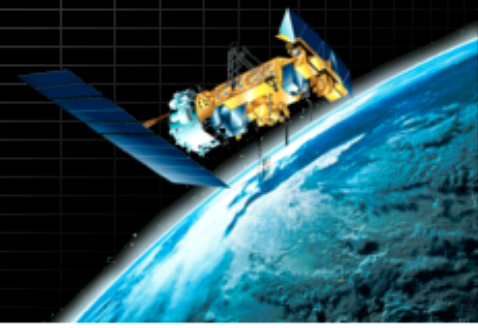


PyTROLL

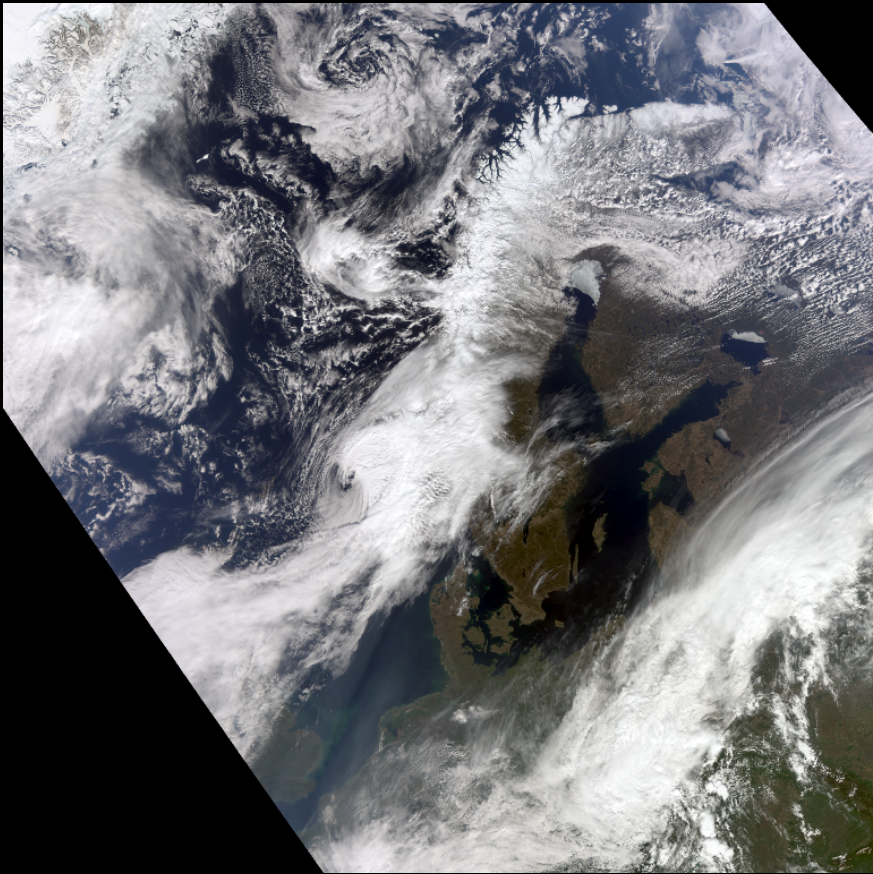
A python weather satellite data processing framework: the VIIRS and MODIS use cases.

Martin Raspaud, Adam Dybbroe,
Lars Rasmussen, Esben Nielsen, Rune Larsen
SMHI & DMI

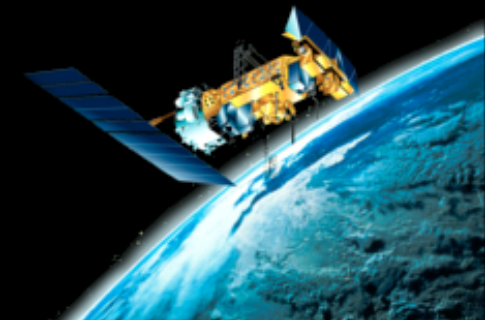


What is pytroll ?

- Collection of FOSS python packages for reading, interpreting, and writing weather satellite data

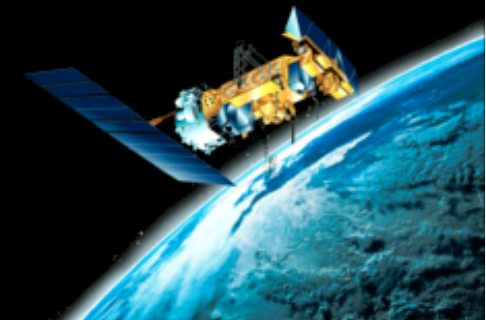


www.pytroll.org



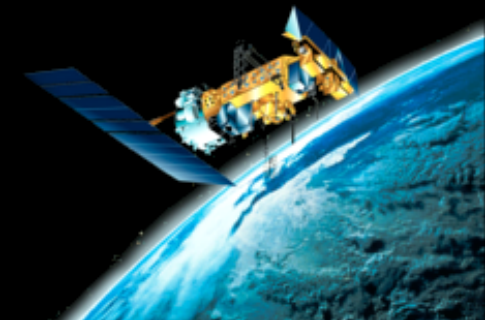
Pytroll

- Satellite positioning
- Data reading, resample, manipulation
- Tie-point interpolation
- Resampling
- Data exchange

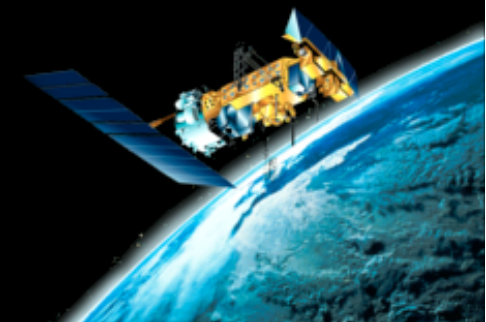
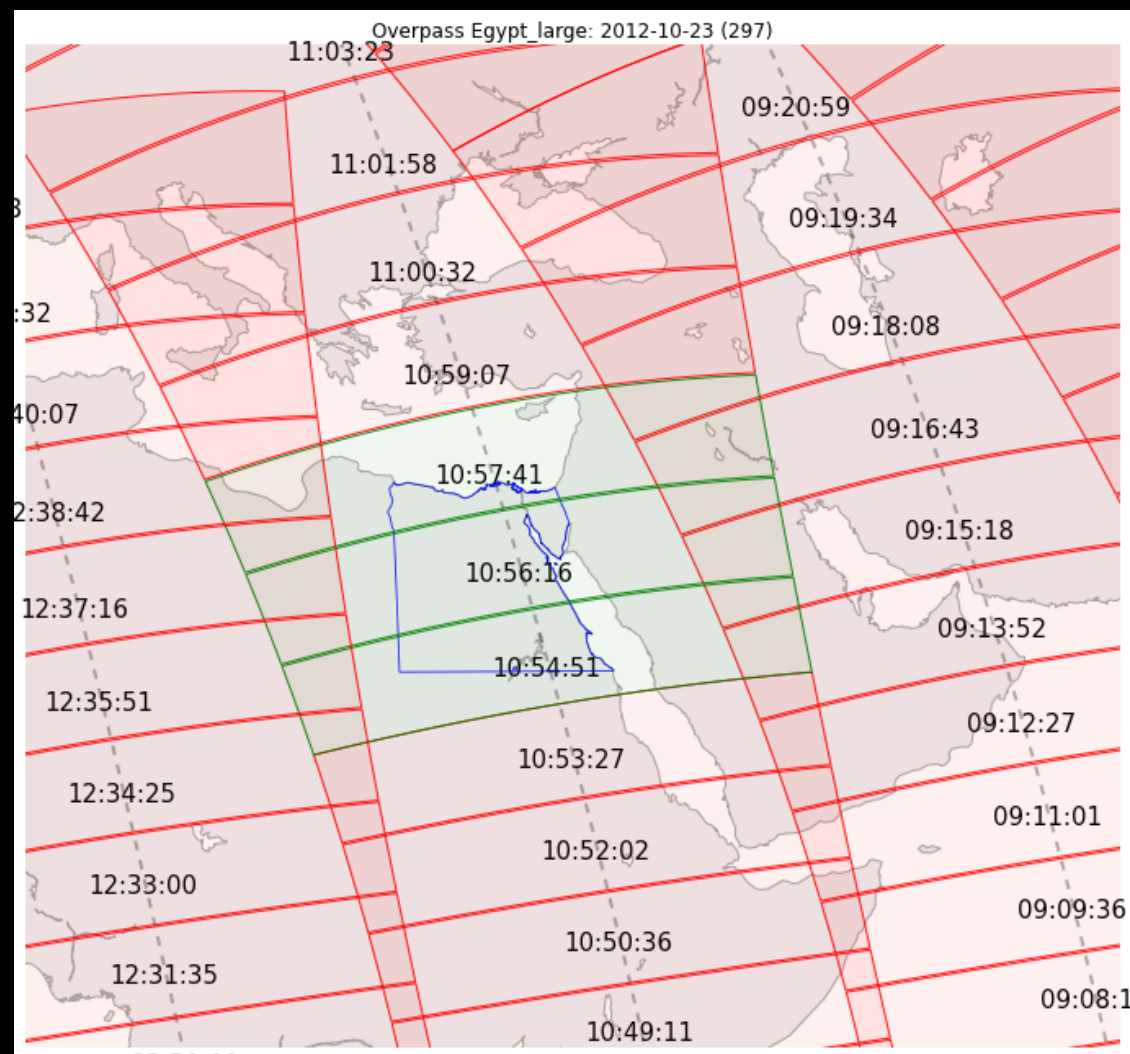


Pyorbital: Satellite positioning

- Uses TLE data
- SGP4 algorithm
- Subsatellite track
- Experimental support for geolocation

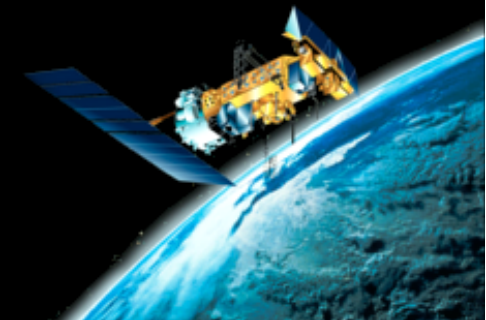


Pyorbital: Satellite positioning



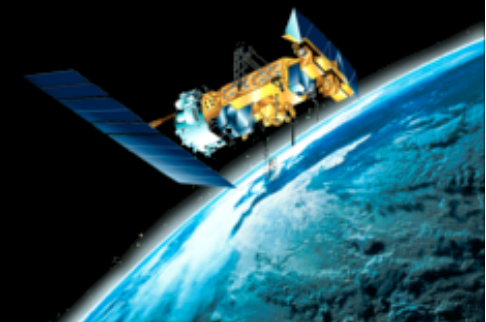
Mpop: the interface

- Load data in a unified way
- Use data, generate products
- Save data (netcdf, image formats (geotiff))



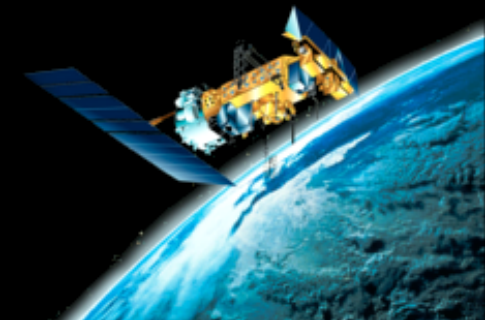
Mpop demo

```
>>> from mpop.satellites import PolarFactory
>>> from datetime import datetime
>>> time_slot = datetime(2012, 5, 18, 12, 9)
>>> orbit = "02882"
>>> global_data = PolarFactory.create_scene("npp", "", "viirs", time_slot, orbit)
```



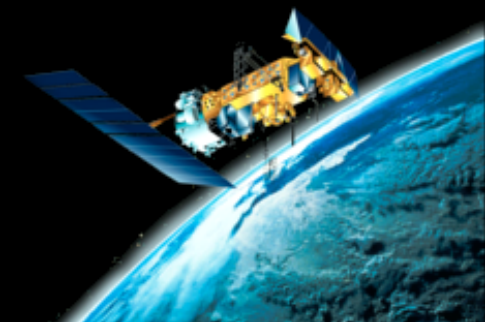
Mpop demo

```
>>> global_data.load([0.64, 0.86, 11.45])
```



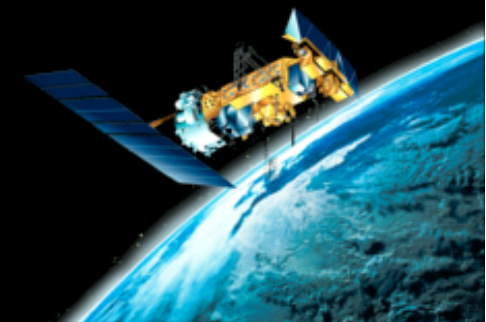
Mpop demo

```
>>> local_data = global_data.project("scan")
```



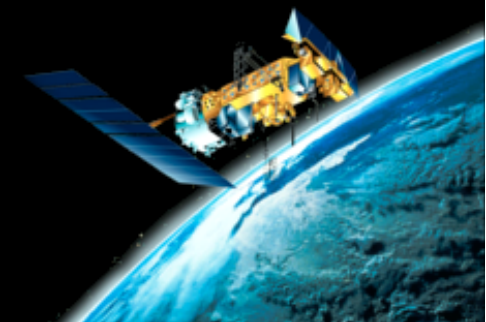
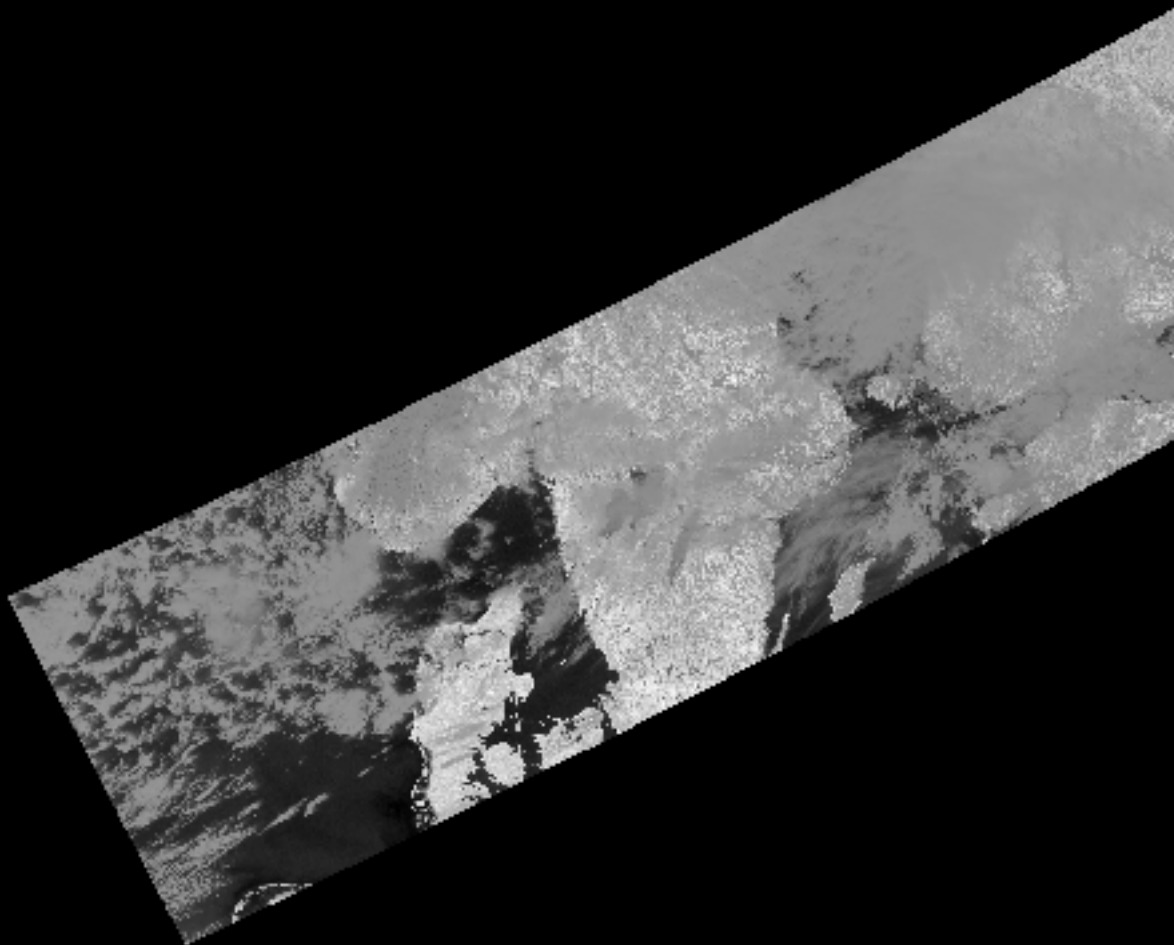
Mpop demo

```
>>> ndvi = ((local_data[0.86] - local_data[0.64]) /  
            (local_data[0.86] + local_data[0.64]))
```



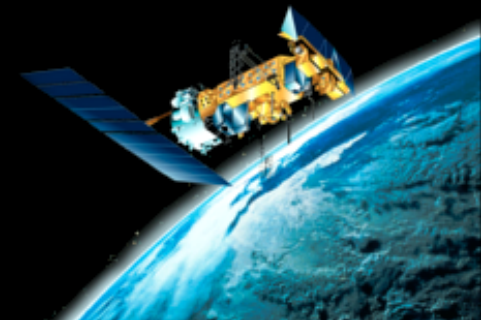
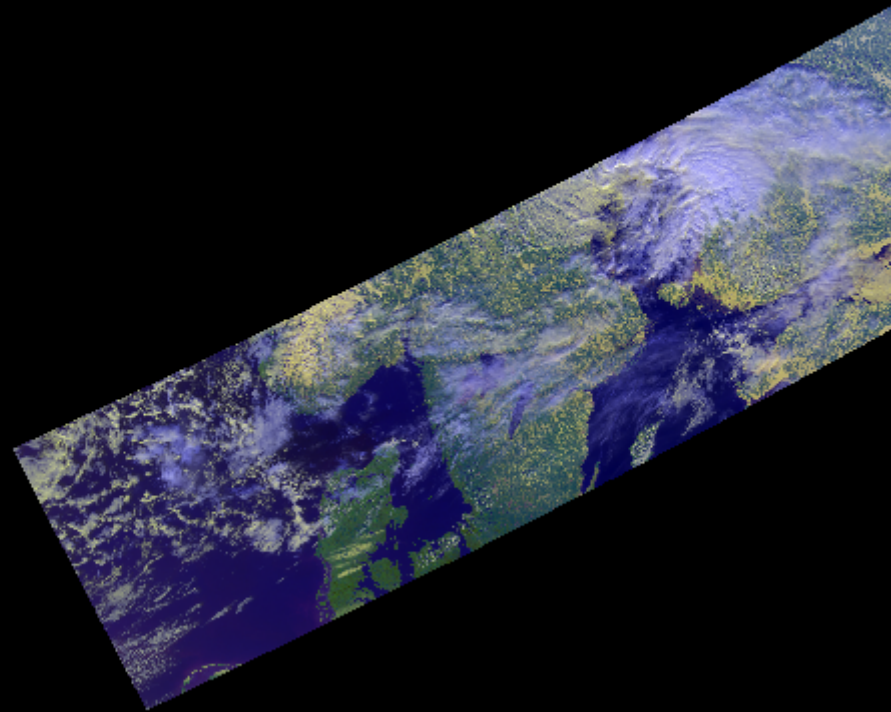
Mpop demo

```
>>> ndvi.show()
```



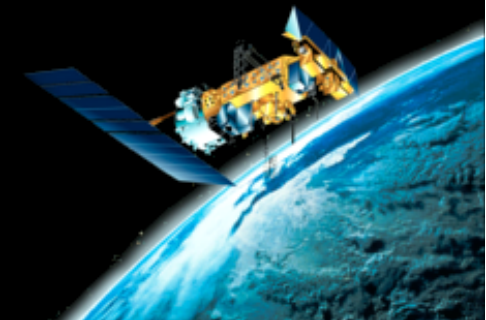
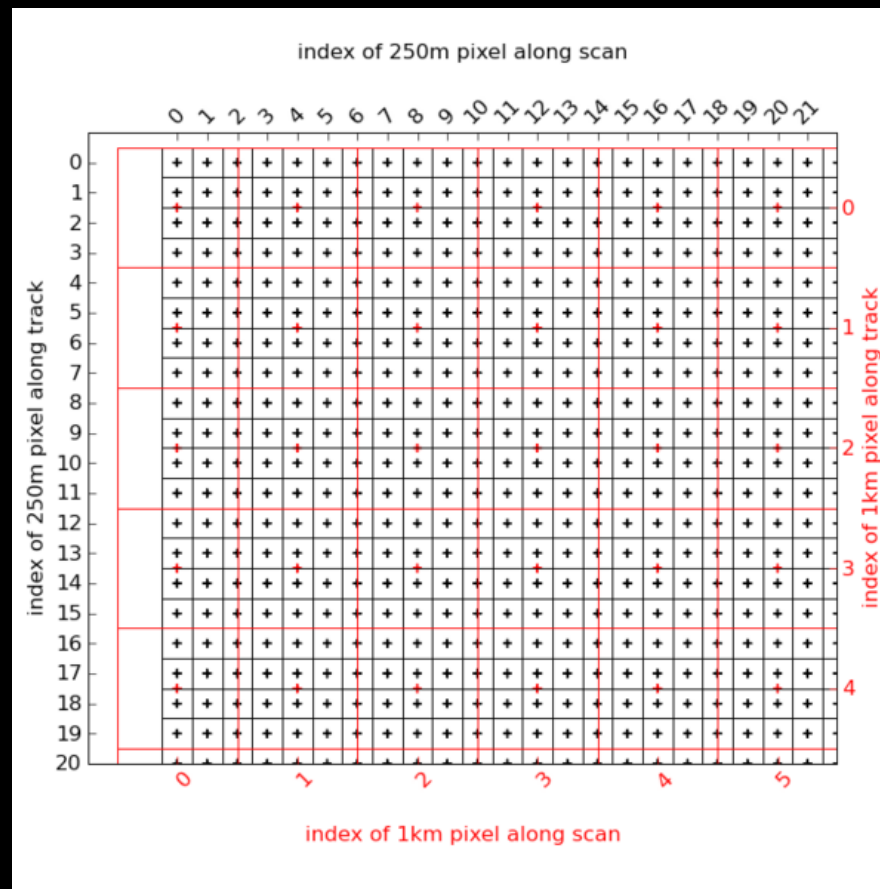
Mpop demo

```
>>> local_data.image.hr_overview().show()
```



Geotiepoints

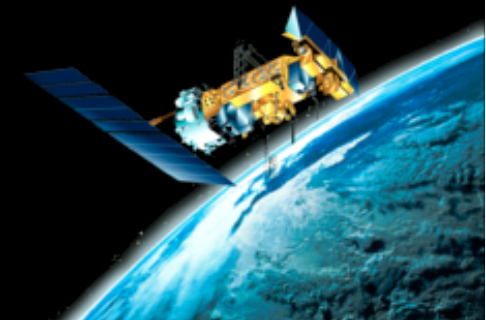
- Tiepoints interpolation



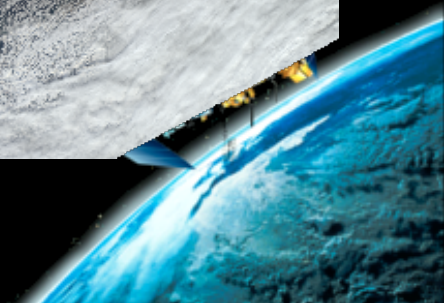
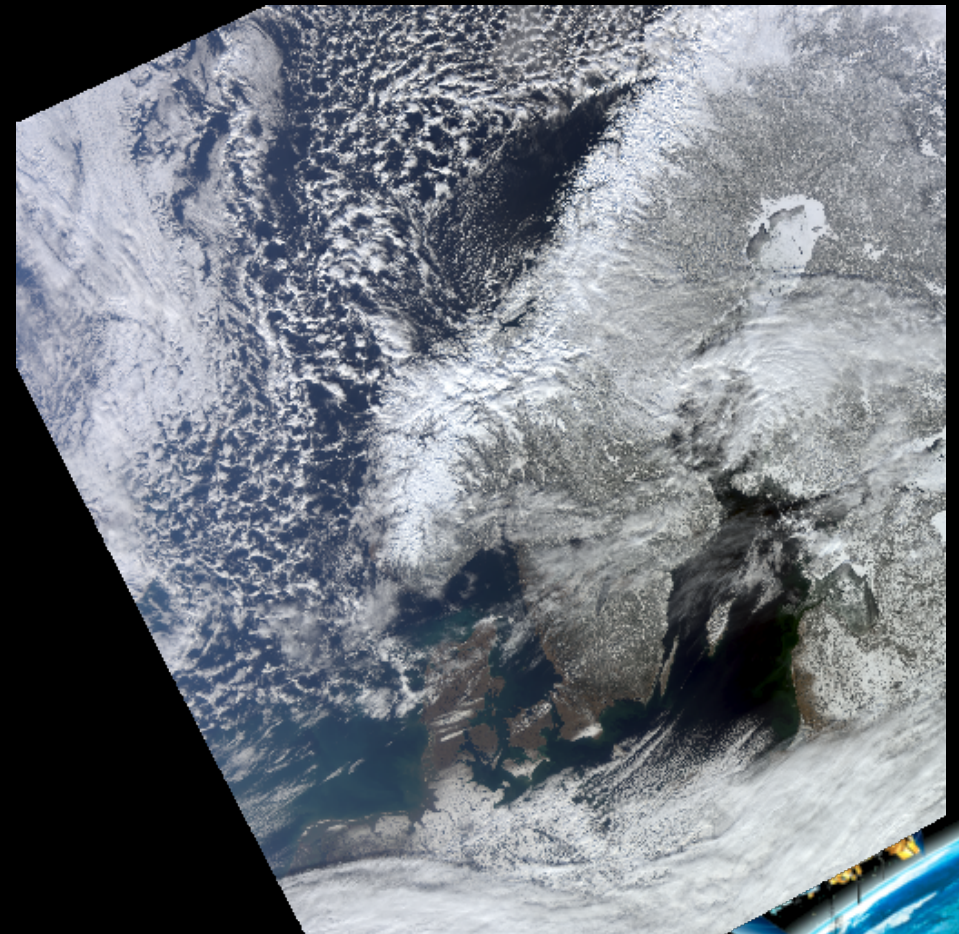
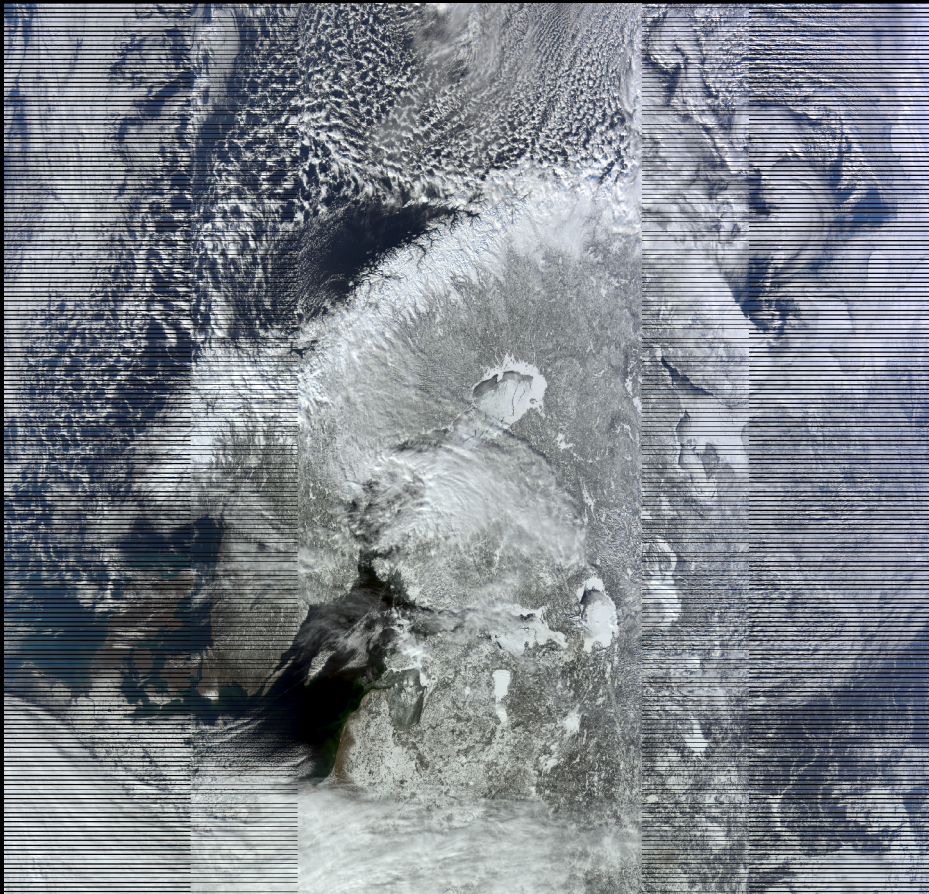
Geotiepoints

- Tiepoints interpolation

```
>>> interpolator = SatelliteInterpolator((tie_lons, tie_lats),
...                                     (tie_rows, tie_cols),
...                                     (fine_rows, fine_cols),
...                                     2, 2)
>>> interpolator.interpolate()
(array([[ 30.          ,  30.20005856,  30.40007805,  30.60006827,
         30.800039   ,  31.          ,  31.19996102,  31.39993181,
         31.59992209,  31.79994159,  32.          ]])
```

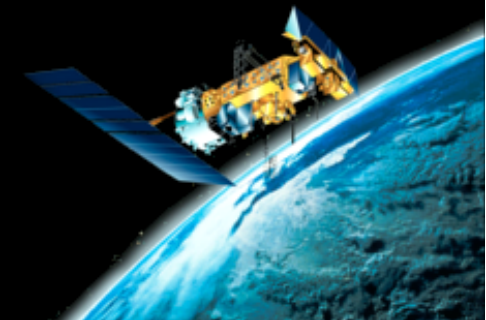


Pyresample



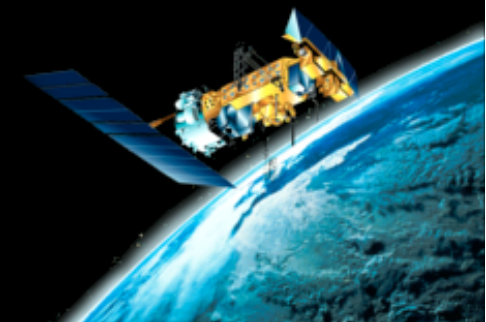
Pyresample

- Resampling of data using nearest-neighbour searches
- Efficient algorithm



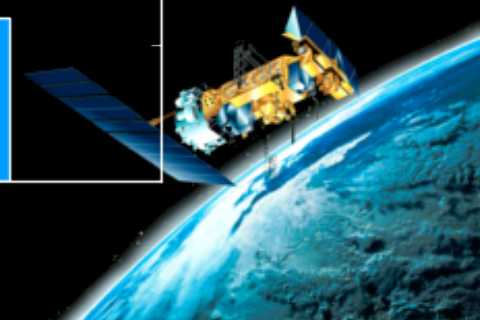
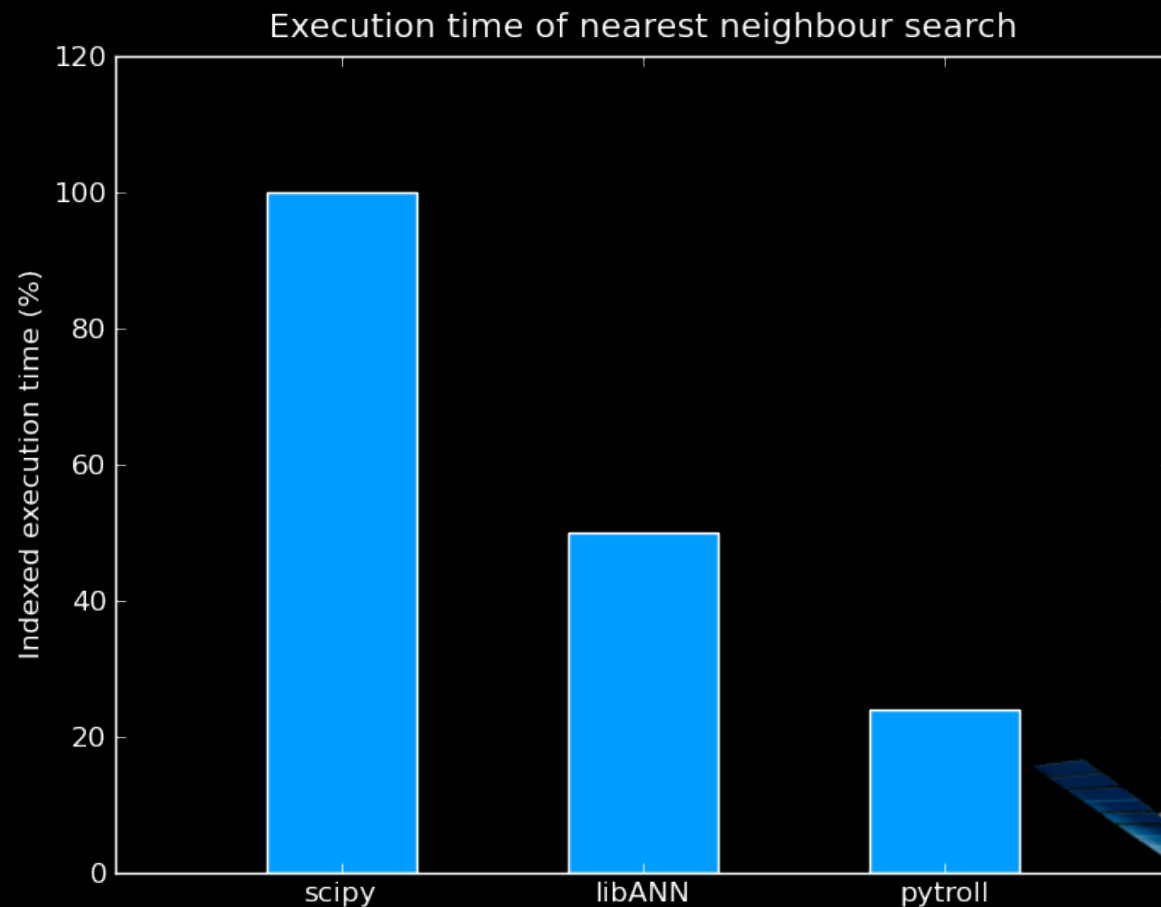
Pyresample: Efficient NN search

- Rewrite of the kd-tree algorithm
- Allow for multithreading
- Low memory consumption



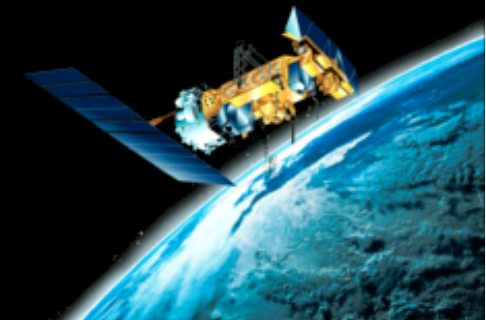
Pyresample: Efficient NN search

- Scipy vs
libANN vs
pytroll



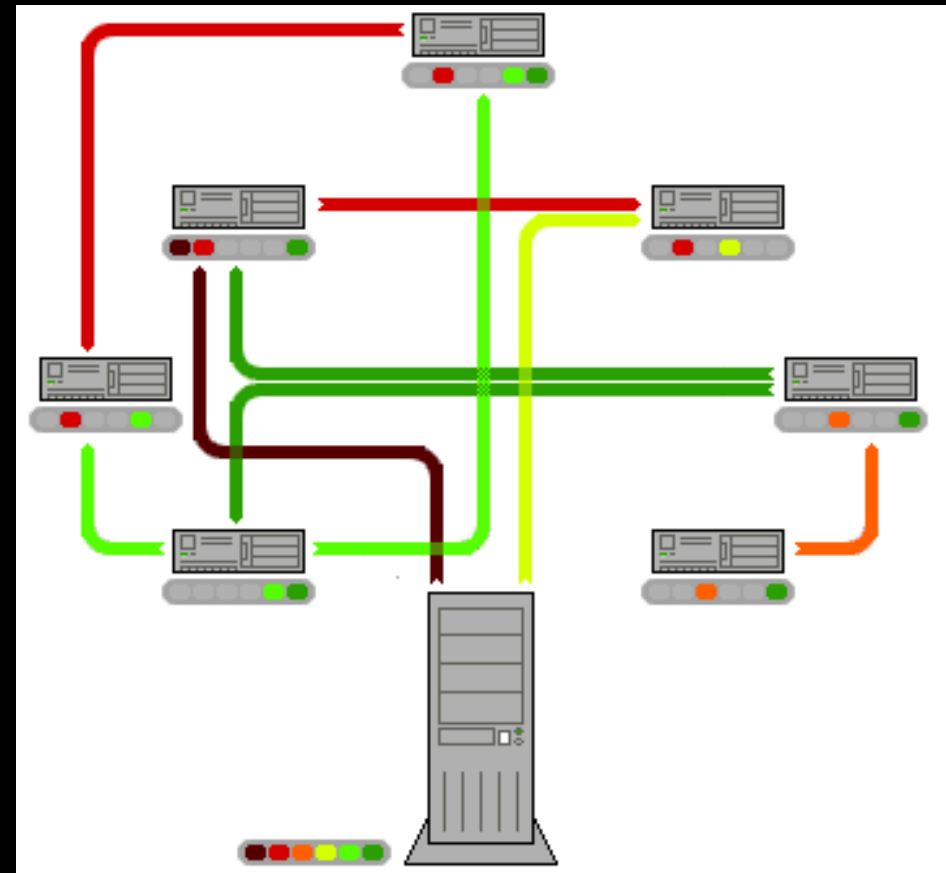
Trollcast: Data exchange

- A backup system (Full and partial)
- For polar weather-satellite data
- With no timeliness
- Getting data dumps from one other station was not fully satisfactory



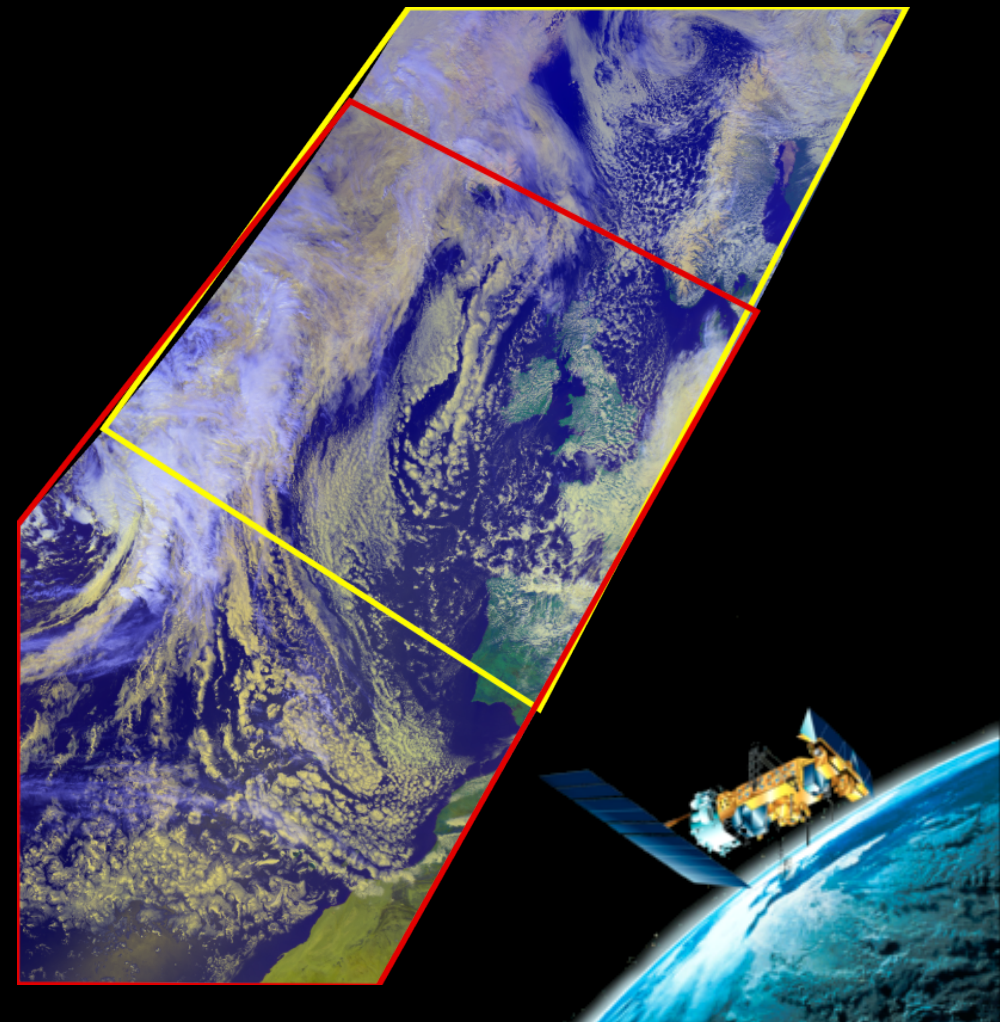
Trollcast: Bittorrent

- P2P as opposed to server-client
- Seeder needs only send data once
- Advertize, make requests, and receive



Trollcast: Non-identical data

- Every reception station gets a unique collection of scanlines
- Quality is not uniform
- Views of the same data!



Trollcast: How does it work?

- Requests are date/time based
(eg: get data from now to now+15minutes)
- When several sources, get highest elevation
- Can be used as complement to own data, EARS/RARS, or full backup



Pytroll.org

NEXT



Welcome to pytroll!

This is the home of the pytroll project. The pytroll project is a collaboration on weather satellite data processing between [DMI](#) and [SMHI](#).

Its objective is provide different free and open source python modules for the reading, interpretation, and writing of weather satellite data.

The provided python packages are designed to be used both in R&D environments and in 24/7 operational production.

If you want to contact us, you can use the following mailing list: <https://groups.google.com/group/pytroll>

Note

[mpop](#) version 0.13.0 with a new avhrr aapp level1b reader in pure python is out!

The available python packages at the moment are:

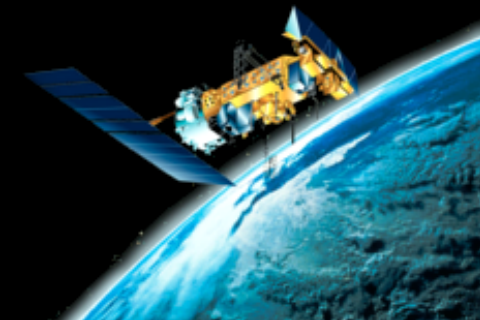
- [pyresample](#) for resampling satellite data
- [mipp](#) for reading weather satellite data

TABLE OF CONTENTS

[Installation and configuration](#)[Quickstart with MSG SEVIRI](#)[Quickstart with AVHRR](#)[VIIRS with Pytroll](#)[Quickstart with custom data](#)[WMO file formats](#)[Quickstart with EARS-NWC](#)[Recipes: Operational Pytroll](#)[Workshop 2012](#)

SEARCH

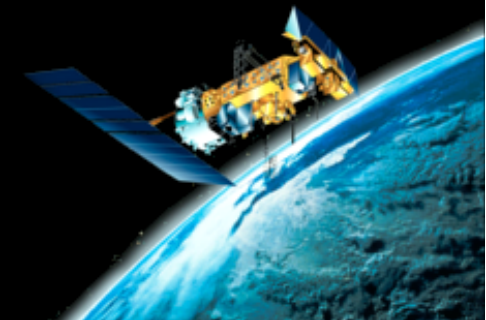
Enter search terms or a module, class or



Come and join us !

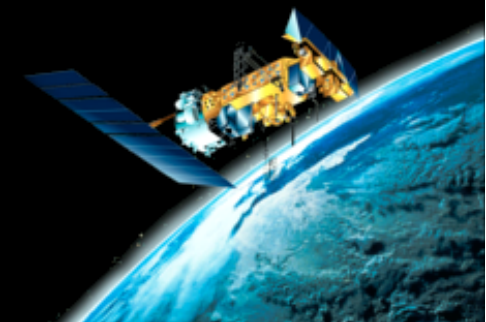
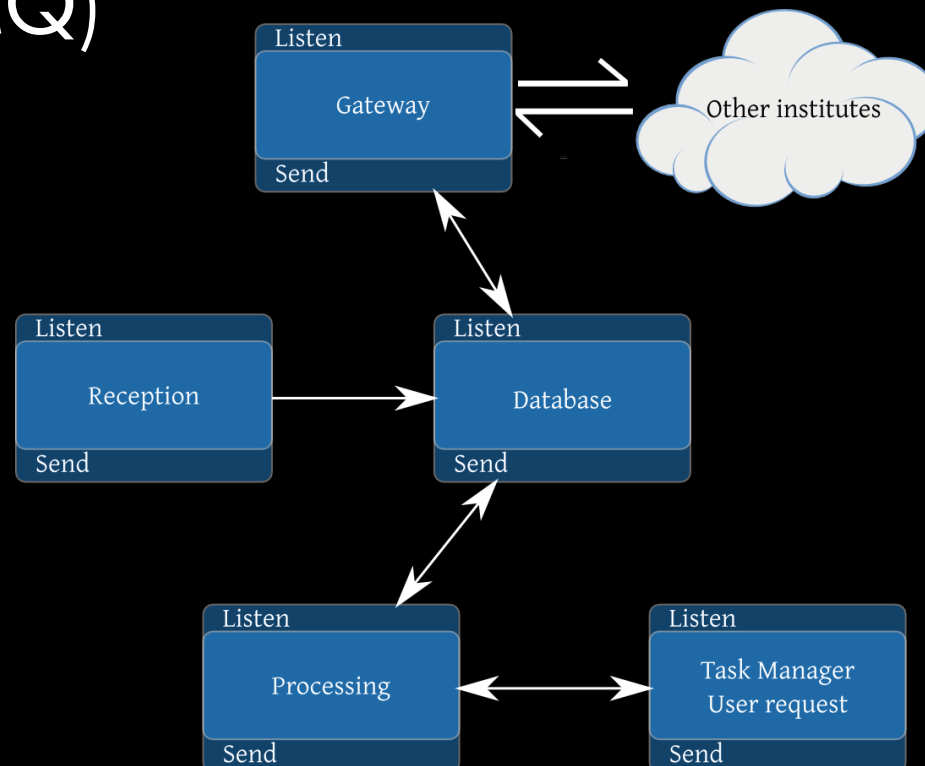
www.pytroll.org

google groups: pytroll



Distributed computing

- Messaging system
- Scales to any number nodes with high efficiency (ZeroMQ)



Unified interface and data structure

- Easy multi-satellite composites

