

# Prefactor - The LOFAR pre-facet calibration pipeline

## Overview

The official repository of prefactor is now on GitHub: <https://github.com/lofar-astron/prefactor>

It consists of parsets for the [genericpipeline](#) that do the first calibration of LOFAR data. Originally in order to prepare said data for the Factor facet calibration (<https://github.com/lofar-astron/factor>), but also useful if you don't plan to run Factor.

It includes:

- clock-TEC separation with transfer of clock from the calibrator to the target
- some flagging and averaging of amplitude solutions
- diagnostic plots
- at least some documentation

There are several pipeline parsets in this repository:

- **Pre-Facet-Cal.parset** : The “standard” pre-facet calibration pipeline, works on pre-NDPPP'ed data
- **Pre-Facet-Cal-RawData-Single.parset** : A pre-facet pipeline to work on raw (non NDPPP'ed) data
- **Pre-Facet-Cal-RawData-PreAvg.parset** : A pre-facet pipeline to work on raw (non NDPPP'ed) data that does the subband concatenating in the first NDPPP step. (To reduce the number of files on systems where this is a problem, e.g. JURECA)
- **Initial-Subtract.parset** : A pipeline that generates full FoV images and subtracts the sky-models from the visibilities. (Needed for facet-calibration, this could also be done as the first step of Factor.)

## Software requirements

- the full “offline” LOFAR software installation version  $\geq 2.15$   
(With small modifications the Pre-Facet-Cal pipelines can be run with older versions, but that is not supported by the authors anymore.)
- LoSoTo
- Python-PP (see <http://www.parallelpython.com/> or <https://pypi.python.org/pypi/pp> )
- Python matplotlib
- WSClean (for Initial-Subtract, version  $\geq 1.9$ )

## Documentation

There is a preliminary version of a cookbook chapter at:

[https://github.com/lofar-astron/prefactor/blob/pdf-doc/docs/cookbook\\_prefacet.pdf](https://github.com/lofar-astron/prefactor/blob/pdf-doc/docs/cookbook_prefacet.pdf) **Please read that first!**

## Usage Notes

- Don't edit the original parset files directly. Make a copy with a descriptive name (e.g. Pre-Facet-Cal-calibrator-3c295.parset) and edit that copy.
- Yes, updating the LOFAR software can be annoying, but it is worth it! Trust me. 😎
- Get someone to write a better documentation for the genericpipeline.

## FAQ

**KeyError 'mapfile'** : Your pipeline run fails like that:

```
2016-02-07 14:48:58 ERROR    genericpipeline:
*****
2016-02-07 14:48:58 ERROR    genericpipeline: Failed pipeline run: Pre-Facet-
Cal
2016-02-07 14:48:58 ERROR    genericpipeline: Detailed exception information:
2016-02-07 14:48:58 ERROR    genericpipeline: <type 'exceptions.KeyError'>
2016-02-07 14:48:58 ERROR    genericpipeline: 'mapfile'
2016-02-07 14:48:58 ERROR    genericpipeline:
*****
```

That happens when one step didn't generate a mapfile. Usually that means that the pipeline was looking for its input data, but couldn't find any files that match. Please check your `*_input_path` and `*_input_pattern` in the parset file! (Note: `ls -d *_input_path/*_input_pattern` should find your data.)

**PipelineStep\_\* missing** : Your pipeline run fails like that:

```
2016-02-04 13:33:56 ERROR    genericpipeline:
*****
2016-02-04 13:33:56 ERROR    genericpipeline: Failed pipeline run: Pre-Facet-
Cal
2016-02-04 13:33:56 ERROR    genericpipeline: Detailed exception information:
2016-02-04 13:33:56 ERROR    genericpipeline: <type 'exceptions.ImportError'>
2016-02-04 13:33:56 ERROR    genericpipeline: No module named
PipelineStep_createMapfile
2016-02-04 13:33:56 ERROR    genericpipeline:
*****
```

(The exact name of the missing module varies.) You are probably missing one of the entries in the `recipe_directories` setting in your `pipeline.cfg`, or one of those entries doesn't work. Make sure both entries point to the correct directories, and that the missing module can be found in the `plugins` subdirectory of one of those two entries.

**Missing “h5imp\_cal\_losoto.h5”**: Your pipeline run fails with an “executable\_args failed” error and in the logfile you can find something like:

```
"/usr/local/lofar/losoto/current/lib/python2.7/site-packages/losoto-1.0.0-  
py2.7.egg/losoto/h5parm.py",  
line 40, in __init__  
    raise Exception('Missing file '+h5parmFile+'.')  
Exception: Missing file ./h5imp_cal_losoto.h5.
```

That was caused by a bug in an old version of the genericpipeline. Update the software, make sure you use the new version of the software when starting the pipeline, and check the pathes in `pipeline.cfg` that they use the new version!

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<https://www.astron.nl/lofarwiki/> - **LOFAR Wiki**

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