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Let’s measure light pollution!

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2023

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Project Information

PROJECT: CliC-PoliT

PROJECT TITLE: Engaging students and the society in environmental and climate change activities to raise awareness and strengthen responsible citizenship.

ACRONYM: Climate Action and Light Pollution Threat

PROJECT WEBSITE: https://www.clicpolit.eu/

PROJECT NO.: 2021-1-IE01-KA220-SCH-000027825

PROJECT COORDINATOR: CIT Blackrock Castle Observatory, Cork, Ireland

Project Partners

BLACKROCK CASTLE OBSERVATORY
The Space For Science

NUCLIO
Núcleo Interativo de Astronomia e Inovação em Educação

FTP-Europlanet gUG

ΑΙΕΝ ΑΡΙΣΤΕΥΕΙΝ
ELLINOGERMANIKI AGOGI

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ΟΡΓΑΝΙΣΜΟΣ ΕΚΠΑΙΔΕΥΤΙΚΗΣ ΡΟΜΠΟΤΙΚΗΣ & ΕΠΙΣΤΗΜΗΣ

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Summary of the scenario

Let's measure light pollution!	
Topic Title: Light Pollution	
Lesson Plan Title: Let's measure light pollution	
Duration: 45 minutes	
Short Description of the Lesson	Students will gain an understanding of the concept of light pollution. It will be demonstrated its adverse effects and the students will investigate by their own the light pollution effect in their area by using the App Loss of the night
Learning Goals	• Define light pollution and why dark skies are important • Think about the different ways in which society contributes to light pollution • Provide examples of the negative impacts of overexposure to light • Experiment about the light pollution at your area • Make conclusions about the light pollution at your area • Think changes that you can make in your everyday life to minimize light pollution
Green Competences Linked	Gain an understanding of the Sustainable Global Goal 13 (climate action), the importance and why it's relevant to us
Target Group	• Elementary school (6 - 10 years, Grade 1-4) • Secondary school (11 - 13 years, Grade 5-7) • Middle-High school (13 - 17 years, Grade 8-11) • Graduate students • Adults
Educational Approach	Project based learning Inquiry based learning Citizen science project

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Link to School Curricula (if Applicable)	•Light pollution •Astronomy •Environmental research
Facility/ Equipment	• Android mobile phone • Internet access
Tools/ Materials	-
Main Tasks	**Task 1: Introduction to Light Pollution** **Task 2: Make assumptions** **Task 3: Experiment** **Task 4: Experimental results**
Extracurricular Activities	-

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Learning activities

LA1 Trigger of Interest

- What are some words that come to mind when you hear the word “pollution”?
- What are specific examples that you can think of when you hear the word “pollution”?

Watch the video below:

LA2 Make assumptions

- How many stars can you see at night sky?
- Do you see the same number of stars near a city’s shopping mall or at a mountain far from the centre of the city?
- Is there any difference between these numbers and why?
- What factor distributes to that difference?
- Is any difference between the seasons of the observations?
- Do you think that light can be a type of pollution? Why or why not?
- Have you ever seen the Milky Way? If so, where were you? If you have not seen the Milky Way, what have you noticed in the night sky?
- Do you think that people can be negatively impacted by too much light at night-time? Why or why not?
- Do you think animals can be negatively impacted by too much light at night-time? Why or why not?
- Do you think that the environment can be negatively impacted by too much light? Why or why not?

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LA3 Experiment. Measuring the light pollution of your area

Step 1: Use the App “Loss of the night”

Measure the light pollution at your area using the stars of the sky.
This could be done by using the App “Loss of the night” by identifying how clear or not you can see the stars of the sky where you live.

The Loss of the Night App is an App that collect data in order to measure light pollution.
Citizen scientists are challenged to identify as many star constellations as they can, by using this App.

The collected data helps scientists to understand how the brightness of the night sky is changing around the world and to understand long-term changes. It is very important the fact that the observations could be observations taken at the same place, year after year, so scientists can make conclusions about the light pollution in specific areas.

Moreover, someone using the App can learn about the sky’s constellations in the specific area which lives and stargazing by tracking of how skyglow is changing over time. The data are being collected and analyse by scientists, so they can understand about light pollution. As we observe more stars, the data become more precise!

Step 2: Download the App

The Android phone must have GPS and the phone case must not have a magnetic clasp.
At first, download the App. You can type at the Play Store the “Loss of the night” App or you can scan the barcode below:

Picture 1 QR code of the App "Loss of the night"

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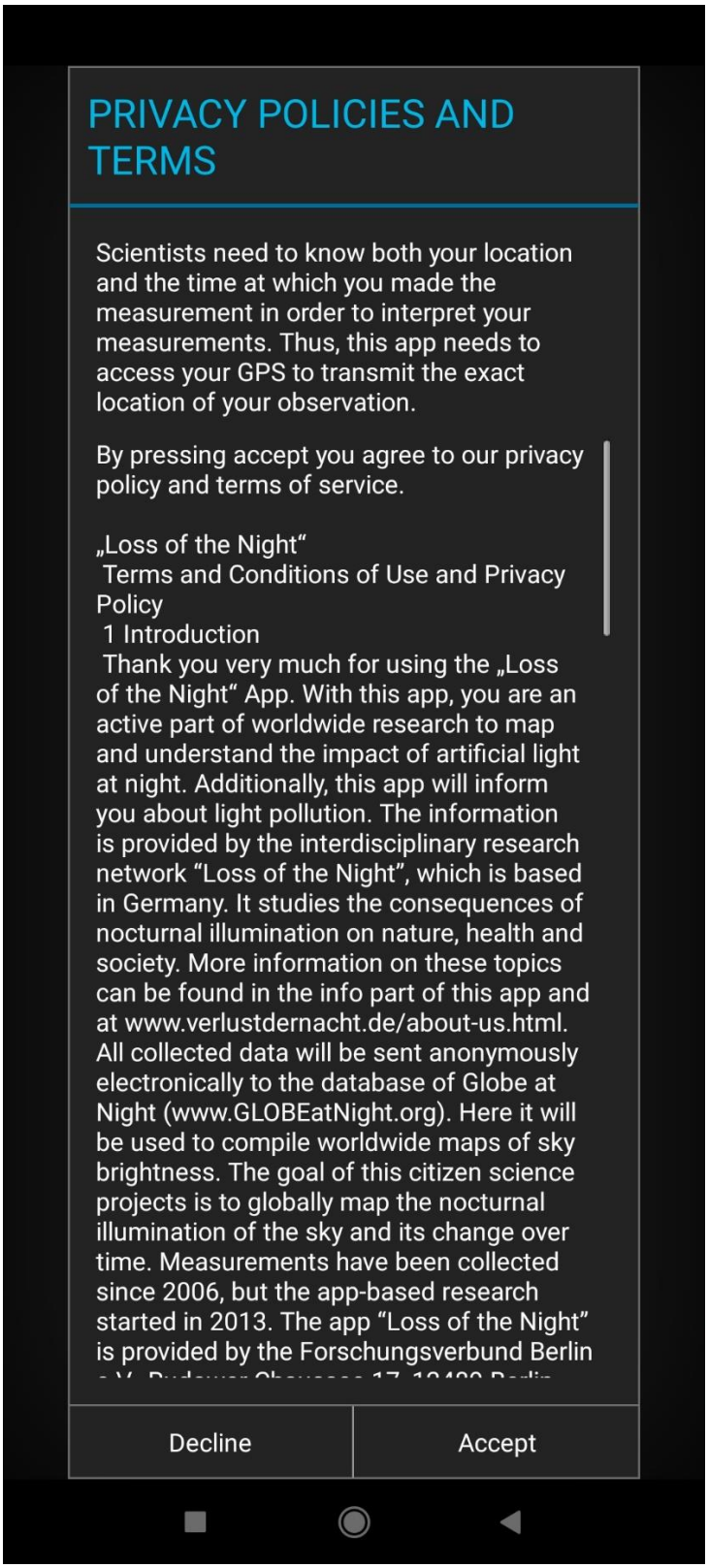
Step 3: Accept privacy policies and conditions

To continue to the App, you have to **read and accept** the privacy policies and conditions.



Picture 2 Accept privacy policies and terms

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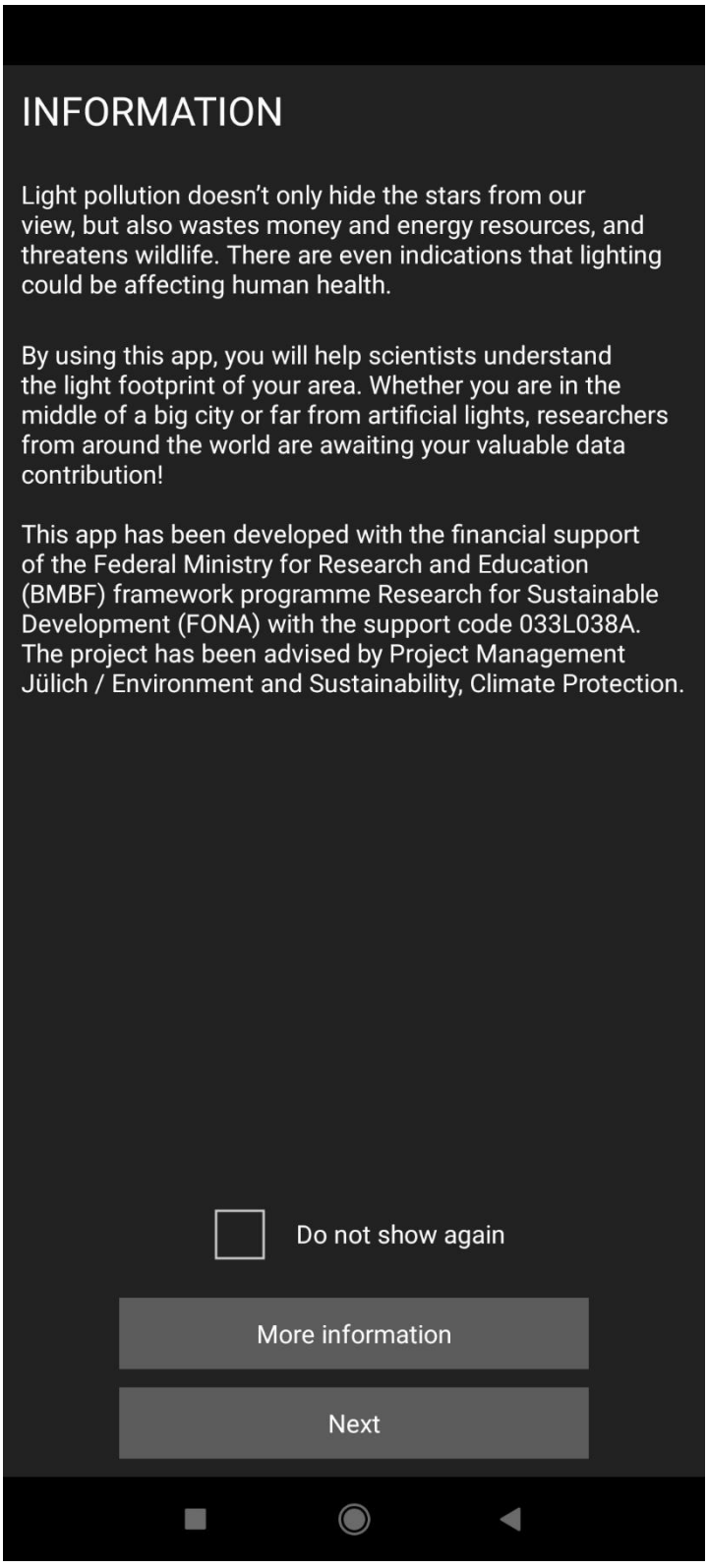
Then it is shown up on screen information about light pollution. You can read them and then click **“next”.**



Picture 3 Information about Light Pollution

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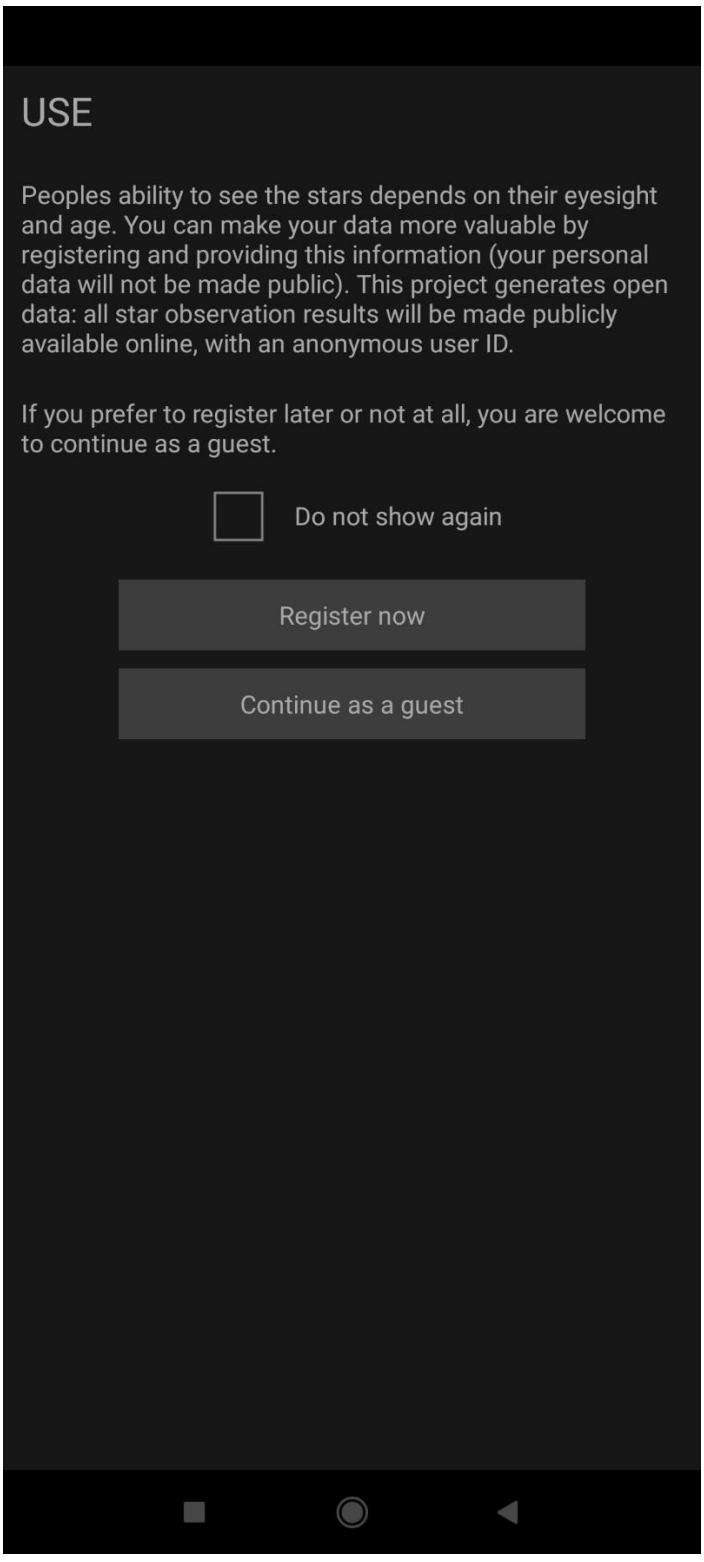
Step 4: Register now or continue as quest

You have 2 options.
The first option is to **“Register Now”** and the other to **“Continue as a guest”.**



Picture 4 Two options. Register now or Continue as guest

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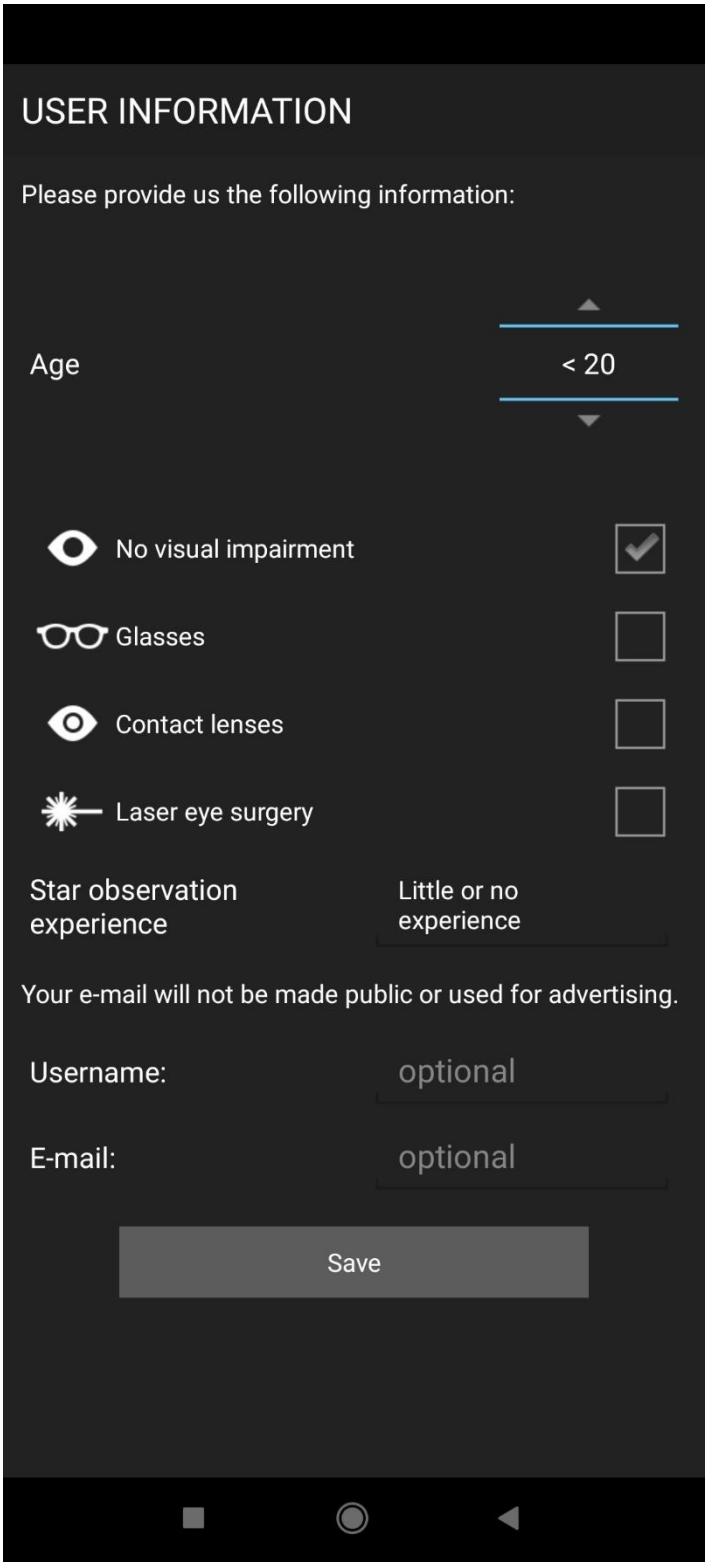
If you select **“Register now”** you must provide some information as shown below:



Picture 5: If "Register now" is clicked, provide User Information

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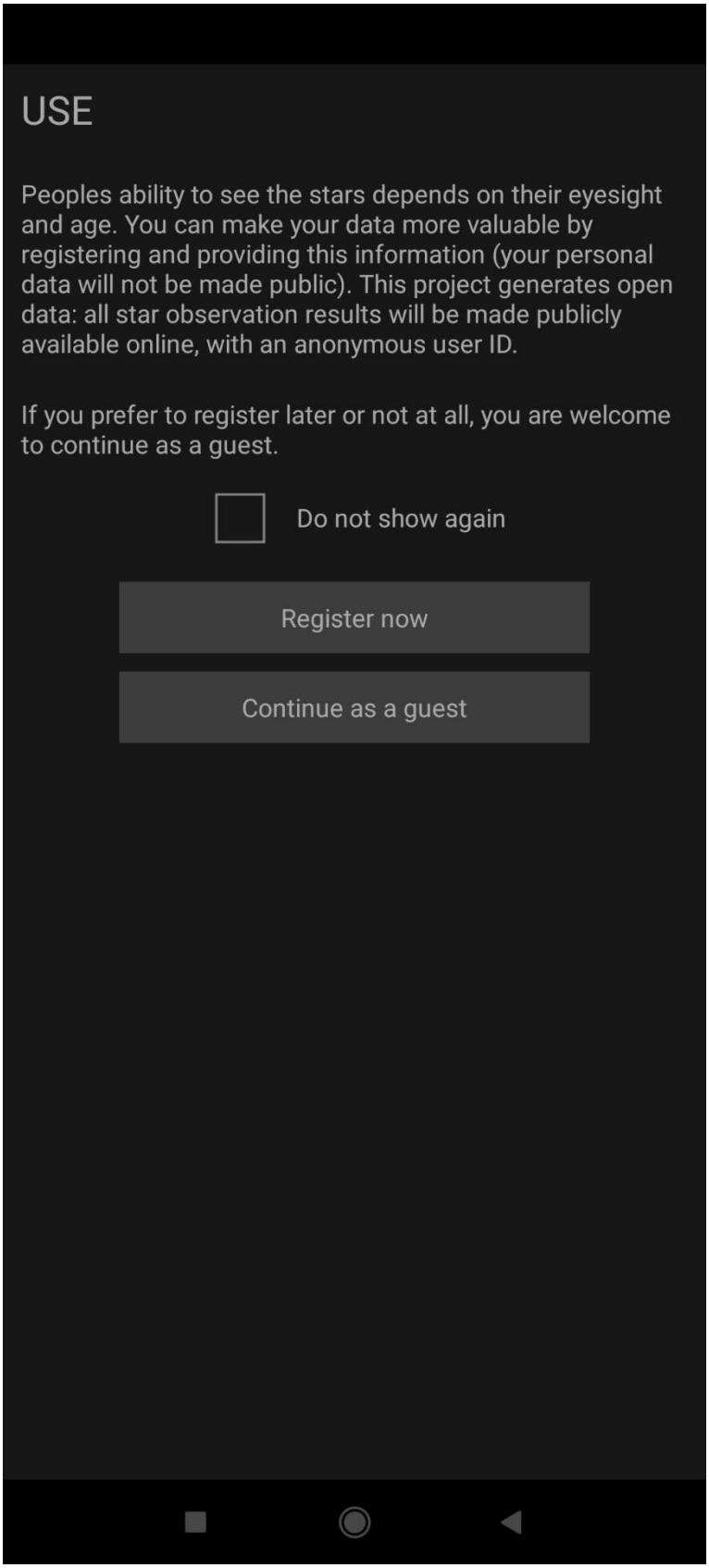
The second option is to **“Continue as a guest”**.



Picture 6 Other option "Continue as guest"

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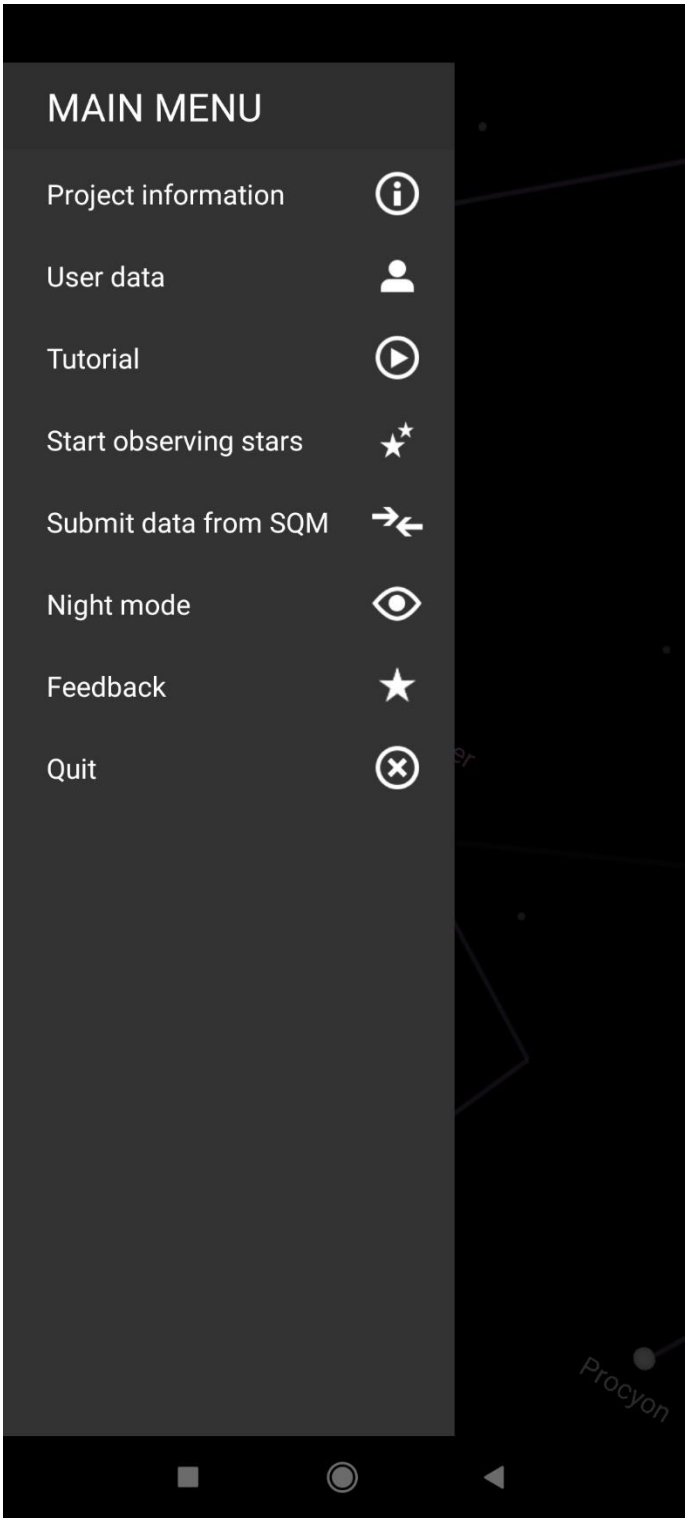
Whatever you select you will be taken to the **main menu**:



Picture 7: The Main menu of the App

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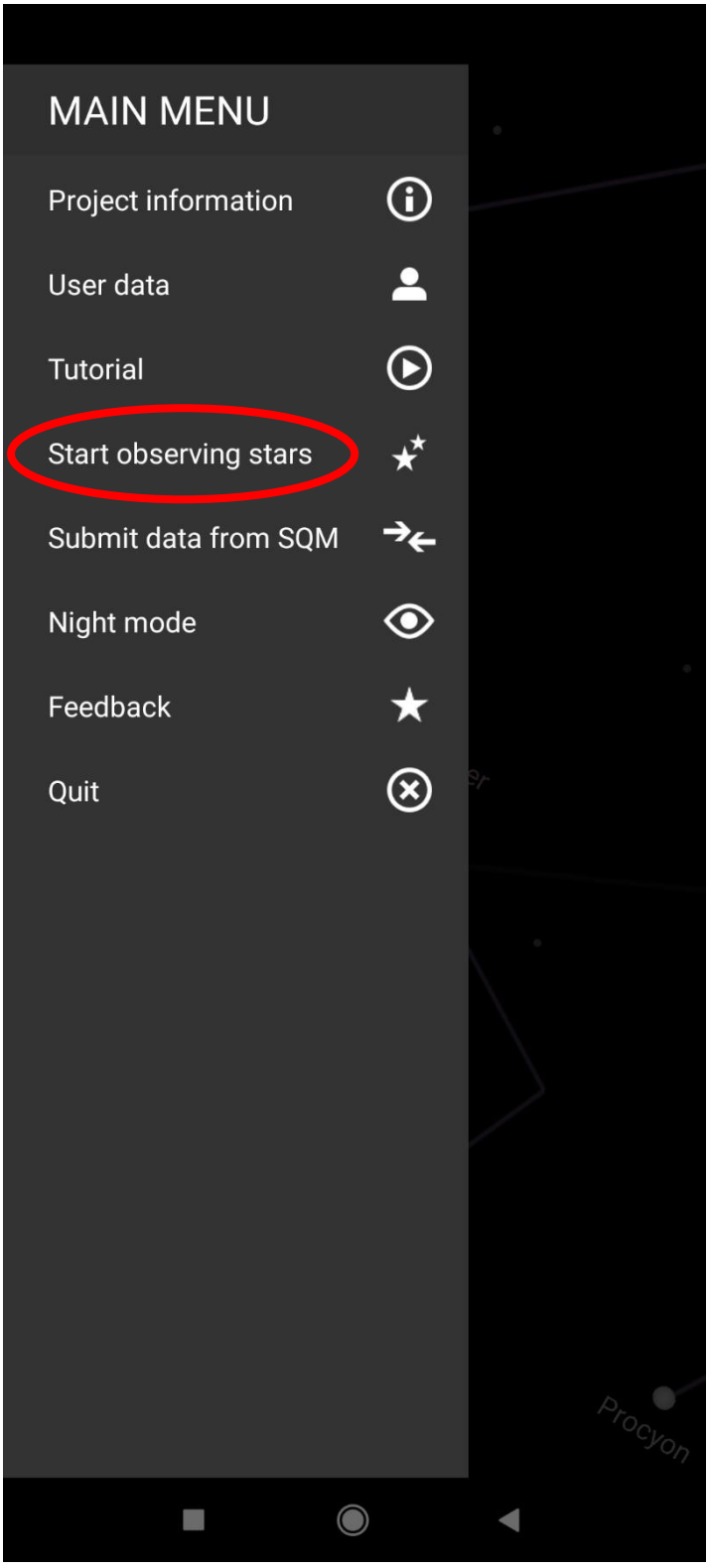
Step 5: Making an observation.

As you are outside and the App gets a GPS signal, click the option **“Start observing stars"** and start your observation.



Picture 8 Start observing stars

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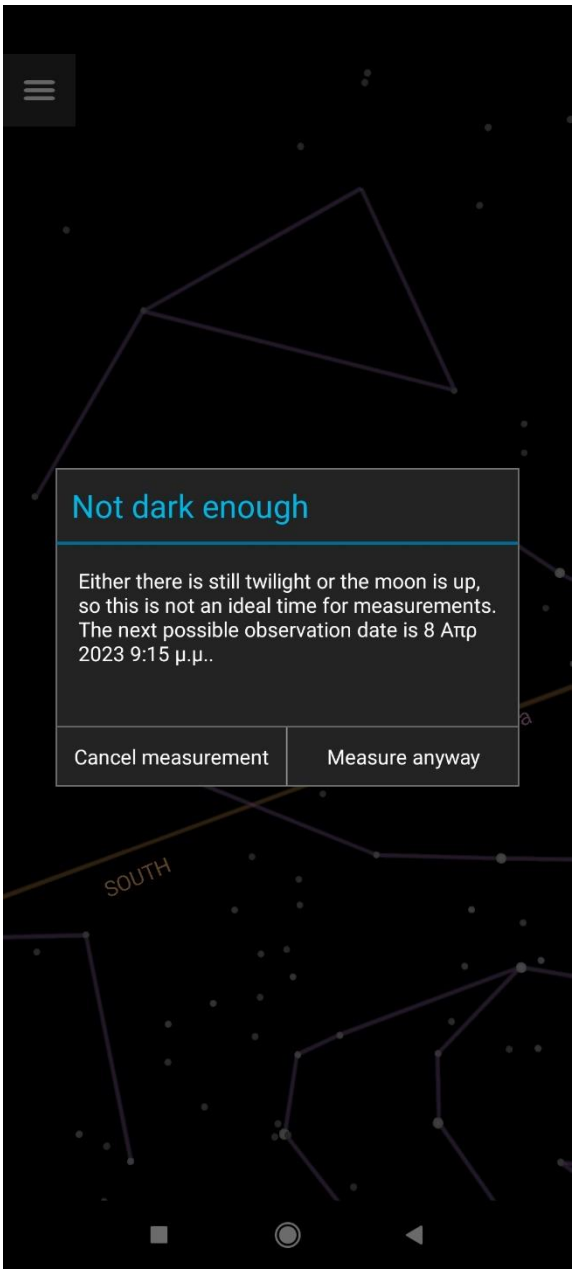
Make sure that if is the moon in the sky, maybe the App will show a message *"it is not dark enough"*. For this reason, the App has an option to add notes about the observing period at your location.



Picture 9 The App maybe will show a message about the brightness of the star

Next, put the current weather conditions of your observation and click **"Continue"**.

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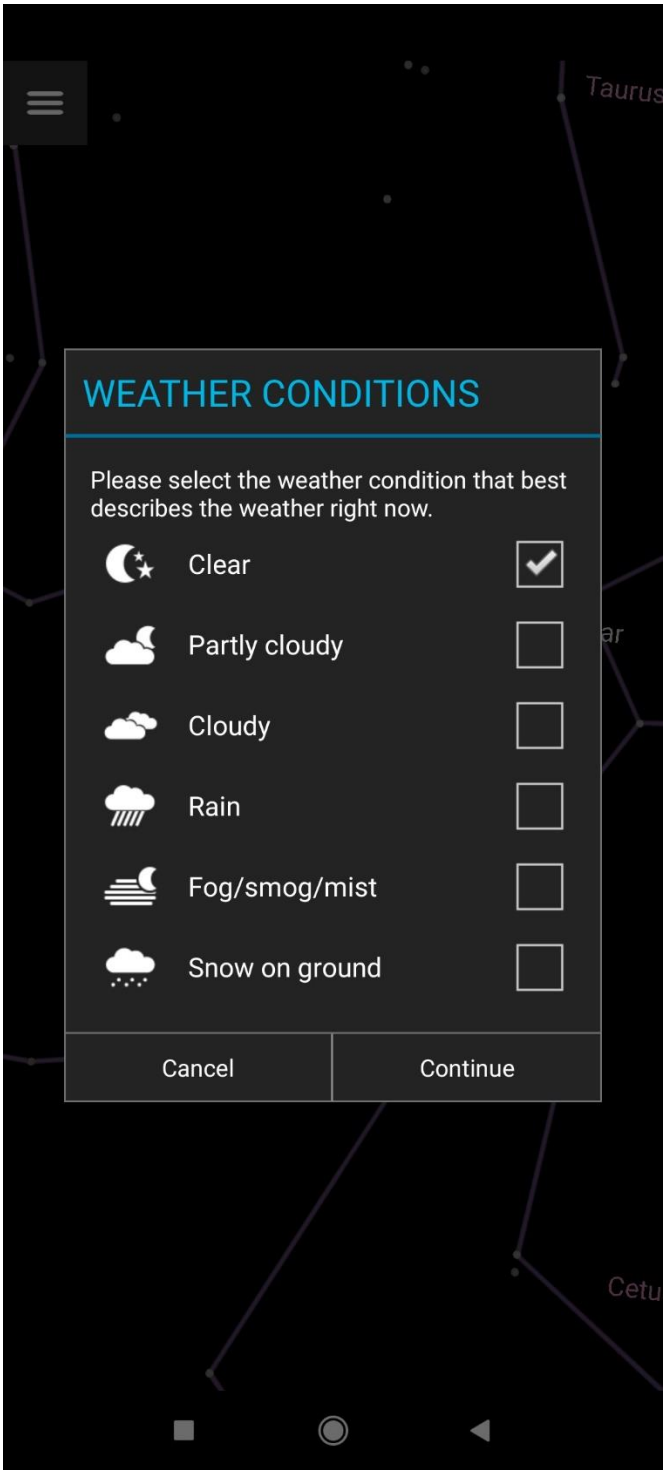

Picture 10 Enter weather conditions

Step 6: Searching the star

The App directs you to one of the brightest stars in your sky. If you turn you will notice how the arrow changes its direction. Keep your phone's screen. Make sure that you keep the phone's screen oriented perpendicular to your body.

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The App will ask you to search for a particular star. Turn your body until the arrow points straight up, and then raise your arm until you see a star with a flashing crosshair on it. Then, after you find the searching star, the circle will expand and three buttons will appear at the bottom of the screen.

Picture 11 First star observation

If the star is visible with naked eye, click the option **“Star is visible”**. Then you must decide if it's **"clearly visible"** or **"barely visible"**.

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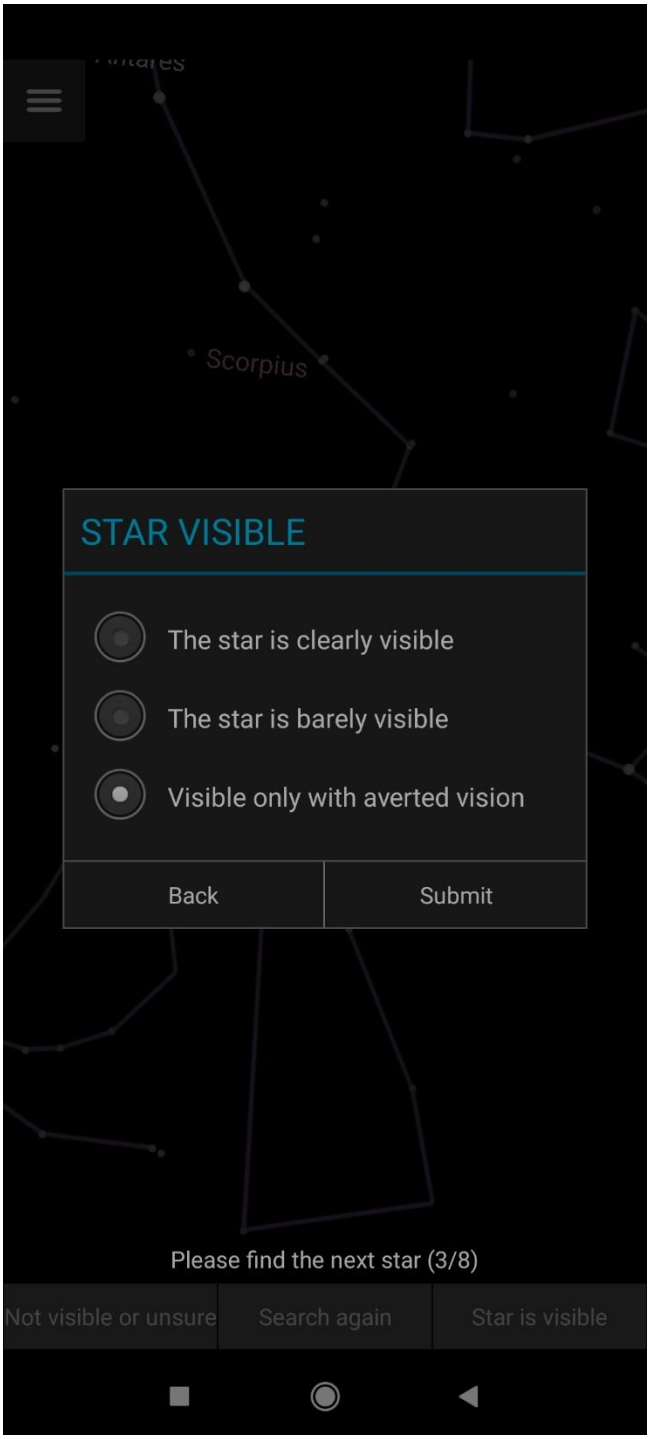
If you can not see the star, click on **"Not visible or unsure"**.



Picture 12 Star visible only with averted vision

Then a menu will appear that gives some options for why you can't see the star. Choose the option that is most appropriate.

Step 7: Continuing your observation

Every time you must follow the procedure explained above.

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Every time you find a star, the App will ask you *if it's visible or not.*

Once you do this for **8 stars** the App will pop up a message **"8 stars reached"**.

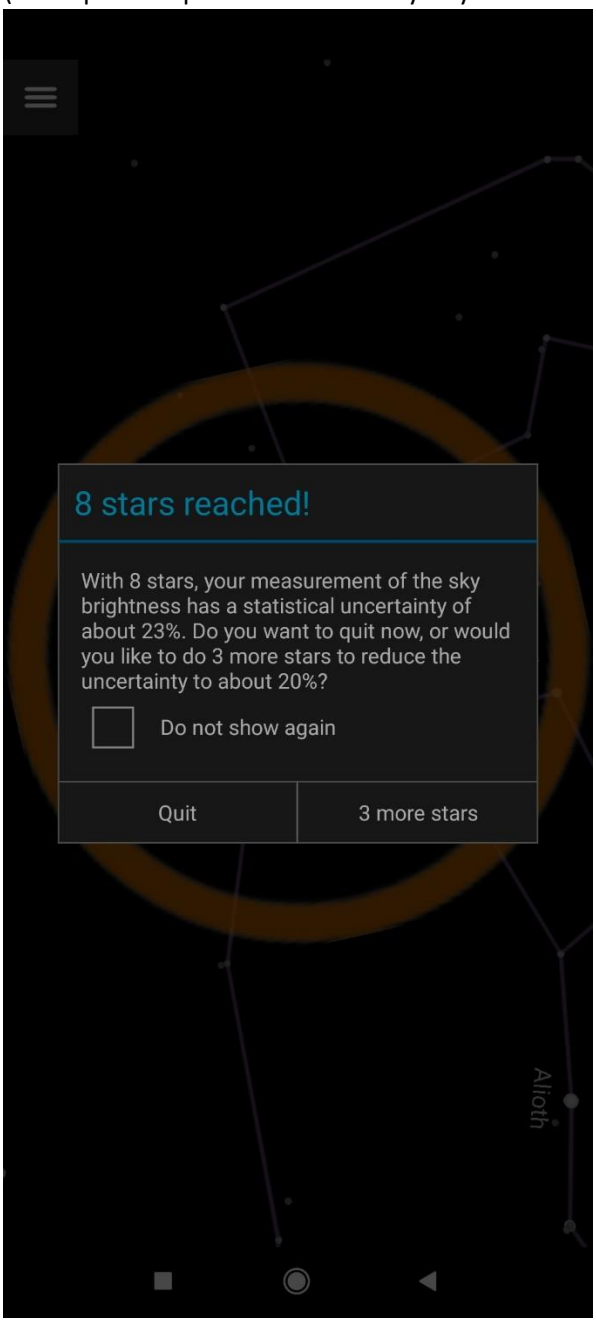
Then you will have two options:

- **“Quit” and "Register"**

(if you haven't done so already) or

- **"3 more stars"**.

(This option improves the accuracy of your measurement)



Picture 13 Completed the 8 stars observation

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Step 8: Three more stars

If you click **"3 more stars"** the App will ask you again to **Quit** or **Continue** when you *reach 11, 14, and 17 stars*.

If you want to continue, you can quit whenever you want and end your observation and click the **"back"** button whenever you are ready to end your observation.

Step 9: Sending your Data

If your phone has an Internet connection, after ending your observation, the data of your observations is automatically sent to a server hosted by the **GLOBE at Night project**, otherwise it will be transferred the next time you have a Wi-Fi connection.

LA4 Experimental results

After sending your data, the App will inform you **how faint is the faintest visible star in your sky** and approximately **how many stars are visible in general in your sky**.
So, this will be a first information about light pollution in your area.

The App will also let you know how consistent your measurements were. So, the more you use the App, most accurate the observations become.

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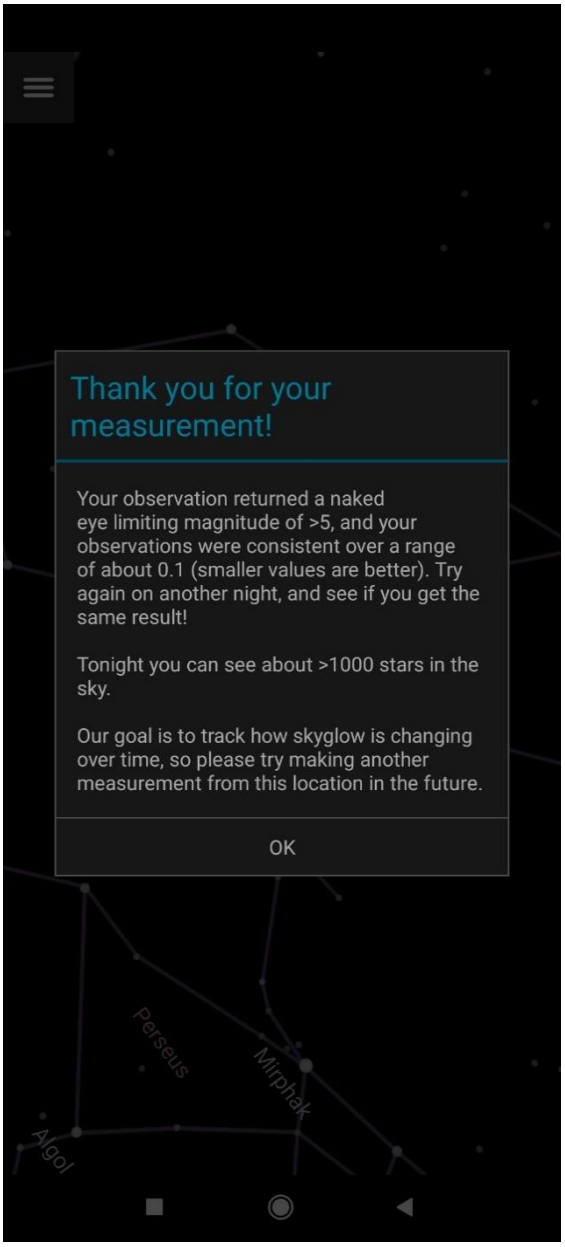

Picture 14 Conclusions about the observation

Step 10: Accessing your data

The App saves your measurements on your phone.

Clicking on the main menu, on **"User data"** and **"My measurements"**, it will show App all your observations (dates and stars) and the results.

If you click on an observation, pops up a message about the names and magnitudes of the stars that you observed. (Stars with smaller magnitudes are brighter.)

Step 11: Additional information /User Data / Settings

You can change the **"User Settings"** by choosing the **"User data"** menu. You can alter, for example, the display of star names.

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You can also increase the size of a star or the font. For example, if the screen is too bright you can click the option **“Make screen darker”**, this might help at the observation too, because minimizes the night effect.

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