New software for processing weather station data

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INTRODUCTION

According to new data published by the International Agency for Renewable Energies (IRENA) in April 2019, the trend of strong growth in renewable energy production capacity, which has lasted for a decade, continued in 2018, with a global increase of 171 gigawatts (GW)[1]. But always for the realization of installation which produce renewable energy, a study of the meteorological situation of the place is a necessity and this is only possible with the analysis of data from past decades by basing data collected from weather stations, such as solar radiation, ambient temperature, wind speed, precipitation, humidity, etc. Generally, these data are recorded instantaneously or by a well-defined time interval (generally in second minute or hour), therefore to see the daily, monthly, seasonal and annual evolution which will better help to estimate the production of the future installation a long treatment must be performed.

The objective of the program is to help people who work on site weather data to process this data and visualize it in a clear and understandable way in order to save time while manually working on excel files.

MATERIALS AND METHODS

For the realization of the software, we used the MATLAB GUI tool of the MATLAB software (also known as Graphical User Interfaces or GUI) which allows Develop applications interactively using App Designer or by programming using MATLAB® functions which provides a simple point-and-click interface to code. Applications contain interactive commands such as menus, trees, buttons, and sliders that execute specific instructions when users interact with them

During its execution, the operation of the program goes through three main parts as illustrated in "Fig. 1".
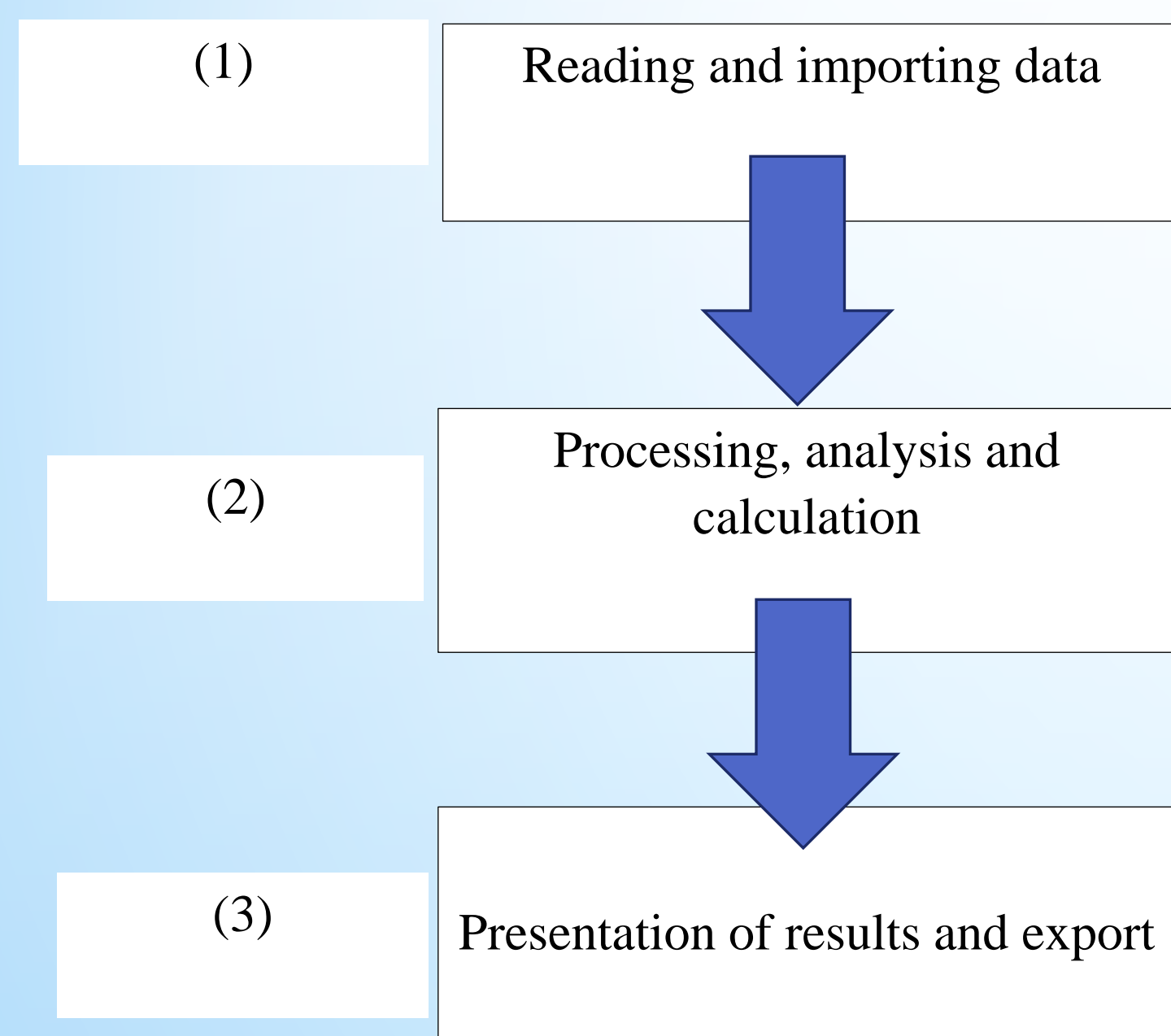

Fig. 1 : Program sequence diagram.

RESULTS AND DISCUSSION

In this part we will present screenshots of the program during these different functional stages for our study case the weather station of M'Sila. A full view of the program after execution is shown in "Fig. 2".
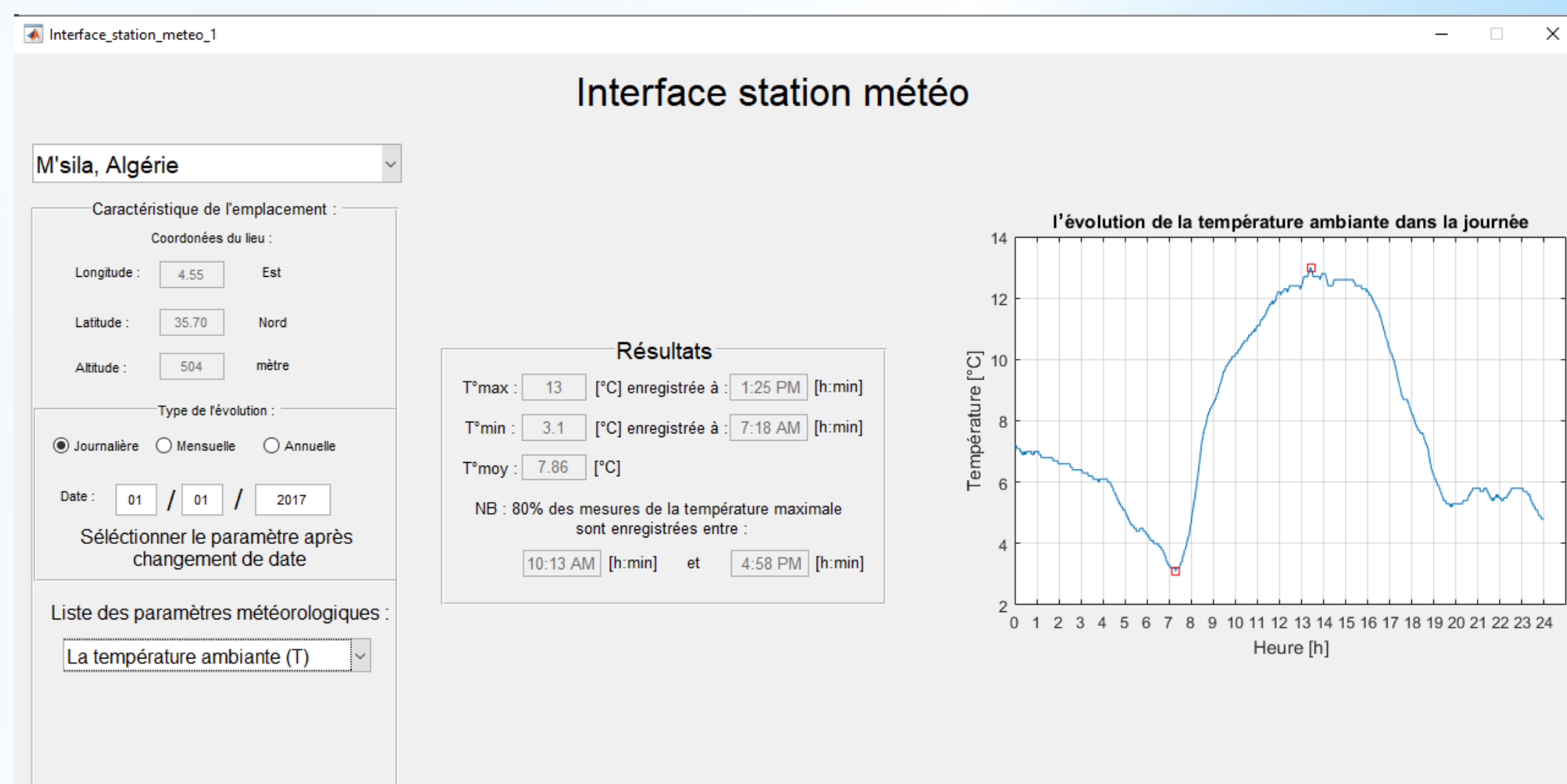

Fig. 2 :   View of the the software.

In "Fig. 3", graphical presentation of the hourly evolution solar radiation. These kinds of figures give us a fair visualization and enlightenment on the extreme values and the type of evolution during the day.

In "Fig. 8", The monthly evolution of temperature is presented with a trend which can be used as a judgment parameter on the capability of the parameter studied to increase or decrease or even remain stable.
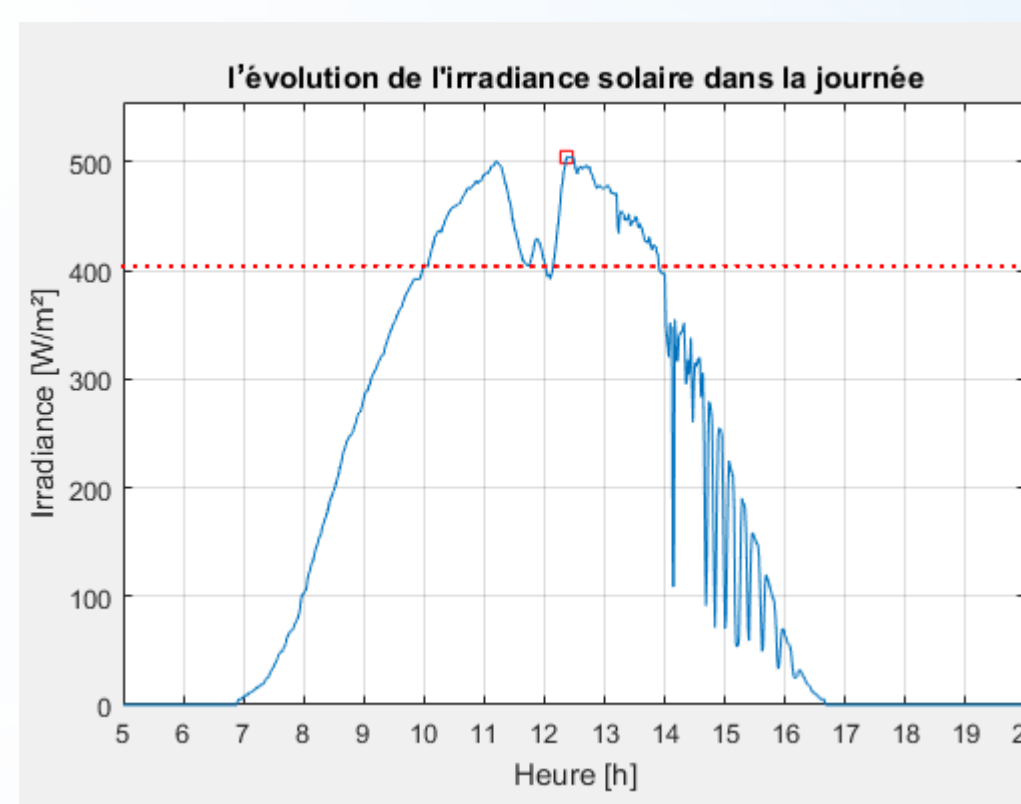

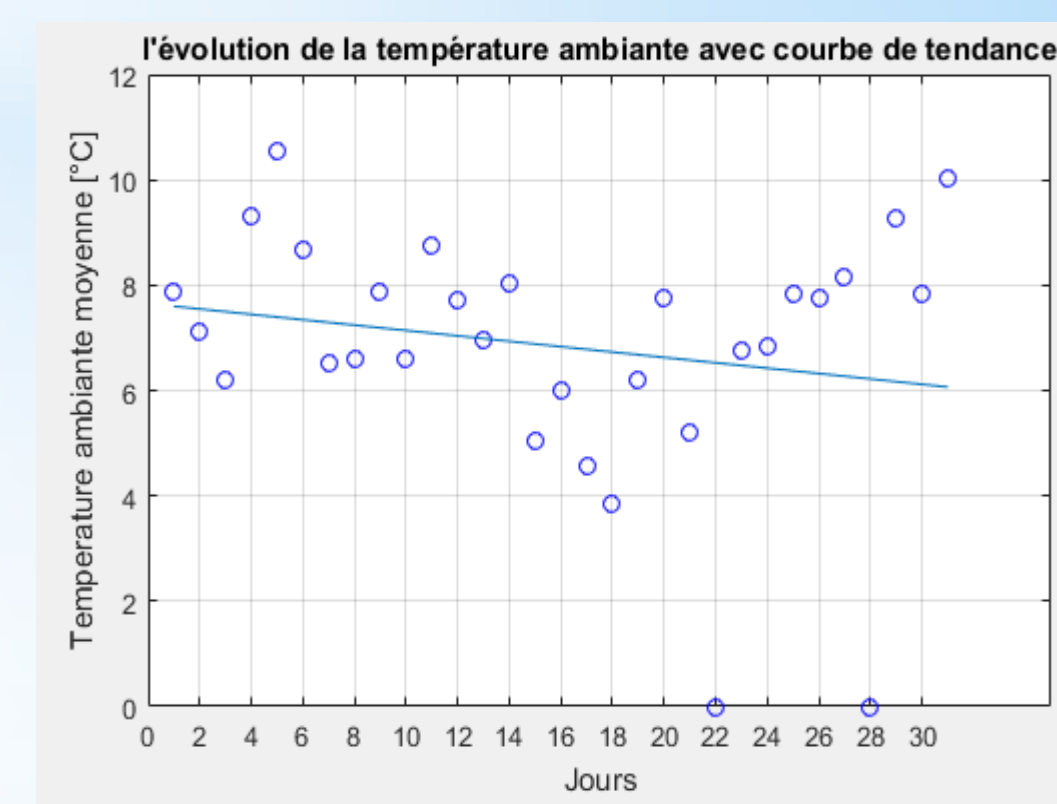**Fig. 3 :** Hourly solar radaition evolution.

Fig. 4 : Monthly ambient temperature evolution.

Conclusion

A software designed using MATLAB GUI, which aims to process meteorological data collected from weather stations which are recorded instantly. It can be used to calculate: daily, monthly and annual evolution values of meteorological parameters, extreme temperature (max and min) with recording time, average temperature over a defined period, interval of time where temperature is higher, maximum solar radiation with recording time, average solar radiation and time interval where we capture 80% of energy per day;

Reference

[1] Brunet 05.10.2019, « Les énergies renouvelables devraient renouer avec une croissance vigoureuse en 2019 », Le Monde de l'Energie, 26-sept-2019. [En ligne]. Disponible sur: https://www.lemondedelenergie.com/energies-renouvelables-croissance-2019/2019/09/26/. [Consulté le: 05-janv-2020].