



The Star-Spotting Experiment 2019

Citizen science project, being run as part of European Researchers' Night in Sweden 2019

In the citizen science project the Star-Spotting Experiment, thousands of pupils and citizens in Sweden and other European countries will contribute to scientific research about light pollution during 2019 and the first two months of 2020. The project will also help participants gain important knowledge about light pollution, scientific methods, ecology, sustainability and urban planning. We now want to invite your organisation to bring the project to your country in the autumn of 2019.

The Star-Spotting Experiment is being conducted as part of European Researchers' Night in Sweden, which has organised an annual citizen science project on different themes since 2009 (see <http://v-a.se/mass-experiments/>). The projects are much appreciated by Swedish teachers and pupils, who embrace the opportunity to participate in a real science project.

The researcher responsible for this year's experiment is Dr Urban Eriksson, a researcher and senior lecturer in physics with a focus on astronomy education at Kristianstad University.

Light pollution

Artificial light has played an essential role for the development of human civilization during the past century. At the same time, our use of artificial light has dramatically changed the night-time environment in large parts of the world. Previous studies have shown unexpected and worrying effects on the biology of many organisms as well as on whole ecosystems, but also on human health. Hence, light pollution can be regarded as a global societal challenge. In order to explore possible solutions, a transdisciplinary approach and large communication efforts are needed.

The Star-Spotting Experiment is an investigation of the light pollution experienced in our everyday lives; from the doorstep of our homes or in the garden. The project is mapping experienced light pollution at a very local level while simultaneously evaluating a simple method for doing so, which anyone can use.



ForskarFredag finansieras av EU:s forsknings- och innovationsprogram Horizont 2020. GA No 818421.

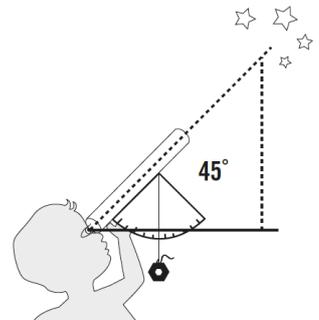
The method

In the Star-Spotting Experiment, participants measure light pollution through naked-eye observations of the night sky. Physicist Dr Urban Eriksson has developed a simple but reliable method in which a cardboard tube (e.g. a kitchen paper roll) is pointed at nine different directions in the sky. The observer uses the app “Star-Spotting” (available in the AppStore and Play Store), developed by the company Spotteron, to report the number of visible stars they can see through the tube, together with information about the weather conditions, lunar phase moon position, co-ordinates, and length and diameter of the cardboard tube.

- The participant goes out at least one hour after sunset and waits ten minutes for their eyes to adjust to the darkness,
- The cardboard tube needs to be held in a 45 degree-angle towards the sky,
- The cardboard tube is pointed in nine different directions (N, NE, E, SE, S, SW, W, NW and Zenith): using a compass,
- The participants count the number of stars visible through the tube and register the data in the app.

Thanks to the simplicity of the method, and the anticipated large number of participants, the Star-Spotting Experiment will generate a unique map of light pollution in Sweden and other participating countries, based on the participants’ own experiences of light pollution where they live.

The Star-Spotting Project does not require any expensive equipment or prior knowledge for participation. Given its straightforward design and its relevance to current topics such as ecology, human health and urban planning, the project has the potential to engage a broad audience, including pupils of all ages and the general public.



Target groups

Teachers and pupils: The Star-Spotting Experiment covers a range of curriculum subjects and can be used with both primary and secondary classes as well as for adult education courses. A teacher’s guide and detailed tutorial is available. To date 13,000 pupils are registered to take part in the experiment.

Outdoor civil society organisations: More than 40 scout groups and amateur astronomy groups in Sweden have registered to participate in the project, involving around 1,000 participants.

Families and the general public: To date over 150 individuals have registered to participate in Sweden.

Summary of time schedule:

- October 2018: Pilot with around ten teachers with pupils in primary and secondary schools,
- February 2019: The Star-Spotting Experiment starts in Sweden,
- April 2019: The first couple of months of the project are evaluated by the Swedish team. Invitations sent to organisations in other European countries,
- September 2019 – February 2020: The Star-Spotting Experiment runs in countries across Europe,
- 27 September (European Researchers' Night) 2019: Publication of the results from the data collection in February - April. New invitations sent to schools, organisations (such as scout groups and other outdoor associations, after school clubs etc) and the general public,
- Spring 2020: Publication of full results of the project.

Information material

The following materials are currently available in Swedish ([found here](#)):

- **Guide for teachers and leaders**
Detailed information for teachers, leaders of outdoor recreation organisations and other participants.
 - information about light pollution and its effects on animals and humans,
 - information about lights in the city,
 - detailed information on how to collect observations,
 - information for teachers containing relevant links to the Swedish school curriculum.
- **App guide**
Detailed information on how to participate with a guide on how to use the app.
- **Practical guide**
A short, practical guide for participants to refer to in the field with printable template on which to record data.
- **Videos**
Three short videos featuring Dr Urban Eriksson:
 - 1). Presentation on the project and information about light pollution,
 - 2). How-to: The Star-Spotting Experiment in Practice,
 - 3). Tips and advice.The videos are in Swedish, English subtitles will be added.
- **Printable compass rose to facilitate use of compass**
- **Guide on how to create a simple protractor**

Bringing the Star-Spotting Experiment to your country

We are happy to see that the Star-Spotting Experiment is generating interest across Europe. We are keen to involve other countries in the experiment, which will allow for international comparisons.

The period open for participation is **September 2019 – February 2020**. The project does not need to be run in conjunction with European Researchers' Night.

The Star-Spotting Experiment is co-ordinated by the Swedish non-profit organisation Public & Science (Vetenskap & Allmänhet, VA). To facilitate administration we would prefer to be in contact with *one* organisation per country. Several organisations within a country can of course collaborate to administer and raise awareness of the project within a country.

At the moment the app can only be used for observations in Sweden. The costs to add a new country to the project are specified below:

<u>Costs for new countries</u>		
Adding country to map in app	For the duration of six months: September 2019 – February 2020	600 € (excluding VAT (Spotteron: Austria))
Administration	Shared translation of information material into English, meetings, contract administration, provision of guidance and support...	1,200 €
	<u>Total:</u>	<u>1,800 € (exkl. VAT)</u>
<i><u>Optional:</u></i>		
Adding another language to the app.	(Translation work should be arranged and paid for directly by the organisation.)	290 € (excluding. VAT (Spotteron: Austria))

Requirements:

- Each organisation should promote the project on their own website. This should include a link to forskarfredag.se (Swedish European Researchers' Night website) and mention Public & Science, (VA) as the co-ordinator,
- The translation of materials and the app into languages other than Swedish and English must be arranged and paid for directly by each participating organisation,
- InDesign files of all the information materials will be made available to allow for adaptation and the addition of translated text. Any costs relating to editing or translation should be covered by each organisation,

- All participating countries are expected to collaborate around the awareness campaign via social media,
- All participating countries are expected to contribute to the final report to be published in the spring of 2020. This includes:
 - supplying a few pictures for inclusion in the report,
 - a short summary about how the experiment was conducted in the country and if any particular findings were made.

Recommendations:

The key to a successful citizen science project is having direct contact between the participants and the researcher. Our experience shows that this direct contact is much appreciated by the participants and provides the opportunity for them to ask questions, get feedback and interact with the researcher. Therefore, we strongly recommend all organisers to work together with a researcher that speaks the same language as the participants.

Open source

All data collected is open source and will be made available to collaboration researchers at the end of the data collection period for national analysis.

For more information:

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English webpage:

<https://forskarfredag.se/star-spotting>

The app company Spotteron: <https://www.spotteron.net/apps>

The Star-Spotting Experiment is co-ordinated by the non-profit organisation Public & Science (Vetenskap & Allmänhet, VA) in collaboration with Kristianstad University, the National Resource Center for Physics Education (NRCE), Lund University, the Swedish National Space Agency and the two science centres House of Science (Vetenskapens hus) in Stockholm and Umevatoriet in Umeå. The project has received funding from Formas, the Swedish Research Council for sustainable development.