**Procedure to follow to run PickCraterSAR application on a mac/linux machine**

**1. Create a python environment and install required package**

git clone https://github.com/mjaspard/pick\_app.git # clone rep

cd pick\_app # go in repo folder

python -m venv env # create python env (env is arbitrary)

source env/bin/activate # activate env

python -m pip install -r requirements.txt # Install required package (this list works fine with python3.8.1)

python start\_app.py # Run application

note: GDAL maybe tricky to install depending on dependencies already installed.(https://gdal.org/api/python\_bindings.html)

**2. Prepare data to load on application (csv file)**

Once the application opened, you can open your csv file in the menubar 'File --> Open'

This csv file must be conform to the following structure starting with the following line:

'folder,img\_name,day,hour\_UTC,azimuth\_pixel\_size,range\_pixel\_size,incidence\_angle\_deg,expo\_greyscale,caldera\_edgeN\_x,caldera\_edgeS\_x,crater\_outer\_edgeN\_x,crater\_outer\_edgeS\_x,crater\_inner\_edgeN\_x,crater\_inner\_edgeS\_x,crater\_topCone\_edgeN\_x,crater\_topCone\_edgeS\_x,crater\_bottom\_edgeN\_x,crater\_bottom\_edgeS\_x,caldera\_edgeN\_y,caldera\_edgeS\_y,crater\_outer\_edgeN\_y,crater\_outer\_edgeS\_y,crater\_inner\_edgeN\_y,crater\_inner\_edgeS\_y,crater\_topCone\_edgeN\_y,crater\_topCone\_edgeS\_y,crater\_bottom\_edgeN\_y,crater\_bottom\_edgeS\_y'

Each line under the first one above will be linked to the amplitude file "folder/img\_name".

If you have a filtered amplitude with the original one, you can rename the filtered as follow example:

original image: amplitude\_image\_CSK\_20200101.r4

amplitude\_image\_CSK\_20200101.hdr

filtered image: amplitude\_image\_CSK\_20200101\_Filtre.r4

amplitude\_image\_CSK\_20200101\_Filtre.hdr

All your SAR image must be available locally in 'folder,img\_name' position.

**3. Functionality**

* The application will use all the available data to draw ellipses, profile, 3d images, simulated amplitude and the plot of picking results.
* You can also Open/Close each figure with Menubar --> View
* You can Enable/Disable the automatic update for each figure (excepted SAR amplitude and profile) if you want to focus on a specific figure with higher reactivity.
* The update button turns to blue as soon as a change is available.
* SAR View image and crater profile can be modified manually to change ellipse/crater shape.
* 3d images, simulated amplitude and the plot of picking results cannot be modified directly and are calculated from ellipse and profile.

**4. Picking rules**

The common usage is to pick ellipses on SAR View image, but you can also change ellipses from crater profile by dragging points

**Picking ellipses from SAR Image:**

* Activate button Picking Action and Show Ellipse
* The next Pick point is written, just right clic on the image to pick the point
* Change greyscale and clip value as desired
* Zoom is available for better precision. (left clic on image and press escape to return to original zoom)
* The button save turns to blue as soon as modification has been entered, clic on it to update your csv file.
* The 'Filtered image' button switch between both amplitude image if present.
* Some ellipses do not have south points to clic because shape is considered as follow:
  + Crater outer ring is considered centered on caldera ring
  + Top cone is considered centered on inner crater.

**Picking from Profile:**

* Some positions are hard coded such as the altitude of the caldera.
* The profile on range axis consider that all ellipses are centered on azimuth axis (which is not obviously the case on SAR image ellipse view).
* You can drag and drop only empty-coloured circle, the others are hard coded (caldera altitude) or directly derived from other points (inner crater derived from top Cone because crater flanc are considered vertically at that position)
* The save button to record modifications is the one in the SAR Image view.

**View3d:**

* The view3d will represent the complete shape based on ellipse position and altitude of profile.

**Simulated amplitude:**

* The simulated amplitude will take into account only the profile, so the shift on azimuth axis is lost.

**Picking results:**

* Evolution of ellipse size and altitude are plotted on two graphics.
* You can resize the time axis using start/end date.
* A vertical dotted line will show the current SAR image selected. It will move automatically if check box 'auto' is selected.