Update on All-Sky-Cameras

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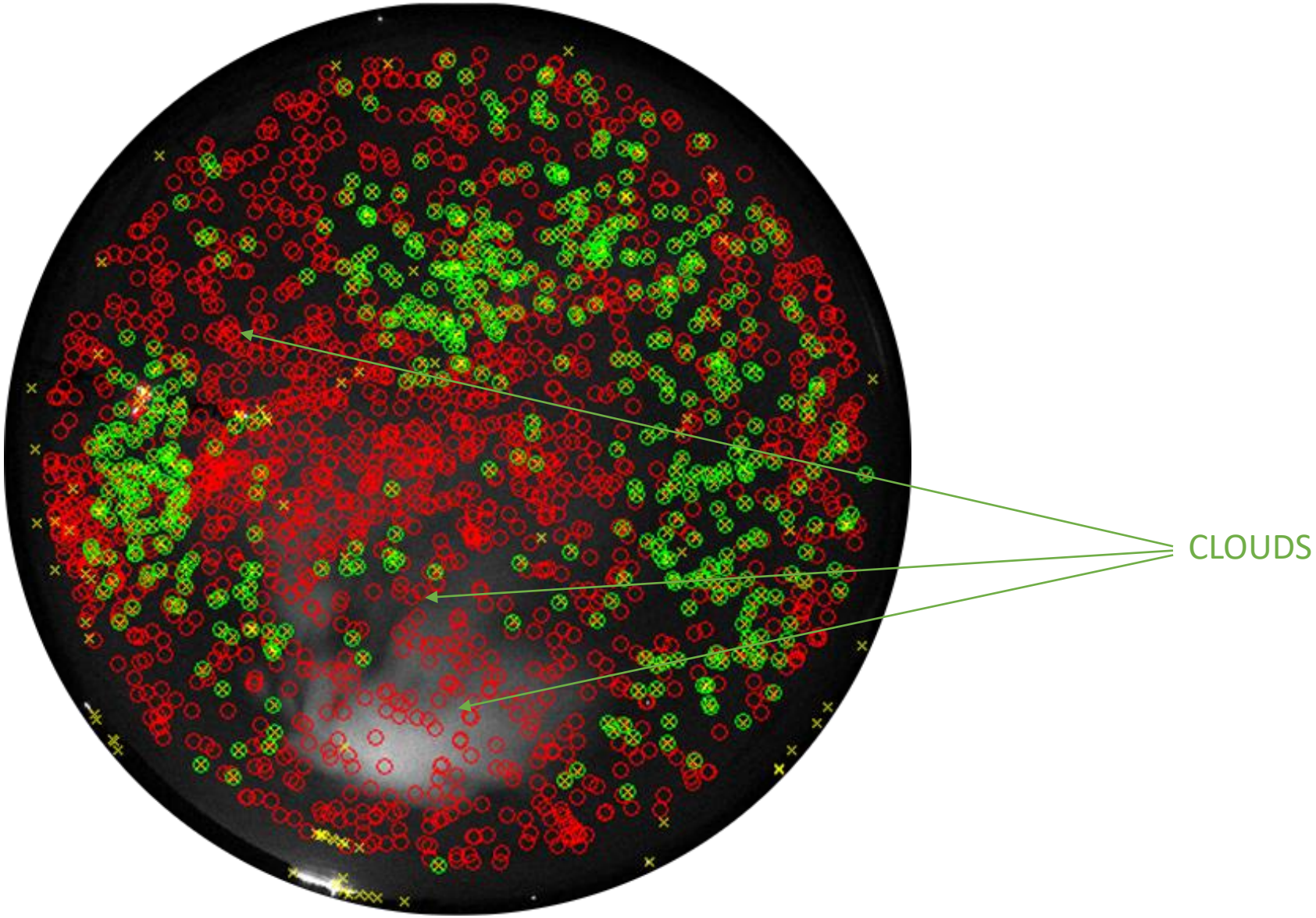
Joint Laboratory of optics of Palacky University and Institute of Physics of CAS

Status:
La Palma – normal operation

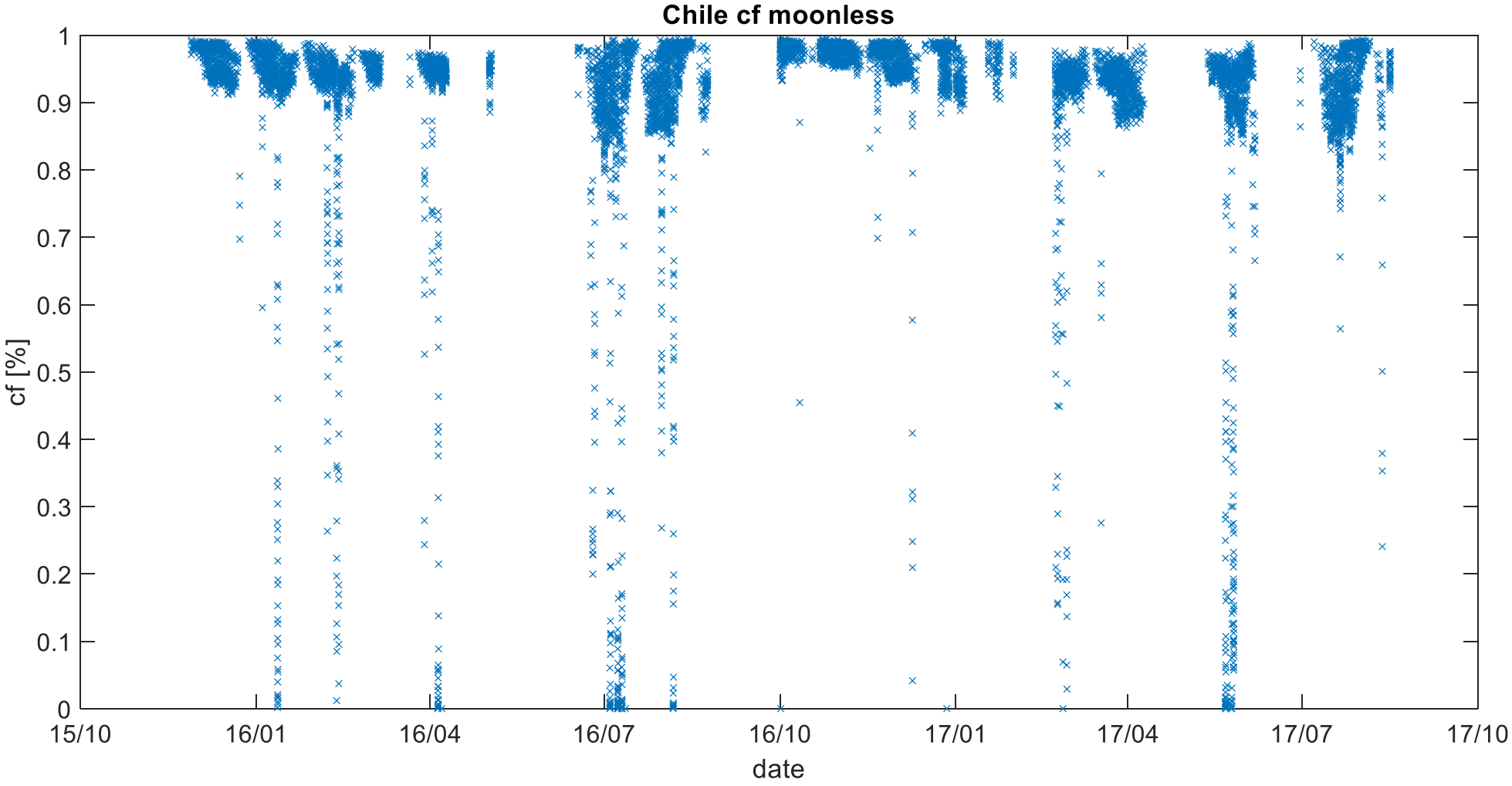
Chile – problem with power -> lost days

Detection of Clouds



Data analysis – Site Characterisation

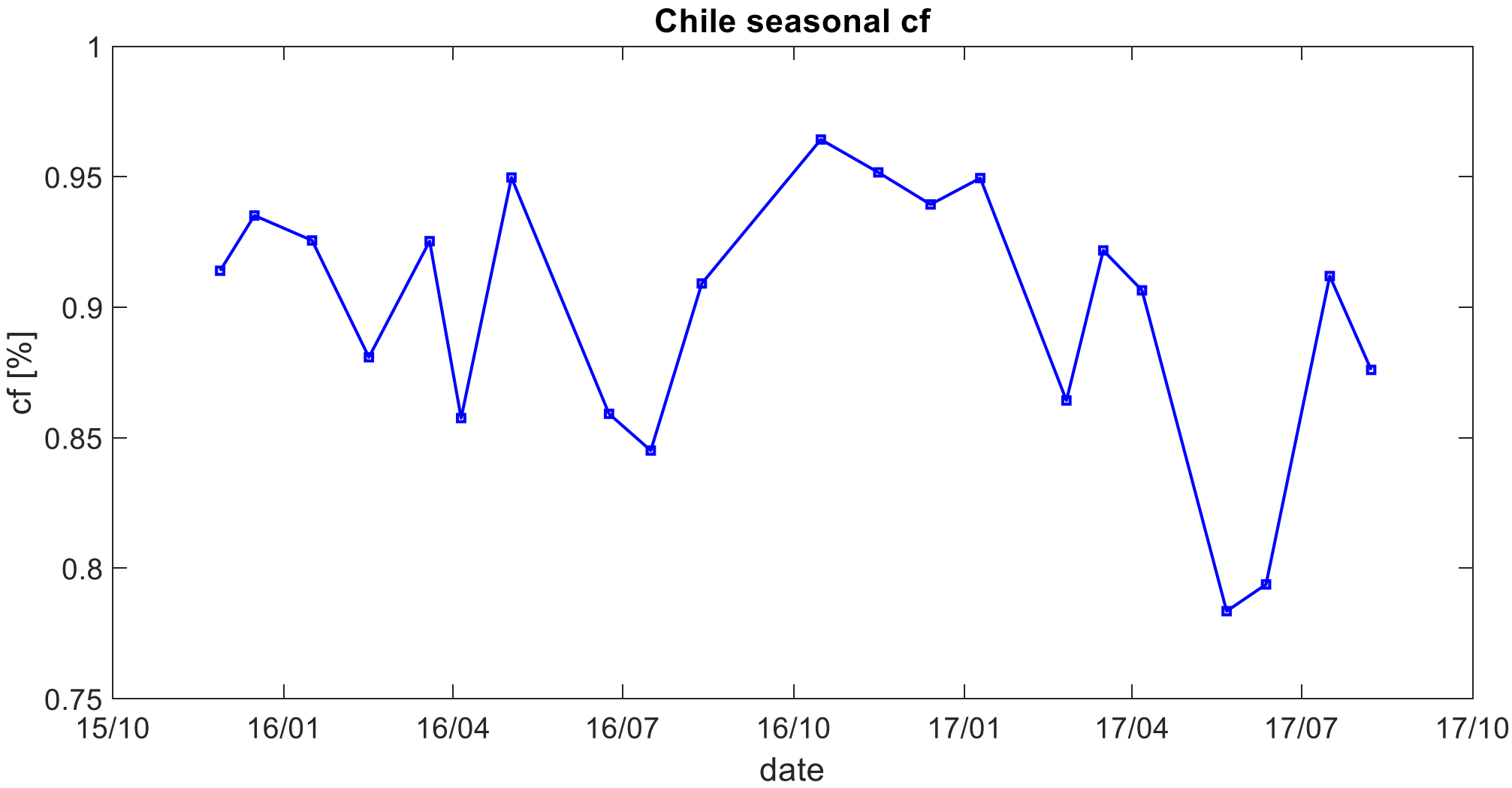
CHILE



All data cf (20000 files analyzed), cf of the period **91% !!!!!**

Data analysis – Site Characterization

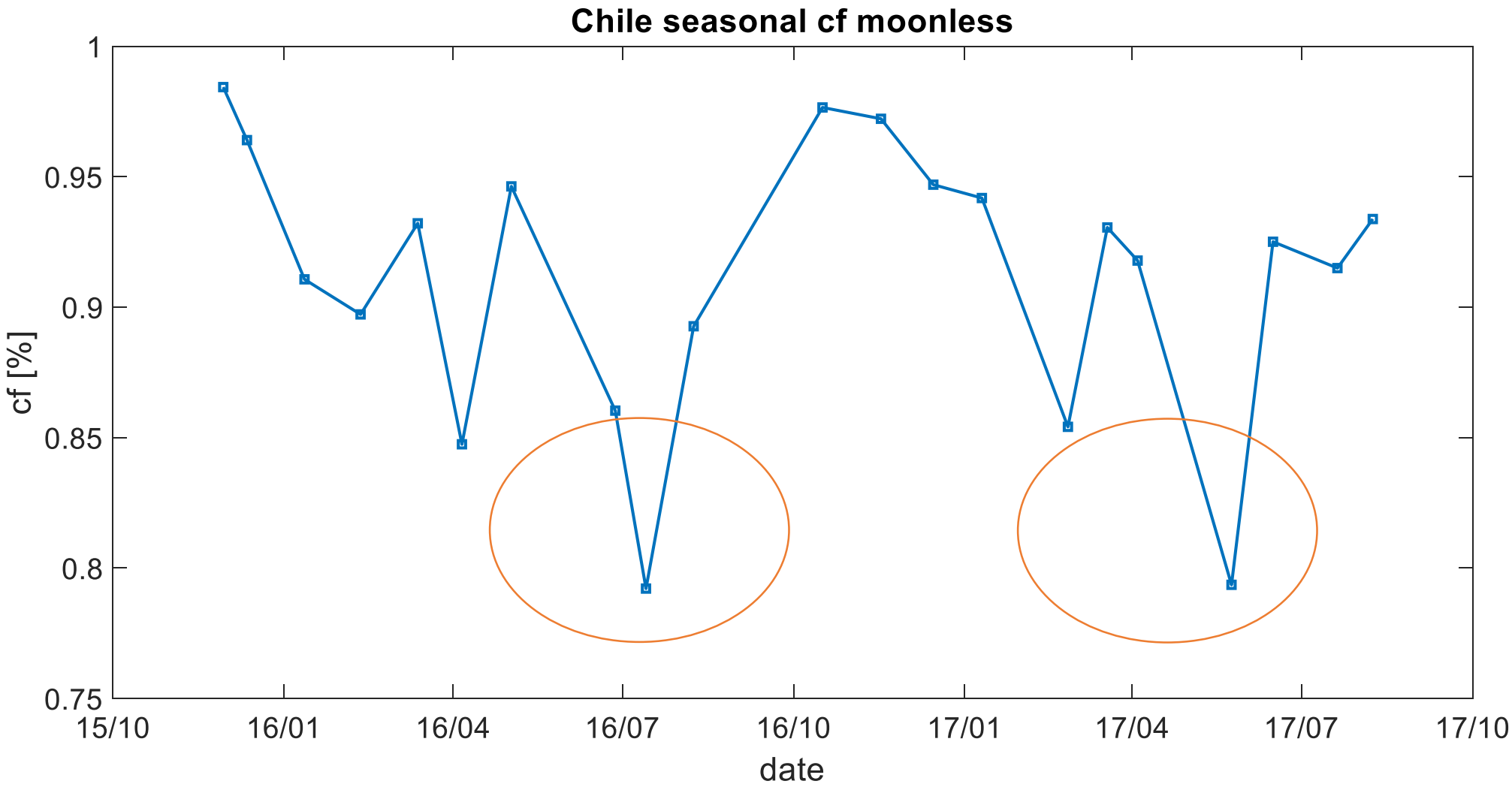
CHILE



Monthly averages of all data including moon period – no significant trends

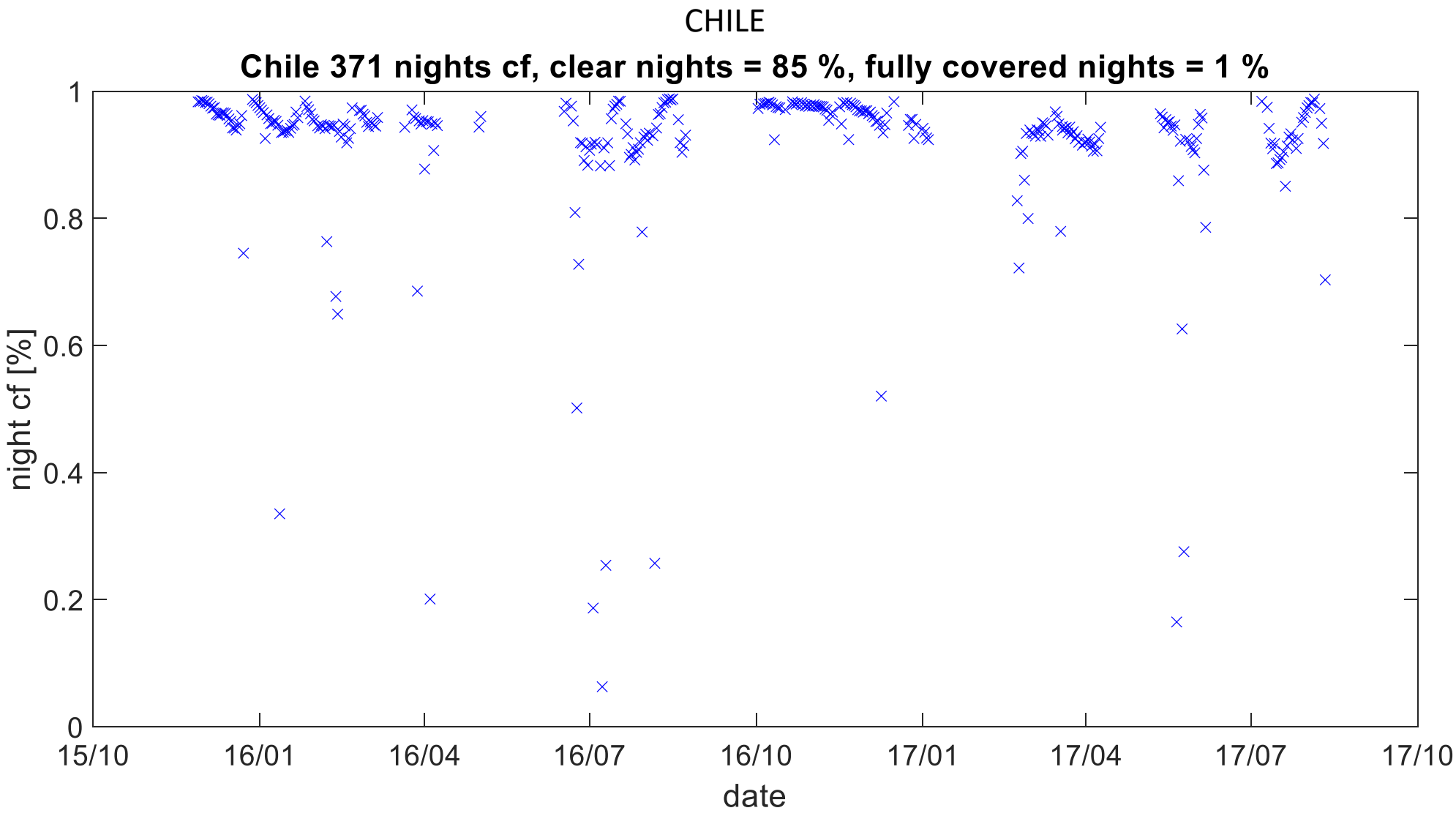
Data analysis – Site Characterisation

CHILE



Monthly averages of moonless – winter cf shows lower values

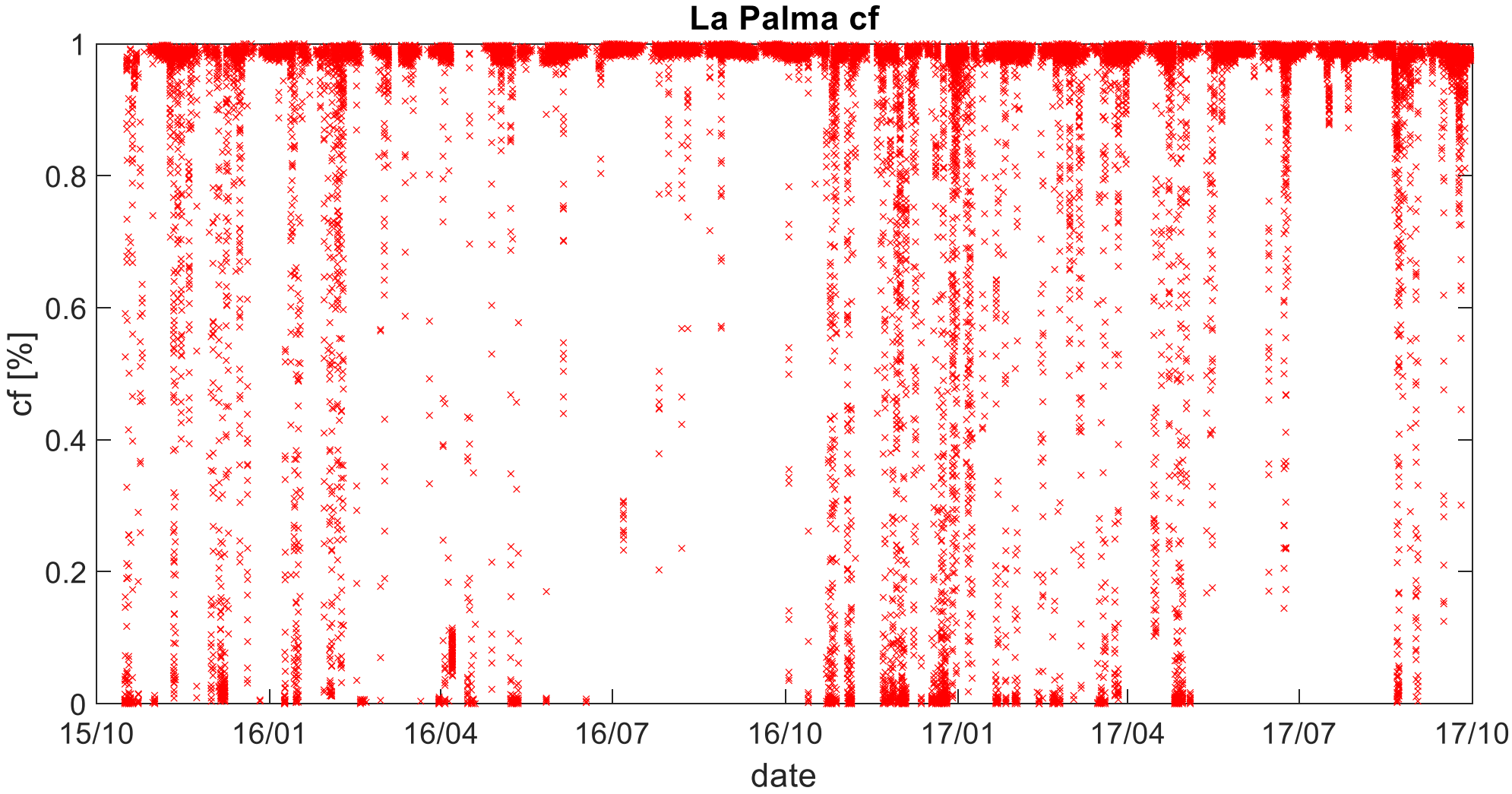
Data analysis – Site Characterisation



Nightly averages of the cf, the criterium for fully clear/covered night is cf >0.8/<0.2

Data analysis – Site Characterisation

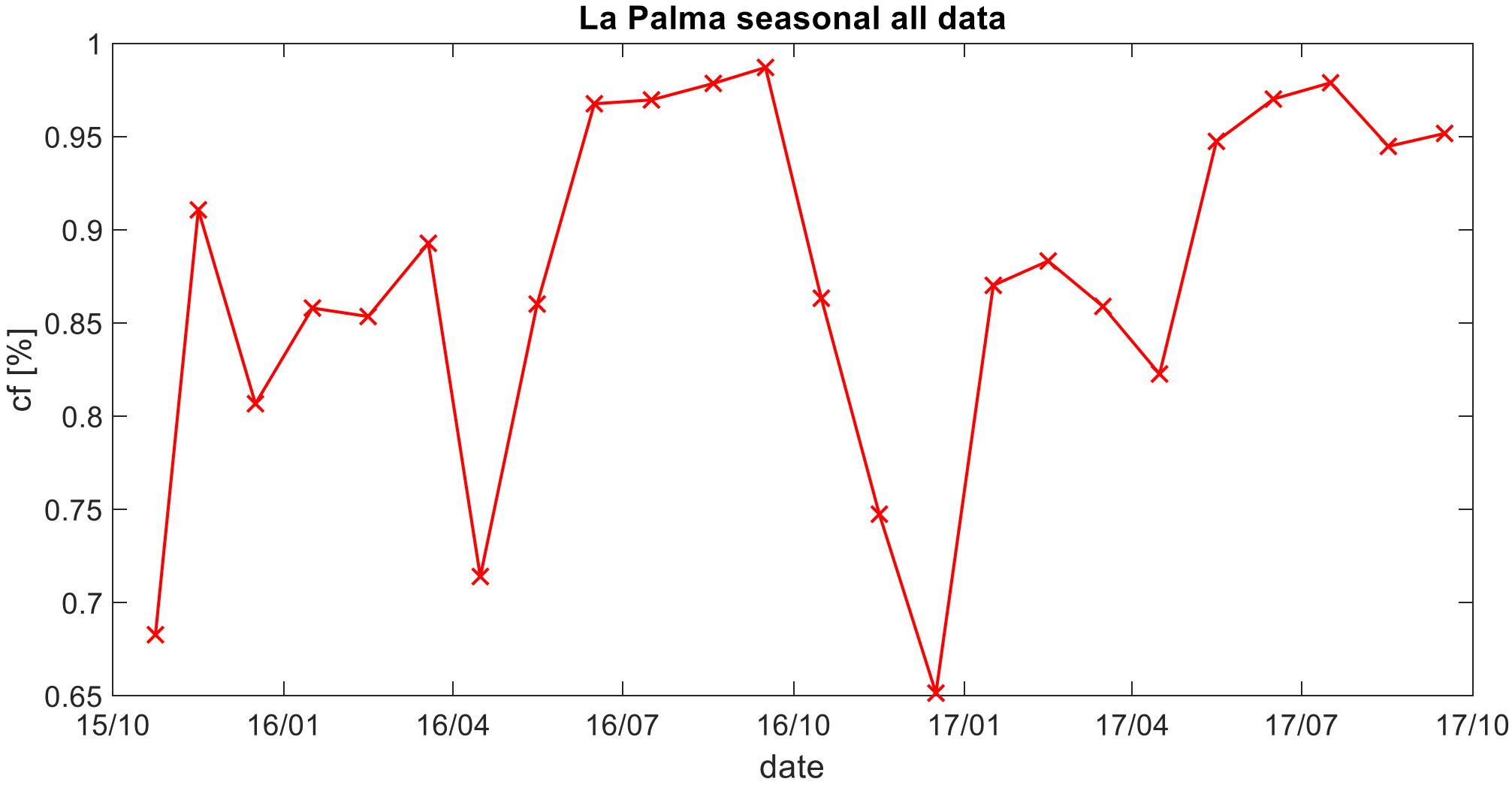
La Palma



All data cf (40000 files analyzed), cf of the period **91% !!!!!**

Data analysis – Site Characterisation

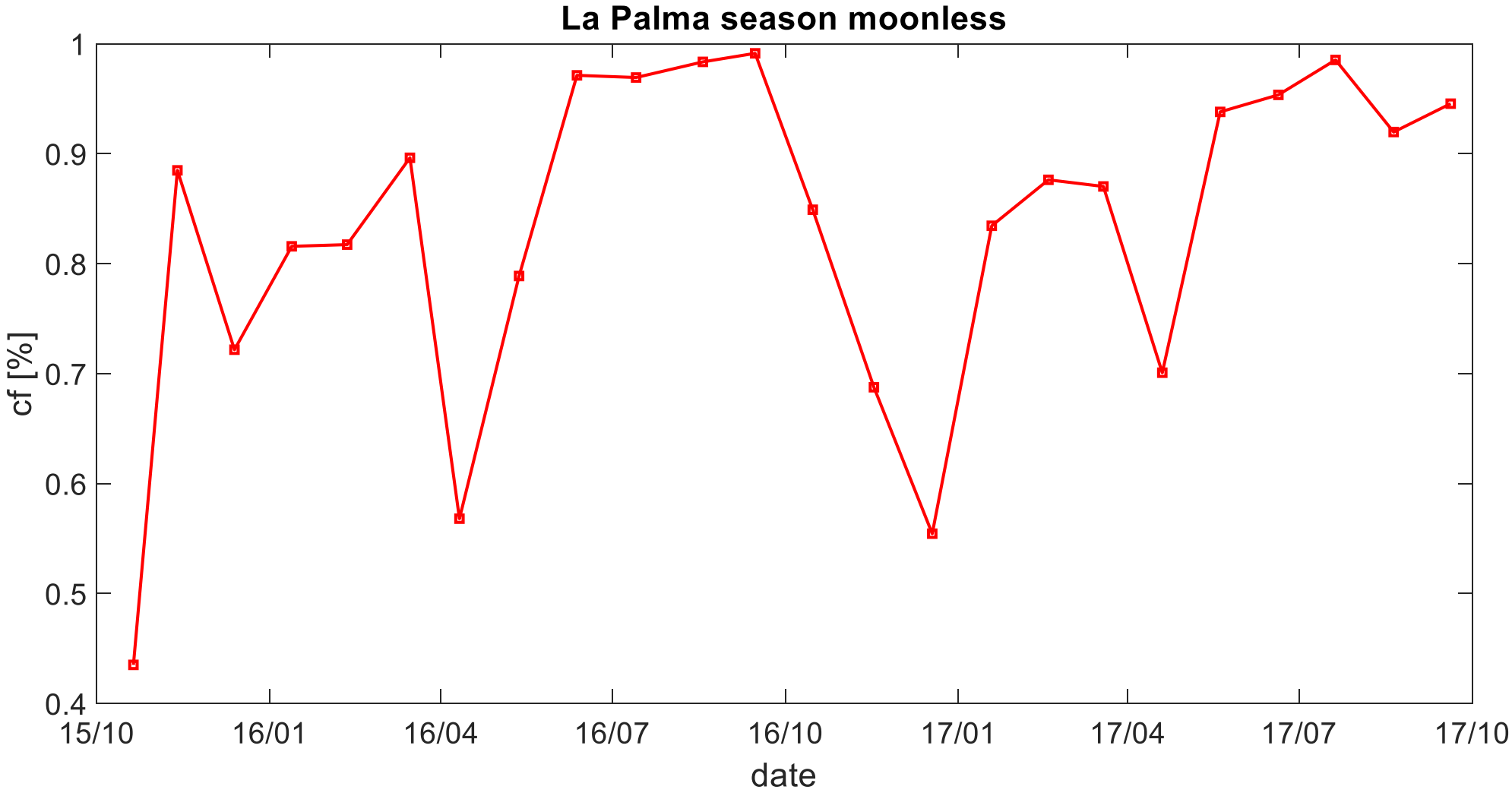
La Palma



Monthly averages of all data including moon period – no significant trends

Data analysis – Site Characterisation

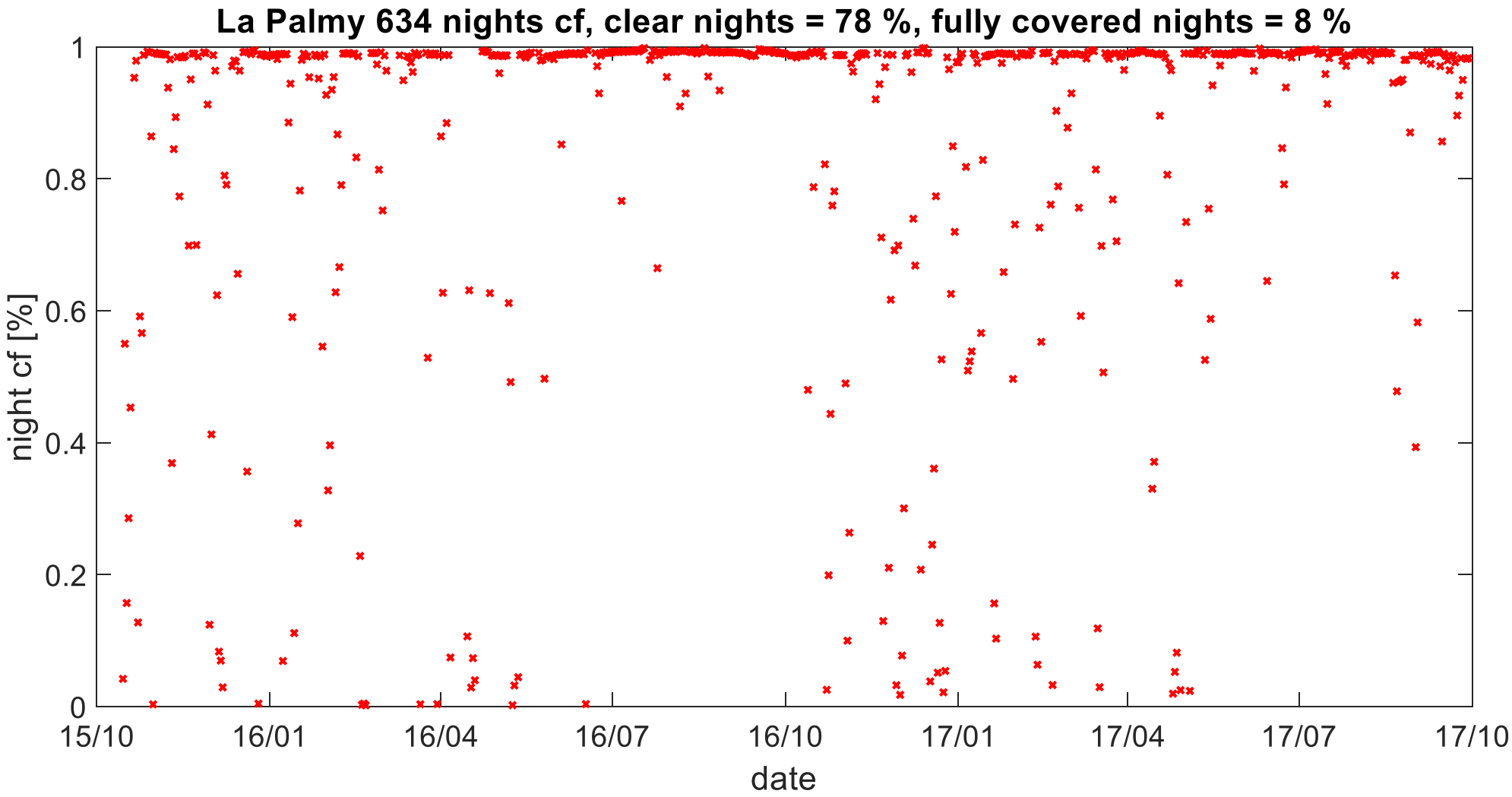
La Palma



Monthly averages of moonless – summer cf shows better values

Data analysis – Site Characterisation

La Palma



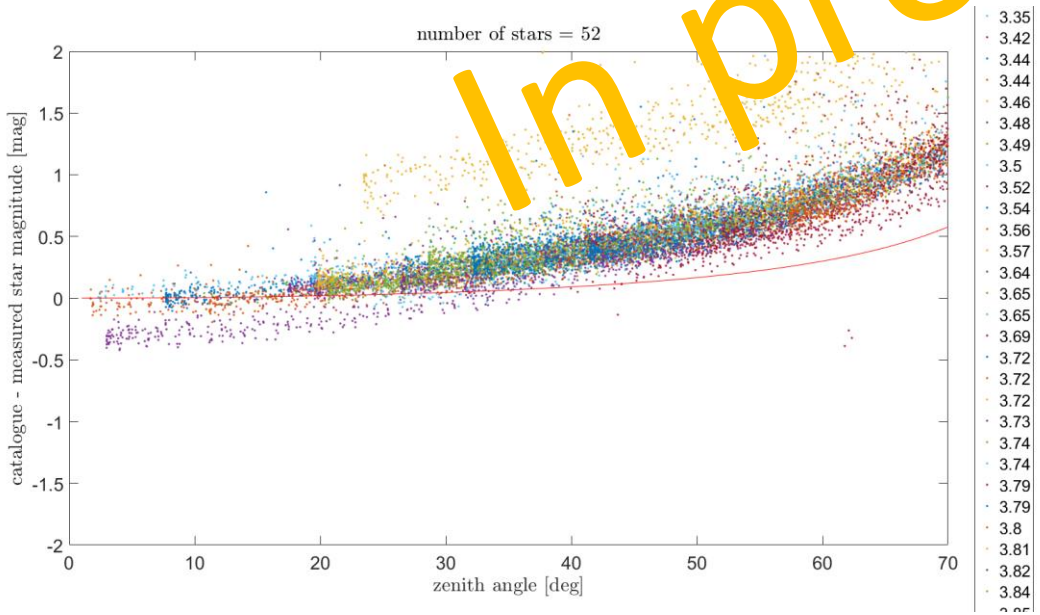
Nightly averages of the cf, the criterium for fully clear/covered night is cf >0.8/<0.2

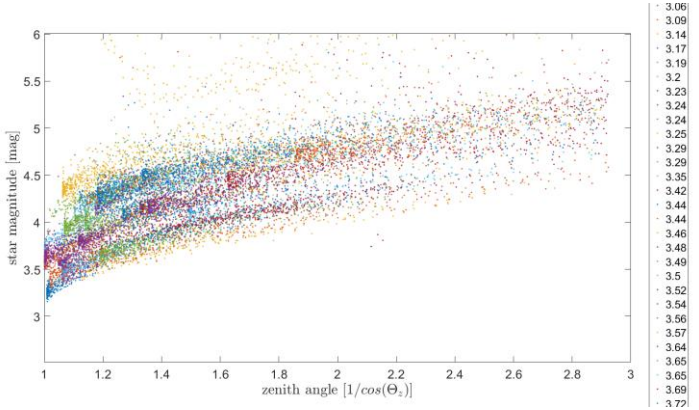
We loose about 8% of nights due to fully covered sky!!!!!!! (only 2 year data)

Photometry

The Johnsons BVR* filter allows us to measure the flux from the known stars and compare the signal with the catalogue for different wave range. The comparison could be used for the RAW estimation of the integral atmospheric attenuation in the direction to the star.

In process





* https://www.andovercorp.com/products/astronomy-filters/johnsonbessel-ubvri-filters/

Data analysis – Hardware

No changes for 2 cameras at La Palma & Chile
new ASC ready for installation in Krakow for the SST1M prototype
Housing, Camera, CCD, lens - the same
New PC - Raspberry Pi 3

Raspbian is a free operating system based on Debian optimized for the Raspberry Pi hardware X **Scientific Linux**

OPC-UA server for the Raspbian in process with help of Vitalii Sliusar (ready soon – next few months)
Test within SST1M infratructure and internal software and GUI
Two cases

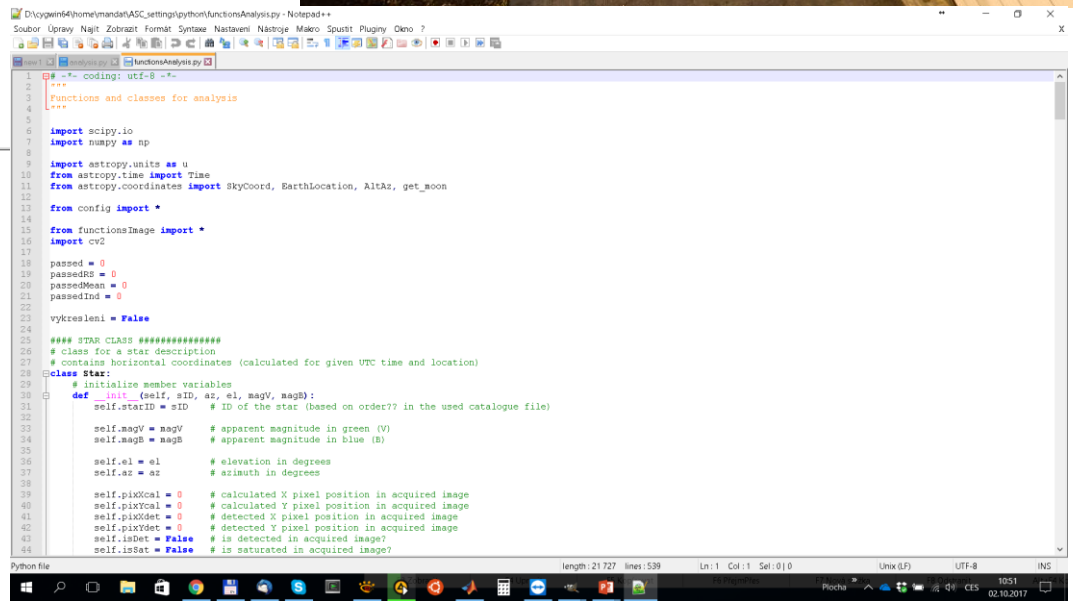
- Data taking – obtain image for further reconstruction on the client side
  inputs – exposure, filter
  output – fits file
- full analysis – obtain the result only
  input – provide full sky analysis
  output – cloud maps, fotometry etc.

Data analysis – software

Python 3 scripts – now tested at the FAST (TA -UTAH)
& SST1M - Krakow

new 1 | analysis.py

```python
# -*- coding: utf-8 -*-
"""
Analysis code

Usage: python3 analysis.py inputFile.fits
"""

import sys
import os
from functionsFITS import GxFITSImage
from functionsAnalysis import *
from functionsImage import *
from config import *

import datetime

DEBUG = True
DEBUG2 = False

flipX = True

if(DEBUG):
    filename = "data/image-20170402-055312.fits"

# check input parameter
if(len(sys.argv) != 2): # there should be exactly one argument
    print("Analysis script expects exactly one argument, the input FITS file name.")
    print("Usage: python3 analysis.py inputFile.fits")
    if(not DEBUG):
        sys.exit()
else:
    filename = sys.argv[1]

# load file, if file is not found, exit
fitsImg = GxFITSImage()
if(not fitsImg.load(filename)):
    print('ERROR: File '+str(filename)+' not found')
    sys.exit()

# get image for analysis
try:
```



D:\cygwin64\home\mandat\ASC_setting\python\functionsAnalysis.py - Notepad++

Soubor Úpravy Najít Zobrazit Formát Syntaxe Nastavení Nástroje Makro Spustit Pluginy Okno ?

new 1 | analysis.py | functionsAnalysis.py

```python
# -*- coding: utf-8 -*-
"""
Functions and classes for analysis
"""

import scipy.io
import numpy as np

import astropy.units as u
from astropy.time import Time
from astropy.coordinates import SkyCoord, EarthLocation, AltAz, get_moon

from config import *

from functionsImage import *
import cv2

passed = 0
passedRS = 0
passedMean = 0
passedInd = 0

vykresleni = False

#### STAR CLASS ###############
# class for a star description
# contains horizontal coordinates (calculated for given UTC time and location)
class Star:
    # initialize member variables
    def __init__(self, sID, az, el, magV, magB):
        self.starID = sID    # ID of the star (based on order?? in the used catalogue file)

        self.magV = magV     # apparent magnitude in green (V)
        self.magB = magB     # apparent magnitude in blue (B)

        self.el = el         # elevation in degrees
        self.az = az         # azimuth in degrees

        self.pixXCal = 0     # calculated X pixel position in acquired image
        self.pixYCal = 0     # calculated Y pixel position in acquired image
        self.pixXDet = 0     # detected X pixel position in acquired image
        self.pixYDet = 0     # detected Y pixel position in acquired image
        self.isDet = False   # is detected in acquired image?
        self.isSat = False   # is saturated in acquired image?
```

Python file | length : 21 727 lines : 539 | Ln : 1 Col : 1 Sel : 0 | 0 | Unix (LF) | UTF-8 | INS

Summary

- ASC La Palma & Chile – data taking/alaysis ongoing (power problem at Chile)
- Further development of analysis
- New hardware (need an approve the compatibility with ACTL)
- All python3 scripts
- Discussion about the (near)future location of ASCs (see next presentation)