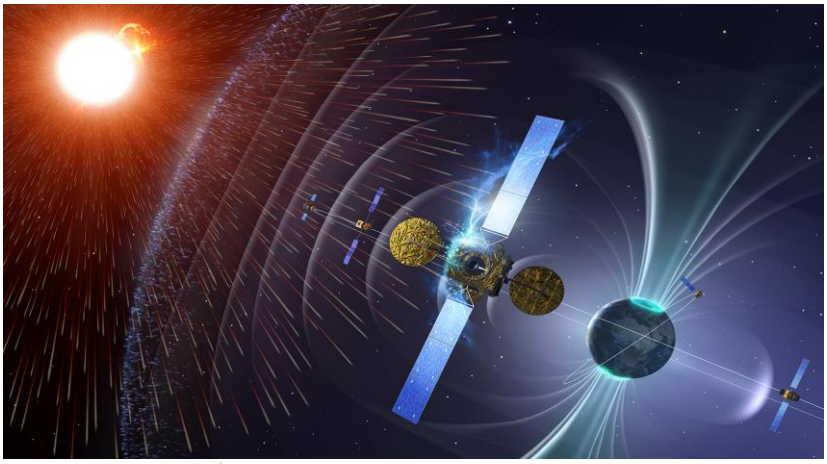

SWATNet NEWSLETTER

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Editorial

Teresa Barata, SWATNet Outreach leader

Welcome to our second newsletter of the SWATNet project, a unique PhD network that aims to educate 12 students in the field of heliosphysics. The second year of SWATNet was extraordinary and exciting. For the first time, our students could meet in presence and participate in several international scientific meetings, seminars, and workshops. It was also possible to start the solar observations program at the Gyula Bay Zoltán Solar Observatory of the Hungarian Solar Physics Foundation (HSPF/GSO). It was a year of intense science learning, but on top of this the ESRs also learned to be innovative, enterprising, and communicative. It was also a time of socializing after the pandemic- this long-awaited period allowed ESRs to take full advantage of the SWATNet training and multiple events outside the network in face-to-face mode. The firsts scientific results of this intense year are starting to emerge, and it is highly likely that in the next year of SWATNet new ideas bases on these results might develop.

1. SWATNet ESRs

The recruitment process of the 12 PhD students of SWATNet called Early-Stage Researchers (ESRs) was completed during this second year. Also, during this second year and after completing the first academic year, the ESRs started their secondments. The secondments mean that all our ESRs travel to other countries for the planned visits to the satellite universities according to their cotutelles agreements.

Another significant milestone this year for our students was the training program at Gyula Bay Zoltán Solar Observatory (GSO) located at the city of Guyls in Hungary. The SWATNet ESRs started receiving practice training in solar observations for one month by operating the solar telescope and analyzing synoptic solar data at GSO. This training program will continue in summer 2023.

SWATNet has received funding from the European Union's Horizon 2020 research and innovation programme under the Marie Sklodowska-Curie Innovative Training Networks Grant Agreement No 955620. The event is the sole responsibility of the organizers and it does not represent the opinion of the European Commission (EC), and the EC is not responsible for any use that might be made of information contained.

2.Update on Scientific results

In 2022 SWATNet ERSs were busy working with their science projects (https://swatnet.eu/projects/). The results have been presented at a number of national and international conferences and workshops, and a few papers have already been submitted or published in peer-reviewed journals of the field. ESRs have also collaborated with each other on their projects. Here are some highlights of the science outcomes so far.

SWATNet focuses on investigating the causes of space weather from Sun to Earth. In the heart of the project are coronal mass ejections and solar flares.

Acceleration and transport of charged particles by coronal and interplanetary shock waves driven by these eruptions are also an integral part of SWATNet.

Our ESRs have explored precursors for these powerful eruptions. These efforts include the development of to detect brightenings in solar active regions, estimating magnetic helicity in solar flux ropes, and investigating typical heights in the corona, where eruptive magnetic field structures lose their stability.

Several interdisciplinary techniques have been applied to improve space weather forecasting. For example, ESRs used a Bayesian inference technique to investigate the propagation of solar eruptions from the Sun to Earth. Image recognition was used to characterize solar activity and to identify flux ropes from coronal simulations.

SWATNet ESRs have also developed a semi-automated tracking method to follow flux rope evolution in data-driven magnetofrictional coronal simulations and explored possible candidates for coronal heating using a two-fluid simulation approach.

Last but not least, the ESRs have formulated an improved the description of how particles are transported in space plasmas to achieve a more realistic inclusion of suprathermal electrons and used Monte-Carlo simulations to investigate the importance of focusing of charged particles due to inhomogeneous magnetic fields in the shock acceleration process.

See some of these results featured in our recently launched Gallery.

More details about scientific results can be accessed through our webpage, respectively:

https://swatnet.eu/publications/
https://swatnet.eu/conference-presentations/

3. Activities

This second year was full of activities. With the reduction of restrictions due to the pandemic, there was the possibility of traveling and carrying out the activities also in person according to the planned SWATNet program. The SWATNet ESRs were able to travel and attend international conferences to present their preliminary results, exchange ideas, and socialize with colleagues.

The first presential event, the "Communication and Outreach" workshop, took place at the University of Coimbra, Portugal. Considering the theme and the fact that it is the first time the ESRs meet face to face, an attempt was made to promote dialogue and debate of ideas through a program of classes with a robust practice component. Journalists and researchers from the Universities of Lisbon (IA - UL), Coimbra (UC), and Helsinki (UH) gave the lectures, which covered diverse topics such as *"Writing about science without being boring*" or "*How to communicate with the camera*". With the concern to promote coexistence among the ESRs, a social program was created that included a visit to the "*Paço das Escolas*" of the University of Coimbra, a short tour of the city, culminating in a visit to the Geophysical and Astronomical Observatory of the University of Coimbra (OGAUC), where they could appreciate the museum and the spectroheliograph acquired

solar observations every day since 1926. A social dinner took place on the last evening near the Mondego River. The feedback received from ESRs was overall very positive. They appreciated the face-to-face format greatly as they experienced close interaction with the lecturers and each other and spent some time networking and social activities.

During 2022 the following events took place:

- Annual meeting - 16 March 2022 (online): https://swatnet.eu/annual-meeting/
- Management a Research Project Workshop 2 – 15-16 March 2022 (online): https://swatnet.eu/notes-from-workshop-2/
- Communication and Outreach Workshop 4 – 20-22 June 2022, Coimbra, Portugal (hybrid with most of the participants being present face to face): https://swatnet.eu/learning-science-communication-skills-in-coimbra/
- School 2: Sun-Earth Interactions - 26-28 September 2022, Athens, Greece (hybrid with most of the participants being present face to face): https://swatnet.eu/a-week-in-athens-learning-about-space-weather/
- Solar Activity and Space weather: Physics behind the process Workshop 3 - 29-30 September 2022, Athens, Greece (hybrid with most of the participants being present face to face): https://swatnet.eu/workshop-3-solar-activity-and-space-weather-physics-behind-the-process/

The next photos show some of the activities mentioned above.

During the Workshop 4 the SWATNet ESRs visited the Geophysical and Astronomical Observatory of UC, June 2022.

Dinner in Athens, during School 2 in September 2022.

Professor Stefaan Poedts with several SWATNet ESRs at the European Space Weather week at Zagreb, Croatia (24-28, October 2022).

4. Outreach Update

SWATNet aims to effectively communicate the activities and results of the project to the general public as well as other audiences and raise awareness about space weather. In 2022, Professor Stefaan Poedts (KU Leuven) participated in the 18th Lublin Science Festival (14 September 2022) in Poland with the following public talk where he also discussed SWATNet:

- S. Poedts: "Predicting extreme space weather: an extreme challenge!", invited popular science lecture at the 18th Lublin Science Festival, Lublin, Poland

Other public lectures to disseminate SWATNet and topics related to it can be consulted on our page: https://swatnet.eu/public-talks/

SWATNet has become a recognised partner of STEM Discovery Campaign 2022 with the aim to increase the visibility of SWATNet outreach material presenting the scientific concepts from space weather and solar physics in an accessible language to different audiences, focusing on reaching educational stakeholders.

Regarding scientific results, to increase their visibility to the scientific community, SWATNet join the Horizon Results Booster program (HRB). With this program, SWATNet has requested the Portfolio Dissemination & Exploitation Strategy service. During the third year of SWATNet more developments in this activity are expected to be done in collaboration with potential sister projects, which will be identified as an outcome of the HBR services exploitation.

By visiting the SWATNet blog, you will find several entries that may be interesting to read.

The Twitter account @SWATNetProject also regularly posts news about project progress as well highlights SWATNet training events through live tweeting.

5. Upcoming Events

- 22 March 2023 – 2nd Annual Project Meeting
- 23-24 March 2023 – Mini MBA Workshop
- June 2023 – SWATNet Summer School "Space Weather and our Technological Society"
- June 2023 – SWATNet Workshop "Entrepreneurialism in Space Physics"
- June-September 2023 – 2nd round of one-month-long observations to be performed by ESRs on-site, at the Gyula Bay Zoltán Solar Observatory (GSO) in Hungary
- February 2024 – "Careers Workshop"
- ...and more!

SWATNet organises its events in a safe and controlled manner to help prevent the spread of COVID-19 virus.

To stay updated on what is happening in the SWATNet project we invite you to follow us on Twitter (https://twitter.com/SWATNetProject) and LinkedIn (https://www.linkedin.com/groups/12623482/) and visit the project website https://swatnet.eu/. We would very much appreciate if you spread the word about the SWATNet project in your channels!