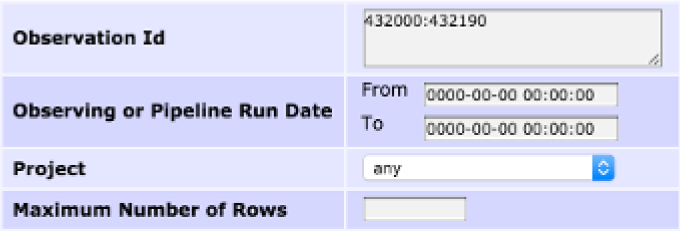
Advanced ways to find and retrieve data in the LTA

There are some useful ways to find and retrieve your data in the LTA that might not be immediately obvious. This page explains some of the more advanced options you have.

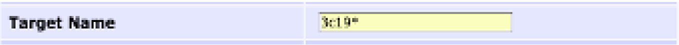
Queries

- You can use colons in numeric queries, to select ranges. This will for example give all observations and pipelines that have a SAS/Observation ID in the range from 432000 to 432190:



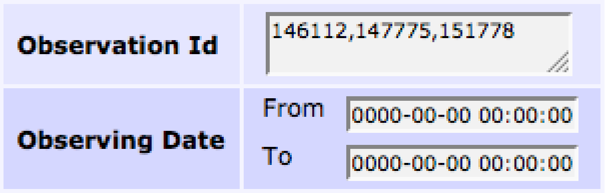
Observation Id	432000:432190
Observing or Pipeline Run Date	From 0000-00-00 00:00:00 To 0000-00-00 00:00:00
Project	any
Maximum Number of Rows	

In textual entries, wildcards can be used.



Target Name	3c19*

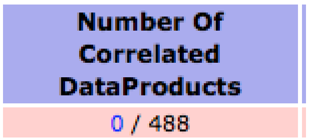
- You can put a list of SAS/Observation IDs in the query:



Observation Id	146112,147775,151778
Observing Date	From 0000-00-00 00:00:00 To 0000-00-00 00:00:00

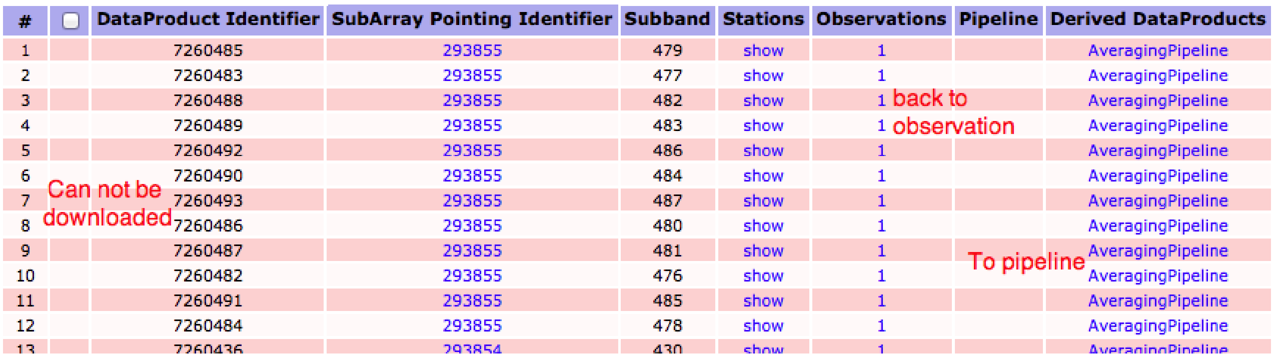
Viewing data

When you are looking at the results of a query you might see something like this:



Number Of Correlated DataProducts
0 / 488

This means that the observation is known in the LTA, it knows what data was produced, the produced data was not archived, but further processing happened on the raw data and the results of some of those pipelines were archived. If you click on the zero, you will see something like this:



#	□	DataProduct Identifier	SubArray Pointing Identifier	Subband	Stations	Observations	Pipeline	Derived DataProducts
1		7260485	293855	479	show	1		AveragingPipeline
2		7260483	293855	477	show	1		AveragingPipeline
3		7260488	293855	482	show	1		AveragingPipeline
4		7260489	293855	483	show	1		AveragingPipeline
5		7260492	293855	486	show	1		AveragingPipeline
6		7260490	293855	484	show	1		AveragingPipeline
7		7260493	293855	487	show	1		AveragingPipeline
8		7260486	293855	480	show	1		AveragingPipeline
9		7260487	293855	481	show	1		AveragingPipeline
10		7260482	293855	476	show	1		AveragingPipeline
11		7260491	293855	485	show	1		AveragingPipeline
12		7260484	293855	478	show	1		AveragingPipeline
13		7260436	293854	430	show	1		AveragingPipeline

back to observation

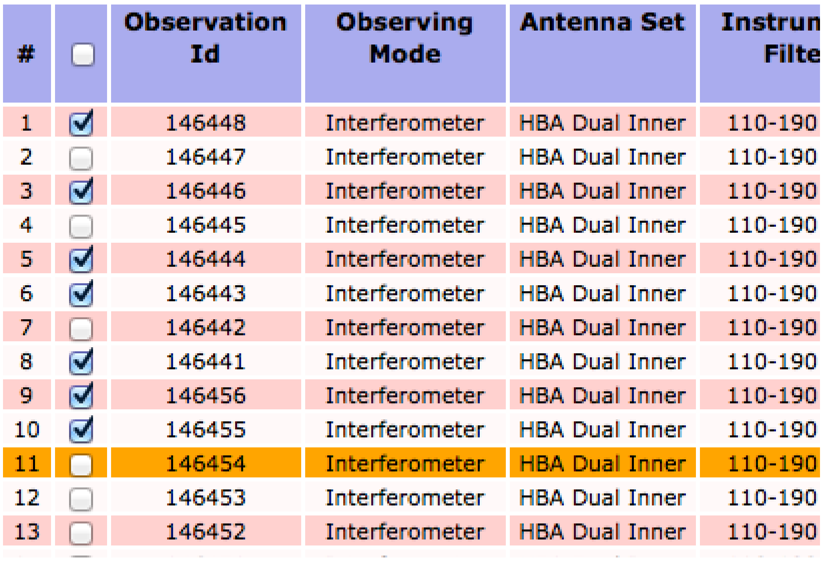
Can not be downloaded

To pipeline

This allows you to navigate from a pipeline back to the original observation, or from the observation to any pipelines that have run on the raw data.

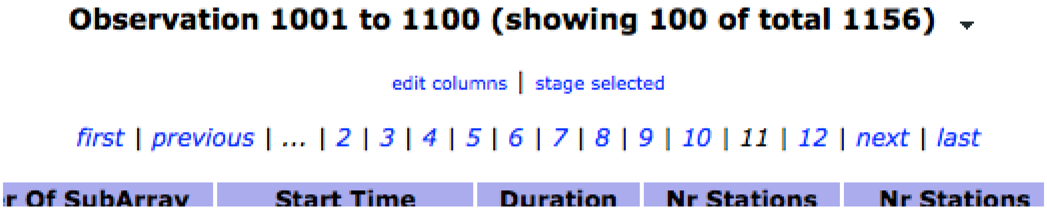
Retrieving data

- You can retrieve data on the Observation and Pipeline level, you don't have to select all files individually.



#	□	Observation Id	Observing Mode	Antenna Set	Instrun Filte
1	☑	146448	Interferometer	HBA Dual Inner	110-190
2	□	146447	Interferometer	HBA Dual Inner	110-190
3	☑	146446	Interferometer	HBA Dual Inner	110-190
4	□	146445	Interferometer	HBA Dual Inner	110-190
5	☑	146444	Interferometer	HBA Dual Inner	110-190
6	☑	146443	Interferometer	HBA Dual Inner	110-190
7	□	146442	Interferometer	HBA Dual Inner	110-190
8	☑	146441	Interferometer	HBA Dual Inner	110-190
9	☑	146456	Interferometer	HBA Dual Inner	110-190
10	☑	146455	Interferometer	HBA Dual Inner	110-190
11	□	146454	Interferometer	HBA Dual Inner	110-190
12	□	146453	Interferometer	HBA Dual Inner	110-190
13	□	146452	Interferometer	HBA Dual Inner	110-190

- If you have a query with more than 1000 results, you can open the multiple pages each in a separate tab/window.



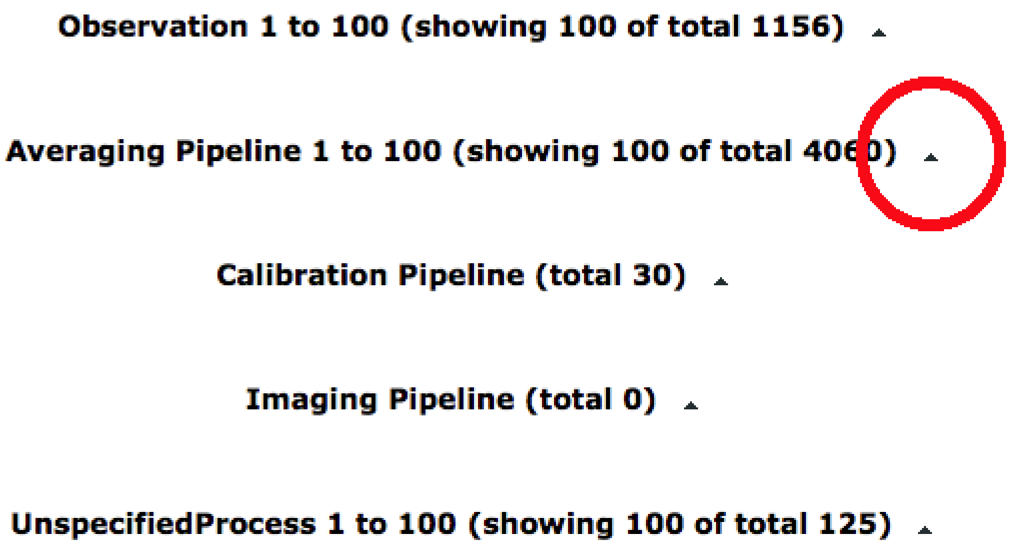
Observation 1001 to 1100 (showing 100 of total 1156) ▾

edit columns | stage selected

first | *previous* | … | *2* | *3* | *4* | *5* | *6* | *7* | *8* | *9* | *10* | *11* | *12* | *next* | *last*

- With the small triangle next to a list, you can fold or unfold the list to get a better overview.

Folded entries



Observation 1 to 100 (showing 100 of total 1156) ▲

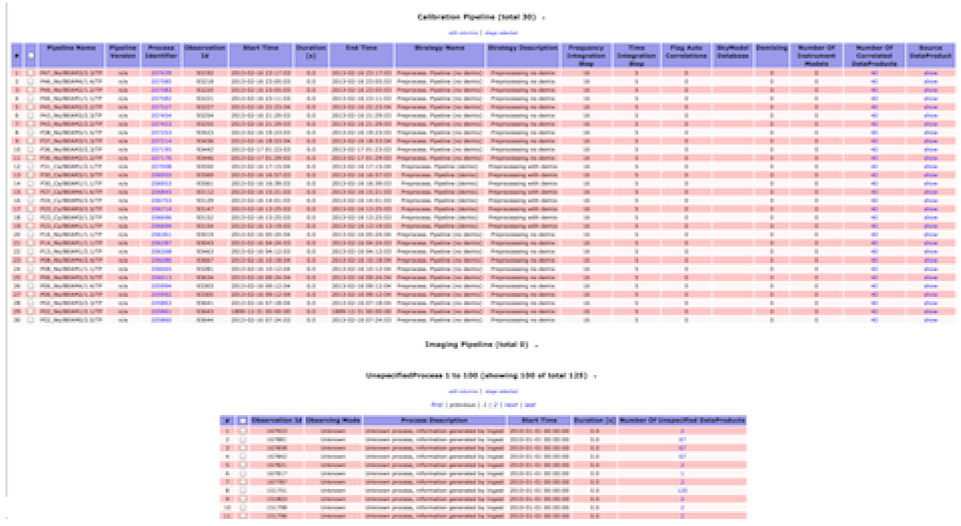
Averaging Pipeline 1 to 100 (showing 100 of total 4060) ▲

Calibration Pipeline (total 30) ▲

Imaging Pipeline (total 0) ▲

UnspecifiedProcess 1 to 100 (showing 100 of total 125) ▲

Unfolded entries



Calibration Pipeline (total 30) ▲

Imaging Pipeline (total 0) ▲

UnspecifiedProcess 1 to 100 (showing 100 of total 125) ▲

DBView

There is a server that gives the option to run your own queries on the database http://lofar-dbview.target.rug.nl/

A useful query might be this one, that gives you all files for a certain Obs Id (SAS VIC tree ID).

```
SELECT fo.URI, dp."dataProductType", dp."dataProductIdentifier",
 dp."processIdentifier"
FROM AWOPER."DataProduct+" dp,
     AWOPER.FileObject fo,
     AWOPER."Process+" pr
WHERE dp."processIdentifier" = pr."processIdentifier"
  AND pr."observationId" = '123456'
  AND fo.data_object = dp."object_id"
  AND dp."isValid" > 0
```

In this '123456' should be replaced with the Obs Id of an Observation/Pipeline you're looking for.

AstroWise Python Interface

There is also a python interface to the LTA. With this, you can script some advanced queries. To have this working, you first need to install the LTA client in your machine. Once you have installed the client, set up your user name and password. These are the same as for MoM. Remember that this is just a different interface to the LTA catalogue: you will need the same credentials as for the web interface.

After installing the LTA client, the file .awe/Environment.cfg will appear in your home directory. Add the following lines to the file

```
database_user : <your username>
database_password : <your password>
```

then create the variable awetarget and set it to awlofar. In a bash shell, you can do so by adding the following to your .profile file:

```
export AWETARGET=awlofar
```

Finally, your hostname may cause an error, if it does not contain a full domain. In this case, check your /etc/hosts file (you will need root/superuser privileges to do so). You should find a line that looks like this

```
127.0.0.1 localhost
```

Change that line into

```
127.0.0.1 localhost <your_host_name>
```

If you do not know your hostname, just type hostname in a shell and you will get it as an output.

Now, you can use the following script as a test. It may still give you some warnings, but if it prints out a list of pointings, then you are ready to go. You may need to kill the script, because it will print out all the observations in a certain patch of the sky archived in the LTA.

```
# python code
from pprint import pprint
from common.database.Context import context
from awlofar.main.aweimports import Observation, Pointing, SubArrayPointing
result = {}
for project in sorted(context.get_projects()) :
    print "Project %(project)s" % vars()
    ok = context.set_project(project)
    # do your query
    obs_ids = set()
    query = (Pointing.rightAscension > 95)  & \
            (Pointing.rightAscension < 105) & \
            (Pointing.declination    > 20)  & \
            (Pointing.declination    < 30)
    print "Total Pointings %d" % len(query)
    for pointing in query :
        print "Pointing found RA %f DEC %f" % (pointing.rightAscension,
pointing.declination)
        query_subarr = SubArrayPointing.pointing == pointing
        for subarr in query_subarr:
            query_obs = Observation.subArrayPointings.contains(subarr)
            for obs in query_obs :
                obs_ids.add(obs.observationId)
    result[project] = sorted(list(obs_ids))
    print result[project]

pprint(result)
```

If you get errors and do not manage to view the list of pointings, there may be the need to open some port on the firewall at your institution. Specifically, port 1521 should be open. In case of trouble, get in contact with Science Support.

Once you have tested that your connection to the catalogue is working, you are ready to browse the archive and stage the data you need. Here we will list a few examples of python scripts that can be used to access the LTA. All of them will need to import some modules:

```
from datetime import datetime
from awlofar.database.Context import context
from awlofar.main.aweimports import CorrelatedDataProduct, \
    FileObject, \
    Observation
from awlofar.toolbox.LtaStager import LtaStager, LtaStagerError
```

The lines above must be added to each of the scripts below for these to work.

This simple script will allow you to find all data within a single project LCX_YYY. If you also want to stage the data you found, just set the do_stage variable to True. Be careful with how many files you stage and what size they have: the same limit as for the web interface apply here.

```
do_stage = False
project = 'LCX_YYY'
cls = CorrelatedDataProduct
if not context.set_project(project) :
    raise Exception("You are not member of project %s" % project)

query_observations = Observation.select_all().project_only()
uris = set() # All URIS to stage
for observation in query_observations :
    print("Querying ObservationID %s" % observation.observationId)
    # Instead of querying on the Observations of the DataProduct, all
DataProducts could have been queried
```

```
    dataproduct_query = cls.observations.contains(observation)
    # isValid = 1 means there should be an associated URI
    dataproduct_query &= cls.isValid == 1
    for dataproduct in dataproduct_query :
        # This DataProduct should have an associated URL
        fileobject = ((FileObject.data_object == dataproduct) &
(FileObject.isValid > 0)).max('creation_date')
        if fileobject :
            print("URI found %s" % fileobject.URI)
            uris.add(fileobject.URI)
        else :
            print("No URI found for %s with dataProductIdentifier %d" %
(dataproduct.__class__.__name__, dataproduct.dataProductIdentifier))

print("Total URI's found %d" % len(uris))

if do_stage :
    stager = LtaStager()
    stager.stage_uris(uris)
```

The following script will find subbands 301 and 302 for all targets within two different projects.

Pay attention to the difference between the keys subband and stationSubband; the former is a sequential number assigned to each subband in an observation, while the latter is linked to the frequency at which the observation was performed. Example: an observation was set up covering the range 30-77.3 MHz with two simultaneous beams using 244 subbands each. In this case, subband will range from 0 to 487, while stationSubband from 153 to 396. The stationSubband information is stored in the observation, but not in the pipeline products (which instead contain the frequency). If you want to search on stationSubband, you must perform your search on observations first, then fetch the pipelines linked to those observations. If you use frequency, you can search directly on pipelines.

As a general advise, before performing a search, you need to **understand thoroughly the meaning of the keywords that you are using and where their values are stored**, otherwise you may not find the data you are looking for.

```
do_stage = False
project1 = 'LCX_YYY'
project2 = 'LCZ_VVV'
subband1 = 301
subband2 = 302
cls = CorrelatedDataProduct

# All URIS to stage
uris = {
    project1: set(),
    project2: set(),
}

for project in (project1, project2) :
    print("Using project %s" % project)
    if not context.set_project(project) :
        raise Exception("You are not member of project %s" % project)
    query_observations = Observation.select_all().project_only()
    for observation in query_observations :
        print("Querying ObservationID %s" % observation.observationId)
        dataproduct_query = cls.observations.contains(observation)
        # isValid = 1 means there should be an associated URI
        dataproduct_query &= cls.isValid == 1
        dataproduct_query &= ((cls.subband == subband1) | (cls.subband ==
subband2))
        # Or for stationSubband do :
        #dataproduct_query &= ((cls.stationSubband == subband1) |
(cls.stationSubband == subband2))
        for dataproduct in dataproduct_query :
            # This DataProduct should have an associated URL
            fileobject = ((FileObject.data_object == dataproduct) &
(FileObject.isValid > 0)).max('creation_date')
            if fileobject :
                print("URI found %s" % fileobject.URI)
                uris[project].add(fileobject.URI)
            else :
                print("No URI found for %s with dataProductIdentifier %d" %
(dataproduct.__class__.__name__, dataproduct.dataProductIdentifier))

for project in (project1, project2) :
    print("Total URI's found for project %s: %d" % (project,
len(uris[project])))

stager = LtaStager()
for project in (project1, project2) :
    if do_stage :
        stager.stage_uris(uris[project])
```

Here, we find data between freq1 and freq2 taken within one project between day1 and day2

```
do_stage = False
project = 'LCX_YYY'
freq1 = 172.0
freq2 = 178.0
day1 = datetime(2016,1,20) # this could include time; ie hours, minutes,
secondes
day2 = datetime(2016,1,31) # idem
# DataProduct class to query; CorrelatedDataProduct, SkyImageDataProduct,
etc ...
cls = CorrelatedDataProduct

if not context.set_project(project) :
    raise Exception("You are not member of project %s" % project)

query_observations = ((Observation.startTime >= day1) &
                      (Observation.endTime   <  day2)).project_only()
uris = set()
```

```
for observation in query_observations :
    print("Querying ObservationID %s" % observation.observationId)
    dataproduct_query = cls.observations.contains(observation)
    # isValid = 1 means there should be an associated URI
    dataproduct_query &= cls.isValid == 1
    dataproduct_query &= cls.minimumFrequency >= freq1
    dataproduct_query &= cls.maximumFrequency < freq2
    for dataproduct in dataproduct_query :
        # This DataProduct should have an associated URL
        fileobject = ((FileObject.data_object == dataproduct) &
(FileObject.isValid > 0)).max('creation_date')
        if fileobject :
            print("URI found %s" % fileobject.URI)
            uris.add(fileobject.URI)
        else :
            print("No URI found for %s with dataProductIdentifier %d" %
(dataproduct.__class__.__name__, dataproduct.dataProductIdentifier))

print("Total URI's found %d" % len(uris))

if do_stage :
    stager = LtaStager()
    stager.stage_uris(uris)
```