1. Introduction

This tutorial contains instructions on how to convert LSA SAF (LandSAF) data from Hdf5 to geotif format, open the converted files in QGIS software, and extract information on given (lat, lon) locations.

2. On window explorer create a new folder tree:

```
C:/Pretoria
```

```
/scripts
          /H5_Data_PROD (where PROD is LST, FVC, FAPAR,...)
          /Out_Data_PROD (where PROD is LST, FVC, FAPAR,...)
Ex:
C:/Pretoria/H5_Data_LST
C:/Pretoria/H5_Data_FVC
C:/Pretoria/H5_Data_FAPAR
And
```

E:\Pretoria\Out_Data_LST E:\Pretoria\Out Data FVC E:\Pretoria\Out_Data_FAPAR

...

...

Copy the files import_data_reproj_*.py and paste it to C:/Pretoria/scripts

Copy the LSA SAF HDF5 files you have (for instance through download from the LSA SAF website) to folder C:/Pretoria/H5_Data_PROD (where PROD can LST, FVC, FAPAR,... according to the product you are working with).

- 3. On QGIS select the keys ctl+Alt+P to open the python console
- 4. Convert the LSA SAF hdf5 files to geotiff format Go to folder C:/Pretoria/scripts, click on the script import_data_reproj_PROD.py (where PROD is one of the following: LST, FVC, FAPAR) and drag it to QGIS python console. This will make the script to run, converting all LSA SAF hdf5 files within the Data folder to geotiff format, and reprojecting.
- 5. Open the LSASAF files converted to geotiff in Qgis

Go to the folder containing the converted geotiff files (C:/Pretoria/Out_Data_Prod), click on the files you want to open in Qgis, which filenames with "_rep" (can be one or any number) and drag it to Qgis.

6. In QGIS, in the Layers window, drag the names of the files assuring that the dates are ordered from the oldest (at the top) to the most recente (at the bottom), like illustrated in the following figure:

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	>	☑ 📲	HDF5_LSASAF_MSG_LST_MSG-Disk_201806241015_rep
	>	☑ 📲	HDF5_LSASAF_MSG_LST_MSG-Disk_201806241030_rep
	>	☑ 📲	HDF5_LSASAF_MSG_LST_MSG-Disk_201806241045_rep
	>	☑ 📲	HDF5_LSASAF_MSG_LST_MSG-Disk_201806241100_rep
	>	☑ 📲	HDF5_LSASAF_MSG_LST_MSG-Disk_201806241115_rep
	>	☑ 📲	HDF5_LSASAF_MSG_LST_MSG-Disk_201806241130_rep
	>	☑ 📲	HDF5_LSASAF_MSG_LST_MSG-Disk_201806241145_rep
	>	☑ 📲	HDF5_LSASAF_MSG_LST_MSG-Disk_201806201200_rep
	>	🗹 📲	HDF5 LSASAF MSG LST MSG-Disk 201806241215 rep
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7. Extract data for given lat, lon point coordinates

Produce a csv file with the following format:

Name, lat, lon Example:

Nome	у	x
Lx	38.722252	-9.139337
Pt	41.157944	-8.629105
Evora	38.571431	-7.913502
Paris	48.856614	2.352222

8. On Qgis top menu select Layer->Add Layer->Add Delimited Text layer

On the window Dialog box that pops up (Data Source Manager | Delimited texto), select the options as in the figure bellow:

Q Data Source Manager Delimited Text		?	×
🚞 Browser	File Name E: Pretoria \AuxFiles \Points.csv		
V- Vector	Layer Name Points Encoding UTF-8		•
Raster	File format CSV (comma separated values) Expression Rendue syncesion delimiter		
GeoPackage	Custom delimiters		
🌽 SpatiaLite	Record and fields options		
PostgreSQL	Number of header lines to discard 0 Decimal separator is comma ✓ First record has field names □ Trim fields □ Simulation to the field has the fie		
MSSQL			
📮 Orade	Geometry definition Applied to the second		
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Virtual Layer	No geometry (Attribute only table) DMS coordinates Geometry CRS Project CRS: PPSG: 4326 - WCS.84	- 4	
🚱 ммз			
🚑 wcs	Sample data		
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ArcGIS Map Server	2 Pt 41.157944 -8.629105		
ArcGIS Feature Server			
GeoNode	Close	He	p

9. On QGIS top menu Select Plugins->Analyses->Point Sampling Tool

In the dialog box that is opened, select the options as in the figure:

Point sampling 100	ſ	>
General Fields About		
Layer containing sampling points:		
Points		•
Layers with fields/bands to get values from:		
Points : Nome (source point)		•
Points : y (source point)		
Points : x (source point)		
Points : field_4 (source point)		
Points : field_5 (source point)		
HDF5_LSASAF_MSG_LST_MSG-Disk_201806241215_rep : Band 1 (ra	ster)	
HDF5_LSASAF_MSG_LST_MSG-Disk_201806241200_rep : Band 1 (ra	ster)	
HDF5_LSASAF_MSG_LST_MSG-Disk_201806241145_rep : Band 1 (ra	ster)	
HDF5_LSASAF_MSG_LST_MSG-Disk_201806241130_rep : Band 1 (ra	ster)	
HDF5_LSASAF_MSG_LST_MSG-Disk_201806241115_rep : Band 1 (ra	ster)	
LIDES LOAGAE MAGE LOT MAGE Diele 201006241100 cons Dand 1 (co	ctor)	× .
Output point vector layer:		
	Deer	
	Brow	se
Add created layer to the map		
Status:		
Complete the input fields and press OK OK	C	ose

When you click in the Ok button the following message is shown:

		source	nam	1
1	HDF5_LSA	SAF_MSG_LST_MSG-Disk_201806241000_rep : Band 1	HDF5_LS	
2	HDF5_LSA	SAF_MSG_LST_MSG-Disk_201806241015_rep : Band 1	HDF5_LS	
3	HDF5_LSA	SAE MSG LST MSG-Disk 201806241030 rep : Band 1	HDF5_LS	
4	HDF5_LSA	Q Point Sampling Tool X	HDF5_LS	
5	HDF5_LSA	At least two field names are the same! Please type unique names.	HDF5_LS	
6	HDF5_LS4	· · · · 1	HDF5_LS	
7	HDF5_LSA	ОК 1	HDF5_LS	
8	HDF5_LSA	SAF_MSG_LST_MSG-Disk_201806241145_rep : Band 1	HDF5_LS	
9	HDF5_LSA	SAF_MSG_LST_MSG-Disk_201806201200_rep : Band 1	HDF5_LS	
10 <		SAE MSG LST MSG-Disk 201806241215 ren - Rand 1	HDES IS	`

So you need to click in the **OK** button and then double-click in the name of each datafile and change it (for instance 1,2,3,...):

Point Sampling Tool ?									
Gen	eral Fields About								
	source		name	^					
1	5_LSASAF_MSG_LST_MSG-Disk_201806241000_rep : B	and 1	HDF5_LSA	SA					
2	5_LSASAF_MSG_LST_MSG-Disk_201806241015_rep : B	and 1	HDF5_LSAS	SA					
3	5_LSASAF_MSG_LST_MSG-Disk_201806241030_rep : B	and 1	HDF5_LSAS	SA					
4	5_LSASAF_MSG_LST_MSG-Disk_201806241045_rep : B	and 1	HDF5_LSAS	SA					
5	5_LSASAF_MSG_LST_MSG-Disk_201806241100_rep : B	and 1	HDF5_LSAS	SA					
6	5_LSASAF_MSG_LST_MSG-Disk_201806241115_rep : B	and 1	HDF5_LSAS	SA					
7	5_LSASAF_MSG_LST_MSG-Disk_201806241130_rep : B	and 1	HDF5_LSAS	SA					
8	5_LSASAF_MSG_LST_MSG-Disk_201806241145_rep : B	and 1	HDF5_LSAS	SA					
9	5_LSASAF_MSG_LST_MSG-Disk_201806201200_rep : B	and 1	HDF5_LSAS	SA					
10 <	5 I SASAF MSG I ST MSG-Dick 201806241215 ren · R	and 1	HDE5 I SA	× ×					
itati	us:	OK		lose					
Ch	eck input values, please!								

Gene	ral Fields About								
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3	HDF5_LSASAF_MSG_LST_MSG-Disk_201806241030_rep : Band 1	3							
4	HDF5_LSASAF_MSG_LST_MSG-Disk_201806241045_rep : Band 1	4							
5	HDF5_LSASAF_MSG_LST_MSG-Disk_201806241100_rep : Band 1	5							
6	HDF5_LSASAF_MSG_LST_MSG-Disk_201806241115_rep : Band 1	6							
7	HDF5_LSASAF_MSG_LST_MSG-Disk_201806241130_rep : Band 1	7							
8	HDF5_LSASAF_MSG_LST_MSG-Disk_201806241145_rep : Band 1	8							
9	HDF5_LSASAF_MSG_LST_MSG-Disk_201806241200_rep : Band 1	9							
10	HDF5_LSASAF_MSG_LST_MSG-Disk_201806241215_rep : Band 1	10	~						
<			>						
Statu	s: OK		Close						

Finally select an output filename (and the directory where to save it) with extension **.shp** you need and click **Ok.** You should get the message **Status: OK. The new layer has been added to the map:**

Q Point Sampling Tool	?	×
General Fields About		
Layer containing sampling points:		
Points		-
Layers with fields/bands to get values from:		
Points : Nome (source point)		^
Points : y (source point)		
Points : x (source point)		
Points : field_4 (source point)		
Points : field_5 (source point)		
HDF5_LSASAF_MSG_LST_MSG-Disk_201806241000_rep : Band 1 (raster	()	
HDF5_LSASAF_MSG_LST_MSG-Disk_201806241015_rep : Band 1 (raster)	
HDF5_LSASAF_MSG_LST_MSG-Disk_201806241030_rep : Band 1 (raster	()	
HDF5_LSASAF_MSG_LST_MSG-Disk_201806241045_rep : Band 1 (raster	()	
HDF5_LSASAF_MSG_LST_MSG-Disk_201806241100_rep : Band 1 (raster)	v .
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Output point vector layer:		
	Browse	
		_
Add created layer to the map		
Status:		
OK. The new layer has been added to the man. OK	Clos	e

10. Go to the Qgis layers window and click on the name of the created layer with the right button of you mouse and select **Save as...like in next figure:**



A **Save Vector Layer** window will pop up, and you will be able to save the .sh file as a CSV (be sure to select the directory where you are saving the file):

Q Save Vector Layer as ?									
Format Cor File name Layer name CRS EPS	ma Separated Value [CSV] G:4326 - WGS 84	•]						
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LINEFORMAT	<default></default>	-							
SEPARATOR	COMMA	•							
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Custom Op	tions —								
		OK Cancel Help							

11. Open an excel spreadsheet. Go to **Data ->Obtain External Data-> From Text**. Select the previously saved .csv file. Open the file as comma separated fileds. You can now work with the data in excel to make some temporal plots, such as in the following example:

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2	Lx		31.59	32.71	32.71	33.48	34.12	34.12	33.38	32	.51	32.38	33.82
3	Pt		-80	-80	-80	-80	-80	-80	-80	8	-80	-80	-80
4	Evora		32.07	32.4	33.15	33.63	35.05	35.8	36.97	37	.66	38.66	38.21
5	Paris		-80	-80	-80	-80	-80	-80	-80	8	-80	-80	-80
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