Mickael Rigault | *ZTF meeting @ Stockholm* | *August 2018*

ztfquery
accessing ztf data with python

https://github.com/MickaelRigault/ztfquery

to get access, email your GitHub id to m.rigault@ipnl.in2p3.fr

Why **ztfquery** ?

You want to have access to ZTF data in a systematic way

i.e. you want data associated to observation made with a seeing lower than 2arcsec between the 1st of May 2018 and the 1st of June 2018.

You want to download the data in your computer

i.e. for testing the calibration or check the reference images

You want to know what field have been observed

Why don't I have data ? Not observed or no reference ?

You want to do that within your script

IRSA web API

https://irsa.ipac.caltech.edu/docs/program_interface/ztf_api.html

Science Exposures

File Path Pattern:

metadata

'https://irsa.ipac.caltech.edu/ibe/data/ztf/products/sci/'+**year**+'/'+**month**+**day**+'/'+**fracday**+'/ztf_'+**filefracday**+'_'
+**paddedfield**+'_'+**filtercode**+'_c'+**paddedccdid**+'_'+**imgtypecode**+'_q'+**qid**+'_'+suffix

You can query IRSA to find the metadata associated to what you are looking

There could be millions of url you may want to build to download the associated data

IRSA data web access

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Raw

File Path Pattern:

'https://irsa.ipac.caltech.edu/ibe/data/ztf/products/raw/'+**year**+'/'+**month**+**day**+**fracdate**+'/ztf_'+**filefracday**+'_'+
paddedfield+**filtercode**+'_c'+**paddedccdid**+'_'+**imgtypecode**+'.fits.fz'

Reference Images

File Path Pattern:

'https://irsa.ipac.caltech.edu/ibe/data/ztf/products/ref/'+**fieldprefix**+'/field'+**paddedfield**+'/'+**filtercode**+'/ccd'+**pa**
ddedccdid+'/q'+**qid**+'/ztf_'+**paddedfield**+'_'+**filtercode**+'_c'+**paddedccdid**+'_q'+**qid**+'_refimg.fits'

ztfquery is made to make this simple

Generic Example

You want data associated to observation made with a
seeing lower than 2arcsec between the 1st of May 2018 and the 1st of June 2018.

In [2]:
```
# Julian dates:
from astropy import time
jd_1may18 = time.Time("2018-05-01").jd # 2458239.5
jd_1june18 = time.Time("2018-06-01").jd # 2458270.5
print(jd_1may18,jd_1june18)
```

```
2458239.5 2458270.5
```

In [3]:
```
from ztfquery import query
zquery = query.ZTFQuery()


# Do the Query to see what exists
zquery.load_metadata(sql_query="seeing<2 and obsjd BETWEEN 2458239.5 AND 2458270.5")
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```

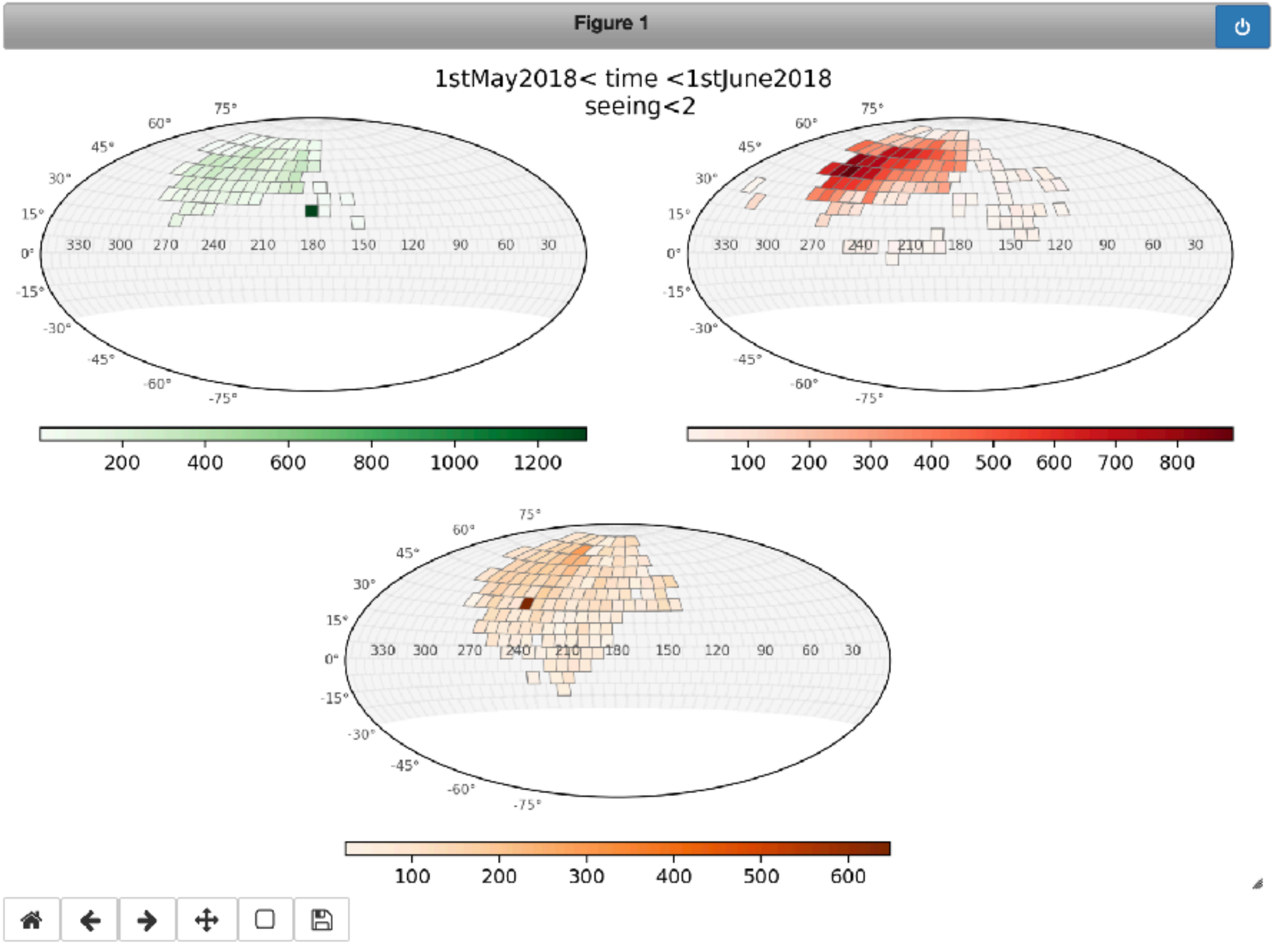
53133 entries

In [5]:
```
zquery.metatable
```

Out[5]:

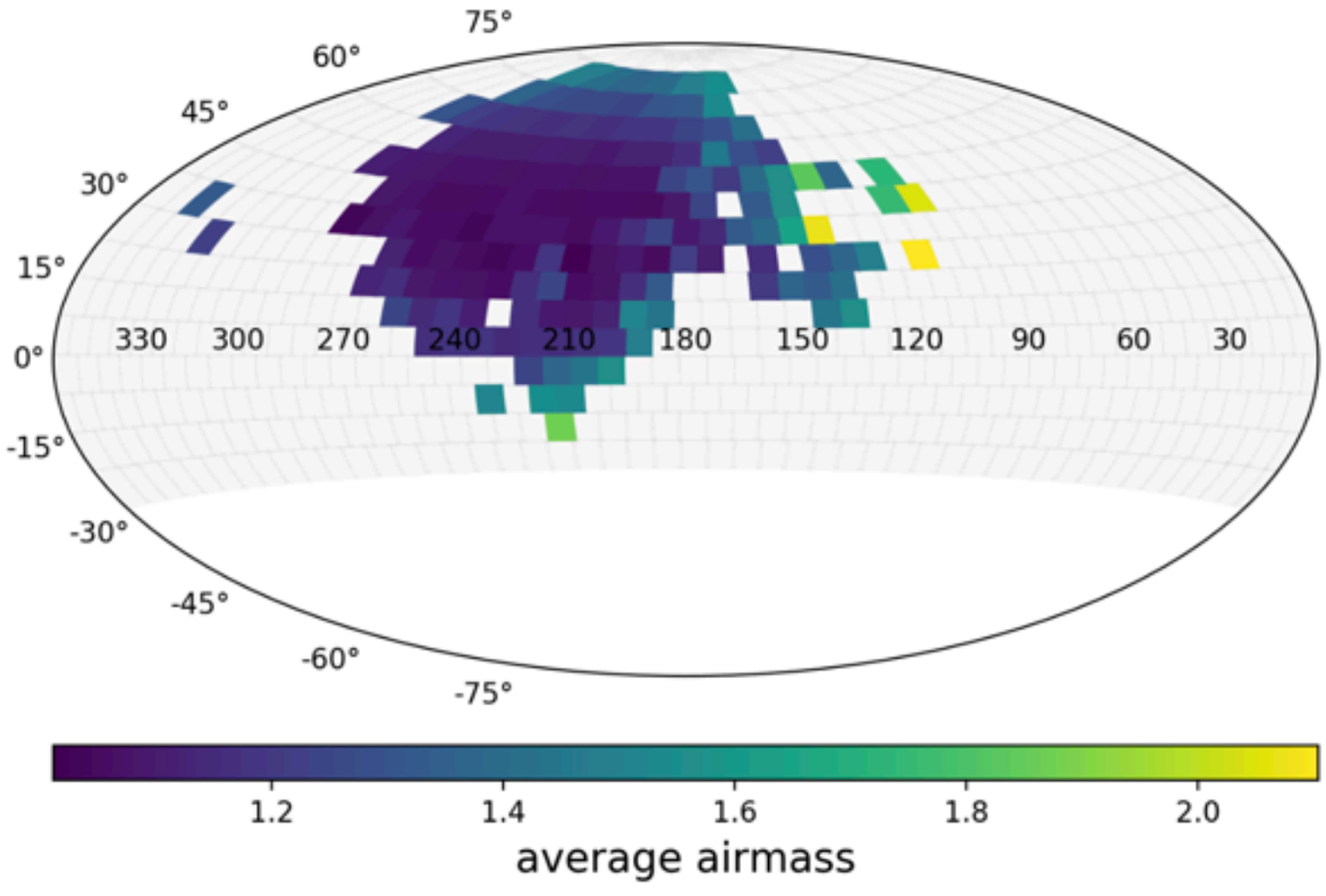
	ra	dec	infobits	field	ccdid	qid	rcid	fid	filtercode	pid	...	ra1	dec1	ra2	dec2	ra3	
0	190.490312	39.224180	0	716	7	3	26	1	zg	488221712615	...	191.040285	39.664754	189.917967	39.647232	189.947574	38.7
1	208.637252	39.234777	0	718	7	4	27	1	zg	488223152715	...	209.394653	39.669722	208.271954	39.663637	208.236738	38.7
2	207.720906	39.223317	0	718	7	3	26	1	zg	488223152615	...	208.271223	39.663591	207.148953	39.646636	207.177826	38.7
3	216.334950	39.224039	0	719	7	3	26	1	zg	488237922615	...	216.885499	39.664158	215.763157	39.647531	215.791667	38.7
4	217.451325	39.235217	0	719	7	4	27	1	zg	488237922715	...	218.008875	39.670025	216.886228	39.664168	216.900577	38.7
5	207.720368	39.225033	0	718	7	3	26	1	zg	488238402615	...	208.270692	39.665294	207.148395	39.648338	207.177279	38.7
6	208.636732	39.236486	0	718	7	4	27	1	zg	488238402715	...	209.394139	39.671418	208.271410	39.665361	208.236221	38.7
7	199.104582	39.225683	0	717	7	3	26	1	zg	488240782615	...	199.654694	39.666105	198.532345	39.648853	198.561668	38.7
8	200.220927	39.237423	0	717	7	4	27	1	zg	488240782715	...	200.778090	39.672481	199.655454	39.666119	199.670584	38.7

```
In [7]: fig = zquery.show_gri_fields(title="1stMay2018< time <1stJune2018 \n seeing<2", grid="main")
```



In [10]:
```
field_airmass = zquery.get_field_average_value("airmass", grid="main")

zquery.show_fields(field_airmass, clabel="average airmass")
```



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```

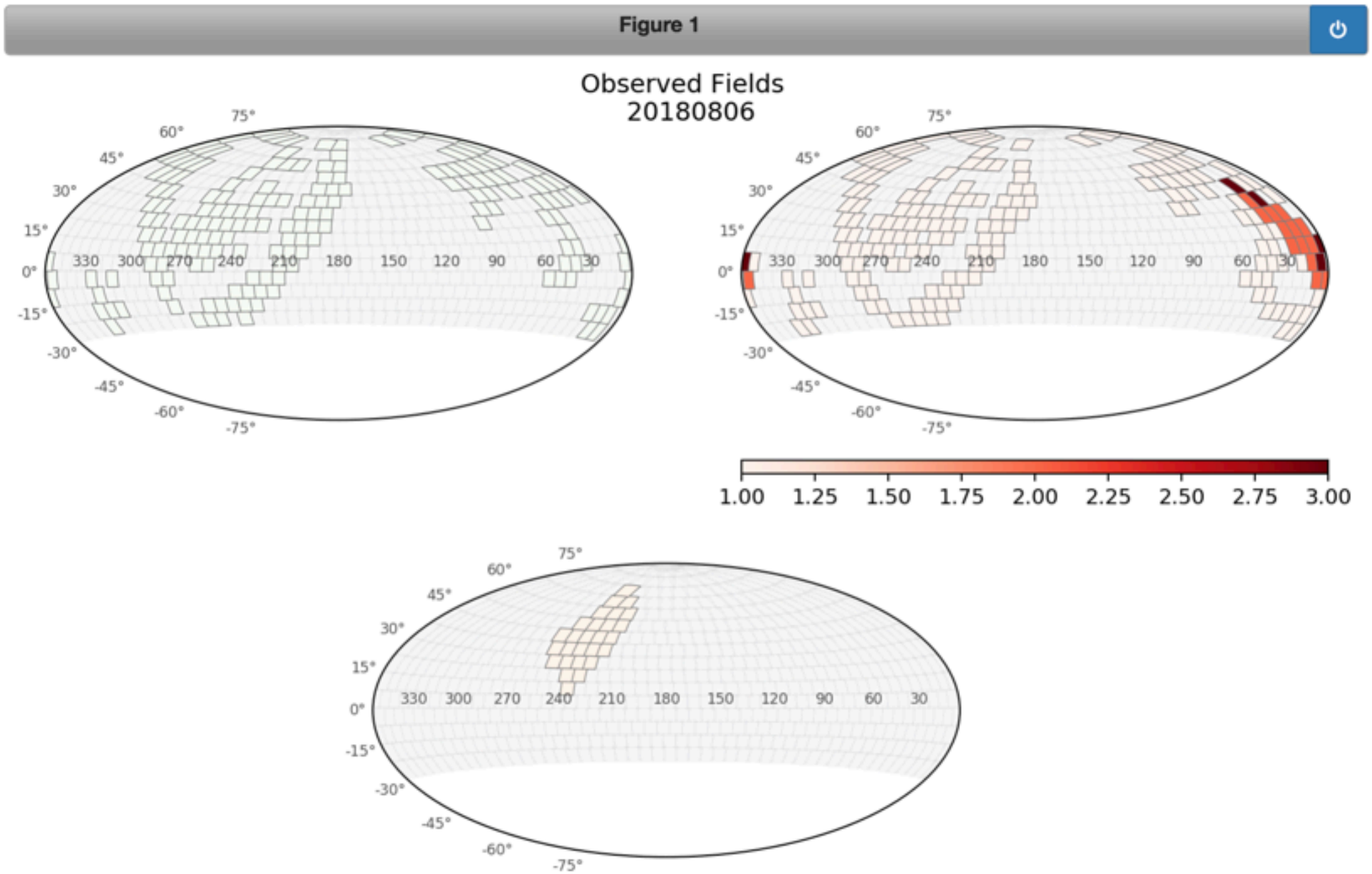
In [ ]:
```
zquery.download_data("psfcat.fits", show_progress=False)
```

- sciimg.fits *(primary science image) [default if not specified]*
- mskimg.fits *(bit-mask image)*
- psfcat.fits *(PSF-fit photometry catalog)*
- sexcat.fits *(nested-aperture photometry catalog)*
- sciimgdao.psf *(spatially varying PSF estimate in DAOPhot's lookup table format)*
- sciimgdaopsfcent.fits *(PSF estimate at science image center as a FITS image)*
- sciimlog.txt *(log output from instrumental calibration pipeline)*
- scimrefdiffimg.fits.fz *(difference image: science minus reference; fpack-compressed)*
- diffimgpsf.fits *(PSF estimate for difference image as a FITS image)*
- diffimlog.txt *(log output from image subtraction and extraction pipeline)*
- log.txt *(overall system summary log from realtime pipeline)*

What have been observed today?

ztfquery has access to Tom's summary page

```
In [29]: night = "20180806"
         thenight = query.NightSummary(night)
         fig = thenight.show_gri_fields(title="Observed Fields \n %s"%night)
```



What have been observed today?

ztfquery has access to Tom's summary page

In [32]:
```
print(thenight.get_observed_fields("primary"))
```

```
['246' '247' '277' '278' '279' '280' '281' '289' '290' '295' '296' '297'
 '298' '299' '326' '327' '328' '329' '330' '332' '333' '338' '339' '340'
 '345' '350' '351' '375' '376' '377' '378' '383' '384' '390' '395' '396'
 '397' '402' '403' '404' '426' '427' '428' '435' '436' '440' '442' '446'
 '447' '448' '449' '451' '452' '453' '476' '477' '483' '484' '487' '488'
 '497' '498' '499' '500' '501' '502' '504' '505' '527' '528' '529' '532'
 '533' '534' '535' '536' '537' '538' '539' '540' '551' '552' '553' '554'
 '555' '577' '578' '579' '582' '583' '584' '585' '586' '587' '588' '590'
 '591' '602' '603' '604' '605' '606' '612' '625' '626' '627' '628' '630'
 '631' '632' '633' '634' '635' '636' '637' '639' '640' '649' '651' '652'
 '653' '658' '659' '672' '673' '674' '676' '677' '678' '679' '680' '681'
 '682' '686' '687' '695' '696' '697' '700' '702' '703' '715' '716' '717'
 '719' '720' '721' '722' '723' '724' '725' '729' '730' '737' '740' '741'
 '742' '743' '745' '754' '755' '756' '758' '759' '760' '761' '763' '768'
 '769' '770' '775' '776' '777' '778' '779' '780' '781' '789' '790' '792'
 '793' '794' '796' '801' '802' '803' '804' '805' '806' '807' '808' '809'
 '819' '820' '822' '823' '824' '830' '831' '832' '833' '843' '846' '847'
 '853' '854' '855' '857' '861' '862' '865' '866' '867' '868']
```

In [31]:
```
thenight.data
```

Out[31]:

	UT_START	sun	exp	fid	type	field	pid	ra	dec	slew	wait	fileroot	progpi	qcomment
84	2018-08-06T03:42:32.0	-12	30	3	targ	633	2	248.3629	26.1500	18.49	12.6	ztf_20180806154421_000633_zi	Kulkarni	i_band
85	2018-08-06T03:43:14.6	-12	30	3	targ	532	2	236.0507	11.7500	7.45	9.5	ztf_20180806154965_000532_zi	Kulkarni	i_band
86	2018-08-06T03:43:54.1	-12	30	3	targ	583	2	238.0418	18.9500	7.66	9.6	ztf_20180806155463_000583_zi	Kulkarni	i_band
87	2018-08-06T03:44:33.7	-12	30	3	targ	632	2	240.8811	26.1500	11.78	11.5	ztf_20180806155926_000632_zi	Kulkarni	i_band
88	2018-08-06T03:45:15.2	-13	30	3	targ	582	2	230.7732	18.9500	8.48	10.4	ztf_20180806156377_000582_zi	Kulkarni	i_band
89	2018-08-06T03:45:55.6	-13	30	3	targ	630	2	225.9177	26.1500	6.71	10.1	ztf_20180806156863_000630_zi	Kulkarni	i_band
90	2018-08-06T03:46:35.7	-13	30	3	targ	631	2	233.3994	26.1500	16.98	14.9	ztf_20180806157326_000631_zi	Kulkarni	i_band
91	2018-08-06T03:47:20.6	-13	30	3	targ	680	2	251.1496	33.3500	6.56	10.3	ztf_20180806157789_000680_zi	Kulkarni	i_band
92	2018-08-06T03:48:00.9	-13	30	3	targ	679	2	243.2964	33.3500	6.56	10.4	ztf_20180806158310_000679_zi	Kulkarni	i_band

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Python wrapper of ZTF IRSA web IPA

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examples/figures	version 0.5	2 months ago
notebooks	Ability to download NightSummary data ; no more queryIRSA	15 hours ago
ztfquery	Ability to download NightSummary data ; no more queryIRSA	15 hours ago
README.md	Update README.md	15 hours ago
setup.py	Ability to download NightSummary data ; no more queryIRSA	15 hours ago

README.md

alpha version: documentation and functionality improving continuously

ztfquery

Python wrapper of ZTF IRSA web IPA

You need to have an IRSA account that has access to ZTF Data to be able to get data using `ztfquery`

Installation

go wherever you want to save the folder and then

```
git clone https://github.com/MickaelRigault/ztfquery.git
```