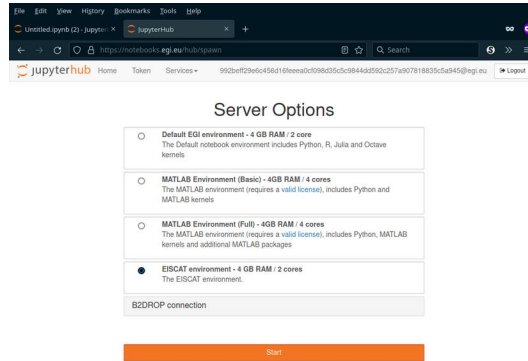


- **EISCAT Data Access Portal (DIRAC)**
 - User access via Check-In/Perun
 - Access token is passed to DIRAC File Catalogue (by DIRAC Client)
 - DIRAC File Catalogue return token with user information
 - (DIRAC Client) access DIRAC Storage Element with token
 - DIRAC Storage element enables search of EISCAT data (in the EISCAT storage)
 - DIRAC Server submits Jobs to Cloud
 - TUBITAK (10core, 30TB) + CSTCloud (30Core, 100GB)
 - **Token access to the Cloud is ongoing**
- **EISCAT Compute Center**
 - Jupyter notebook
 - User access via Perun
 - Matlab enabled
 - Not yet access to DIRAC Storage Element - cannot perform search, and have lower performance
 - EISCAT Storage: EISCAT data
- **EISCAT Notebook Container**
 - Enable EISCAT user access
 - Notebook+DIRAC image
 - dirac.egi.eu cvnfs repository is configured alongside eiscat cvnfs repository (eiscat.egi.eu)
 - DIRAC client is available via cvnfs
 - **pass user access token to the DIRAC File Catalogue to get user information**
 - **Access the DIRAC Storage Element to search and retrieve data from the EISCAT storage**
 - Will include Matlab
 - **Token to use EISCAT license?**
 - Will include EISCAT Tools

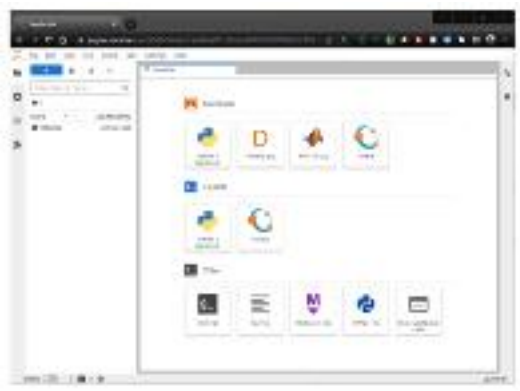
Jupyter notebooks



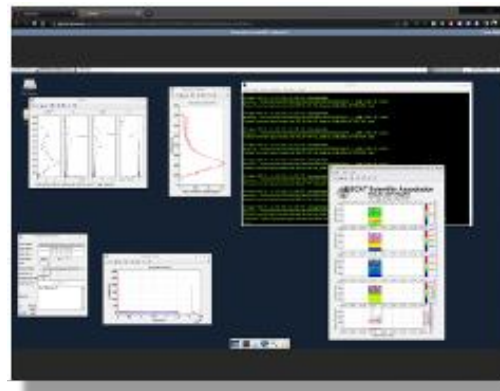
1. Login by EGI Check-In



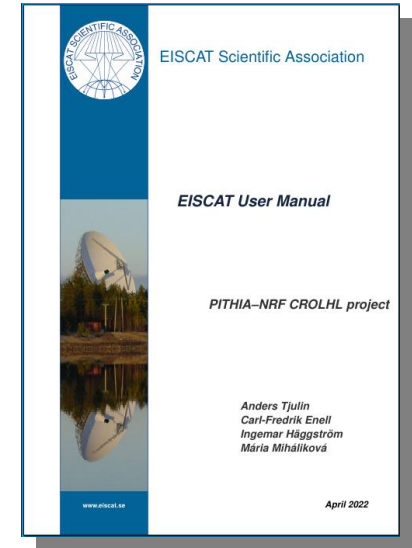
2. Select server



3. EISCAT Jupyter Notebook landing page



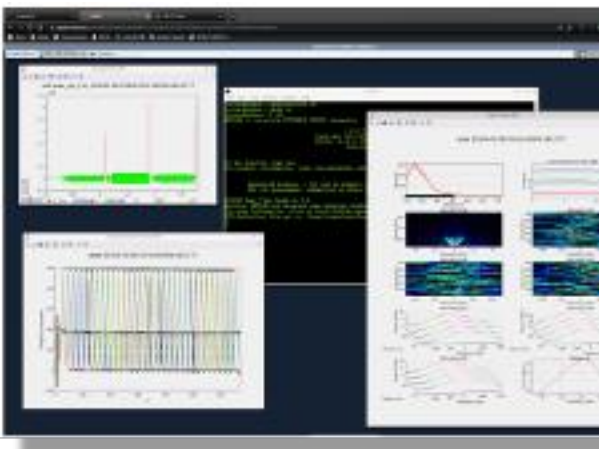
•Jupyter Notebook Desktop workspace with EISCAT GUI application analysis running



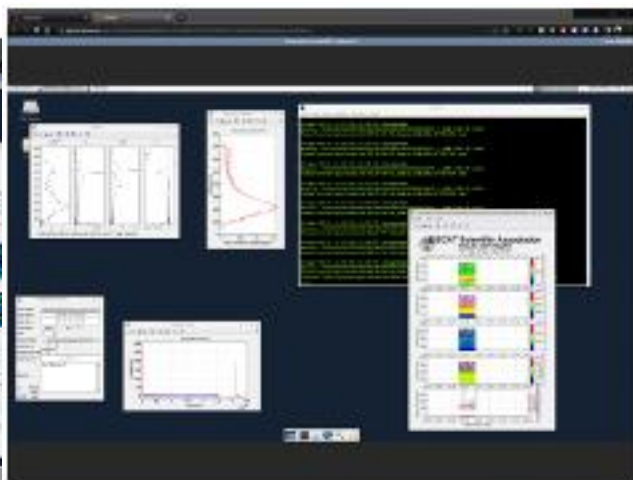
User Manual

EISCAT Notebook is in production:
<https://notebooks.egi.eu/>
<https://jupyter.eiscat.se/>

Notebook screenshots



RTG (xfce+matlab)



GUISDAP (xfce+matlab)

```

[11]: import madrigalweb, madrigalweb as mw
from io import StringIO
import numpy as np
import matplotlib.pyplot as plt

[16]: # Path to Madrigal server
madURL = "https://madrigal.eiscat.se/madrigal"

# Madrigal logs user details
UserName = "Ingemar Haggstrom"
UserEmail = "ingemar@eiscat.se"
UserAffiliation = "EISCAT"

[17]: # Create data object
madData = mw.Madrigal(Data(madURL))

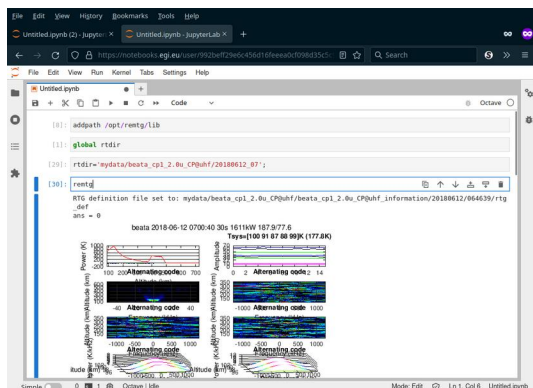
[18]: # Instrument codes:
# 70: EISCAT multi-static vector data
# 71: EISCAT Kiruna UHF receiver
# 72: EISCAT UHF radar
# 73: EISCAT Sodankylä UHF receiver
# 74: EISCAT VHF radar
# 75: EISCAT Kiruna VHF receiver
# 76: EISCAT Sodankylä VHF receiver
# 90: EISCAT Svalbard radar
# 2050: EISCAT Tromsø Dynasonde
# 2051: EISCAT Svalbard Dynasonde
madInstruments = 1721

[19]: # List UHF experiments during April 2, 2019
madExps = madData.getExperiments(madInstruments, 2019, 4, 2, 0, 4)

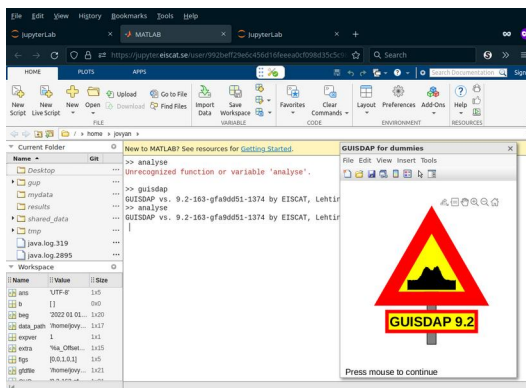
[20]: for madExp in madExps:
    print(madExp.name)
    2019-04-02_beta2duhfa

[21]: # There is only one UHF experiment for this day. Find its ID and
expID = madExp.id
expURL = madExp.url
print(expID)
print(expURL)
    
```

Madrigal (python)



RTG (octave)



GUISDAP (Matlab)

- **Matlab on jupyter notebooks**
 - Several license solutions
 - Included
 - Network
 - User
 - Community notebooks
 - Special compiled libraries
- **Next steps**
 - **Notebook developments**
 - Matlab with Jupyter environment
 - **License developments**
 - Connect license to Checkin
 - Need to map credentials to license