Topical Discussion Meeting report about TDM 01

"*ENGAGING THE SPACE WEATHER COMMUNITY: EDUCATION AND OUTREACH INITIATIVES BY E-SWAN PROTO COMMITTEE*"

TDM Conveners: Carlos Larrodera, Lenka Zychova, Jean Lilensten, Domenico Di Mauro

TDM Secretary: Domenico Di Mauro

Location, date and time: Guillaumet Room, Tuesday 21st November 2023 at 11:45-12:45

Number of participants: ~35 in-person and about ten on-line via Zoom platform

Objective of the TDM: *The TDM aims to actively involve the Space Weather and Space Climate community in the Education and Outreach Committee of the European Space Weather and Space Climate Association (E-SWAN). The meeting focuses on sharing ongoing committee activities, such as organizing courses, webinars, and publishing a Space Weather and Space Climate book. The TDM seeks fresh ideas and suggestions from the community to enhance current initiatives and explore future projects. Attendees are encouraged to participate actively by sharing experiences, providing feedback, and contributing ideas related to space weather education and outreach. The goal is to foster collaboration, strengthen existing initiatives, and identify new opportunities for outreach projects. The valuable input gathered during the TDM will contribute to improving the Education and Outreach Proto Committee's activities, ensuring their relevance and effectiveness. The meeting invites active participation, open dialogue, and collective shaping of future actions to advance outreach and education efforts in the dynamic field of Space Weather and Space Climate.*

Discussion highlights

The TDM commenced with a presentation by Carlos Larrodera, and the attached slides can be found at the end of this document as an ANNEX. He highlighted the approval of the committee's bylaws and recent activities of the new education and outreach committee. Carlos also focused on listing high-priority sectors to enhance the effectiveness of education and outreach activities. This includes targeting primary schools, the general public, and the media, utilizing current social media platforms. Carlos illustrated ongoing initiatives and proposed new ideas within the committee, encouraging input from the audience.

The discussion continued with the presentation of new initiatives by Jean Lilensten. He suggested the development and international dissemination, particularly in developing countries, of educational tools, such as the Planeterrella, a table-size simulator of polar lights. He proposed creating a scientific social network mainly addressed to space weather topics. Jean also suggested developing a weekly (or monthly) space weather report in local languages. This latter initiative involves a non-profit association, collaborating with astronomers and astro-photographers to disseminate scientific content through radio, TV, and press publications, with the goal of reaching 300 million people in Europe and Africa. Jean emphasized the potential for widespread impact and encouraged participation from various countries and institutions. In this context, collaboration with sociologists is a very important aspect to maximize the effectiveness and comprehensibility of information and news about space weather towards the different targets. For example, regarding reaching teenagers on modern social media platforms, Jean suggested using Instagram and Tik Tok, where the younger generation spends a significant amount of time. He proposed creating short, engaging videos, possibly collaborating with influencers or popular creators. The challenge lies in making science fun, interactive, and reliable, tapping into trends that resonate with the younger audience,

such as interactive quizzes related to space weather. The goal is to make content shareable for a broader audience. Jean also highlighted the potential of gamification, creating educational games or apps that blend entertainment with learning.

Jean stressed the importance of inclusivity in outreach efforts, aiming to reach not only those interested in science but also those who may not have had exposure to it. This involves considering diverse backgrounds, economic situations, and educational settings. Collaboration is deemed crucial, involving industries, science centers, museums, and educational institutions to amplify the impact. The objective is to build a network of support to make space weather a more integral part of public awareness and education. The call is for collective efforts to make space weather a fascinating and accessible topic for people of all ages.

Then Lenka Zychova took the floor to drive the final part of the meeting. Lenka addressed her gratitude to in-person and on-line participants. She brought again the focus on education and outreach activities. The key challenges identified are the underrepresentation of space weather in science outreach and the difficulty in reaching people not already interested in science. She emphasized the importance of inclusivity, especially targeting groups with low income or limited resources. Lenka proposed addressing these challenges by creating possibilities for learning about space weather through public lectures, workshops, and online resources. The challenge of addressing a broad range of audience, also those that are not primarily interested, would be through educational programs and public awareness campaigns, creating lessons for primary and secondary schools, and also through cooperation with science centres and museums that are a typical place where children, interested or not, come within their visits with schools.All these initiatives are aimed to generate interest in space weather, making it accessible to a broader audience. The committee is actively working on booklets tailored for general audiences to enhance science outreach efforts.

More specifically, Lenka discussed the following three key points:

1. **Industry Collaboration for Awareness:**
    - Creating educational programs in collaboration with industries relevant to space weather.
    - Public awareness campaigns in partnership with industries such as airlines and power grids.
2. **Primary and Secondary School Education:**
    - Recognizing the challenges teachers face, proposing the creation of lessons specifically crafted for direct use in primary and secondary schools. These lessons would elucidate essential topics mandated by the education curriculum while concurrently delving into subjects pertinent to space, the solar system, and Earth. Additionally, these lessons would incorporate supplementary information on space weather.
    - Cooperation with science centers and museums to make space weather more visible to students, even those from schools with limited resources.
3. **Engaging the Young Generation through Social Media:**
    - Emphasizing the importance of social media, especially for the younger generation.
    - Suggesting the creation of short, animated videos on platforms like YouTube Kids to explain space-related phenomena.
    - Highlighting the popularity of social media apps among teenagers and young adults, including Instagram, X (Twitter), and TikTok.

Lenka solicited input and discussion on these points, also through the use of a realtime opinion poll with the help of *wooclap* platform. She invited all participants at the meeting to scan the QR code for immediate activation of the interaction about the questions already prepared and posed (see Figure 1 and Figure 2).

A participant discussed a past initiative in the UK to comprehend public perception of space weather through detailed investigations, working groups, and online surveys. The report resulting from this initiative was presented to the government. Another participant mentioned the importance of considering the University of the Third Age, a group of retired individuals with a science and engineering background, highlighting their economic influence and support for science. Another participant mentioned the efforts in promoting heliophysics education and space weather through social media, especially during events like eclipses.

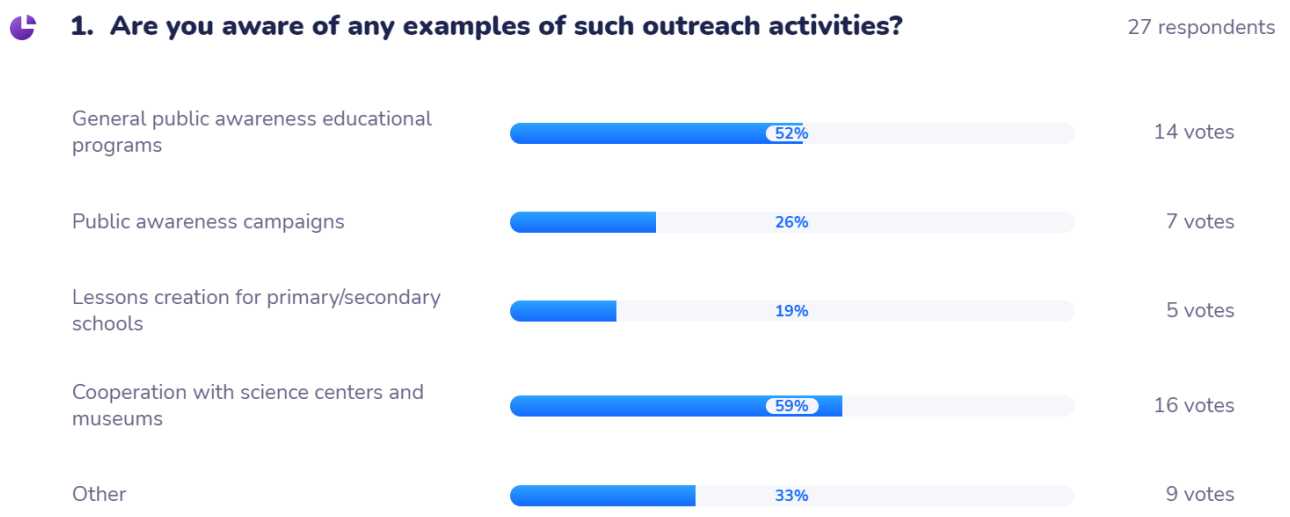

Figure 1: Results from the online poll on the question if the participants were aware of any examples of mentioned outreach activities.

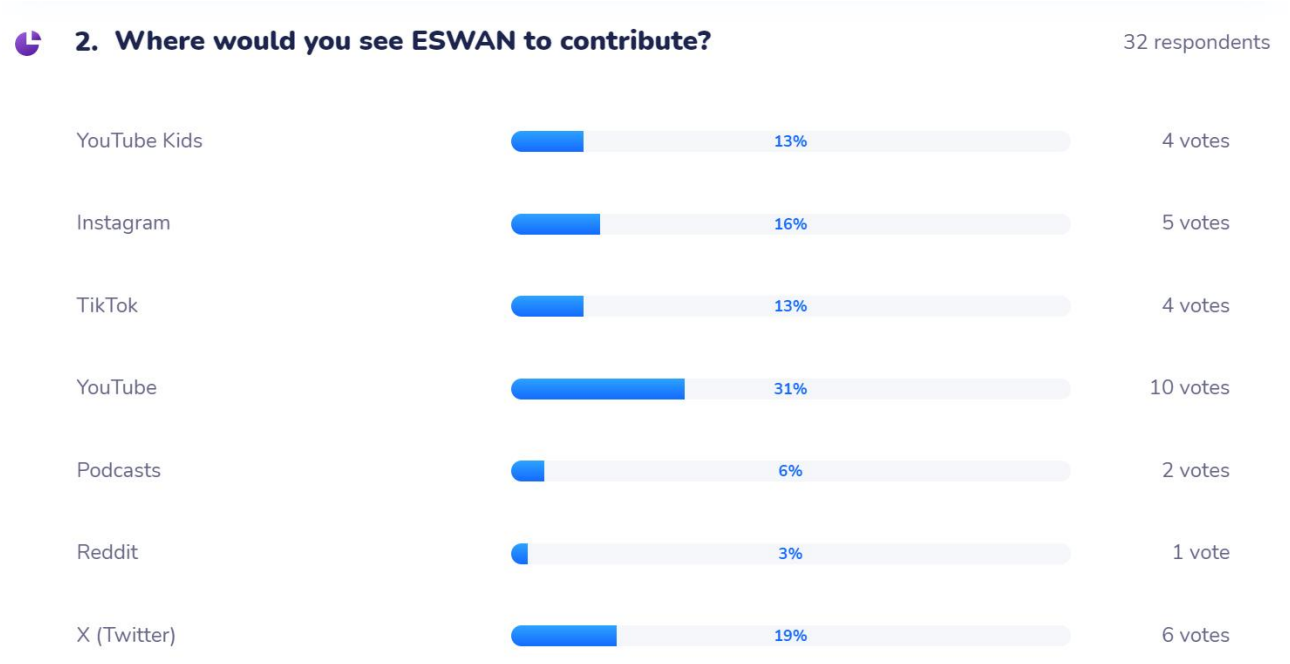

Figure 2: Results from the online poll on the question where would the participants see ESWAN contributing.

The discussion includes a focus on public awareness and the challenge of reaching certain age groups resistant to social media. The idea of creating lessons tied to the national curriculum and available online for teachers is also mentioned. The importance of teacher training sessions is emphasized to effectively integrate space weather topics into the curriculum.

The ongoing discussion touched on the importance of university education, challenges in curriculum development, initiatives such as creating educational resources like books to enhance understanding of space weather.

Key points from this part of the discussion:

1. **Inclusion of Space Weather in university curriculum:**
    - Emphasis on ensuring that space weather is taught at universities, particularly where astrophysics or geoscience sciences are offered.
2. **Teacher training and curriculum challenges:**
    - Mention of past teacher training centers in the UK focused on space and space weather.
    - Recognition of challenges in the curriculum, with teachers in some countries having to create their own lessons each year.
3. **Diverse teaching approaches:**
    - Varied teaching approaches, with some teachers using textbooks and pre-made materials, while others create their own resources.
    - The importance of adaptability in teaching methods, considering the diverse socio-economic backgrounds of students.
4. **Initiative for a Space Weather Book:**
    - Introduction of an initiative to create a book about space weather and space climate.
    - The book aims to be introductory, historical, and suitable for both specialists and the general public.
    - The book is anticipated to be published soon and available in open source, accessible to everyone.

Participants further discussed collaboration, challenges, and initiatives in planetariums, educational resources, and outreach efforts aimed at making space weather education more accessible to diverse audiences. The main points are listed below:

- **Planetariums and Collaboration in France:**

  Reference to the speaker's experience working in a planetarium in Lyon, France. Mention of the association of all planetariums in France, highlighting the community's interest in space weather.

- **Observatories and Planetariums in Different Countries:**

  Comparison between France and Belgium regarding the prevalence of observatories and planetariums. Noting challenges and differences in the cultural approach to these facilities in different regions.

- **Collaboration with NASA's CCMC and Open Space Project:**

Collaboration between NASA's Community Coordinated Modeling Center (CCMC) and the Open Space Project for showcasing space weather and human exploration in planetarium shows. Mention of a planetarium show at the California Academy of Sciences, available on YouTube for broader accessibility.

- **Challenges in reaching children without support:**

  Discussion on the challenge of reaching children without financial or other support for educational activities. The participant from NASA CCMC mentioned the open access to YouTube links for shows to address this challenge.

- **Proposal for an International Space Weather Movie:**

  Suggestion to initiate the development of an international space weather movie, possibly under the umbrella of ILWS (International Living with a Star). Call for volunteers to contribute to the project.

- **Committee invitation and supporting educational initiatives:**

  Invitation for participants to join the educational and outreach committee. Discussion on creating more educational materials and resources, especially targeting schools or places with limited support.

- **Adapting educational resources for different social groups:**

  Acknowledgment of the need for diverse resources targeting different social classes and groups. Emphasis on re-engineering educational materials to be more digestible and engaging for lower-income groups and students.

- **Addressing challenges in science outreach:**

  Recognition that addressing challenges in science outreach, especially to underprivileged groups, is a broader issue that requires rethinking educational approaches.

- **Focus on the community of colleges in the US.:**

  Reference to the community of colleges in the US as institutions where space weather education can be introduced successfully.

The closing discussion focused on the opportunity to create interactive events like space weather-themed *escape games* in different formats, including *city games,* space weather international (celebrating) day with some simultaneous action worldwise, similar to the astronomical events, where people, for instance, use their own telescopes to observe the sky simultaneously. This maximises the accessibility and impact of such events, reaching a diverse audience. Additionally, the simplicity of organizing such events was highlighted, along with the potential to engage in discussions about space weather with the general public.

Conclusions

In conclusion, the TDM concluded with dynamic discussions on advancing space weather education and outreach. Addressing challenges and proposing solutions, the discussions included ideas such as collaborations with industries, science museum, teachers of primary and secondary schools, as well as using social media for engaging younger audiences. The participants also shared experiences and initiatives, covering challenges in education, university-focused endeavors, and plans for a forthcoming space weather resources.

The conversations extended to collaborative efforts in planetariums, educational materials, and outreach, with a strong emphasis on inclusivity and diverse engagement strategies. The closing discussions suggested interactive events like space weather-themed escape games and global days celebrating space weather, emphasizing accessibility and public engagement.

The TDM fostered a collective commitment to collaborative, inclusive, and innovative approaches, reflecting a shared determination to enhance global awareness of space weather and its impacts.

Annex

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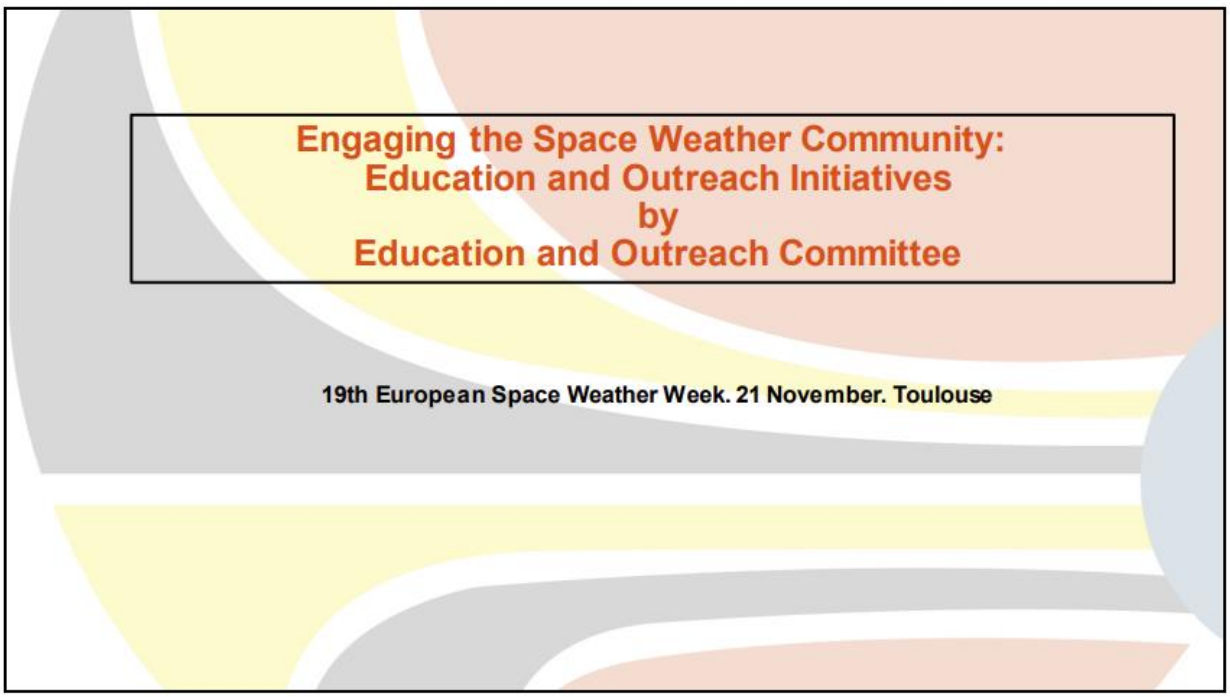
Engaging the Space Weather Community:
Education and Outreach Initiatives
by
Education and Outreach Committee
19th European Space Weather Week. 21 November. Toulouse

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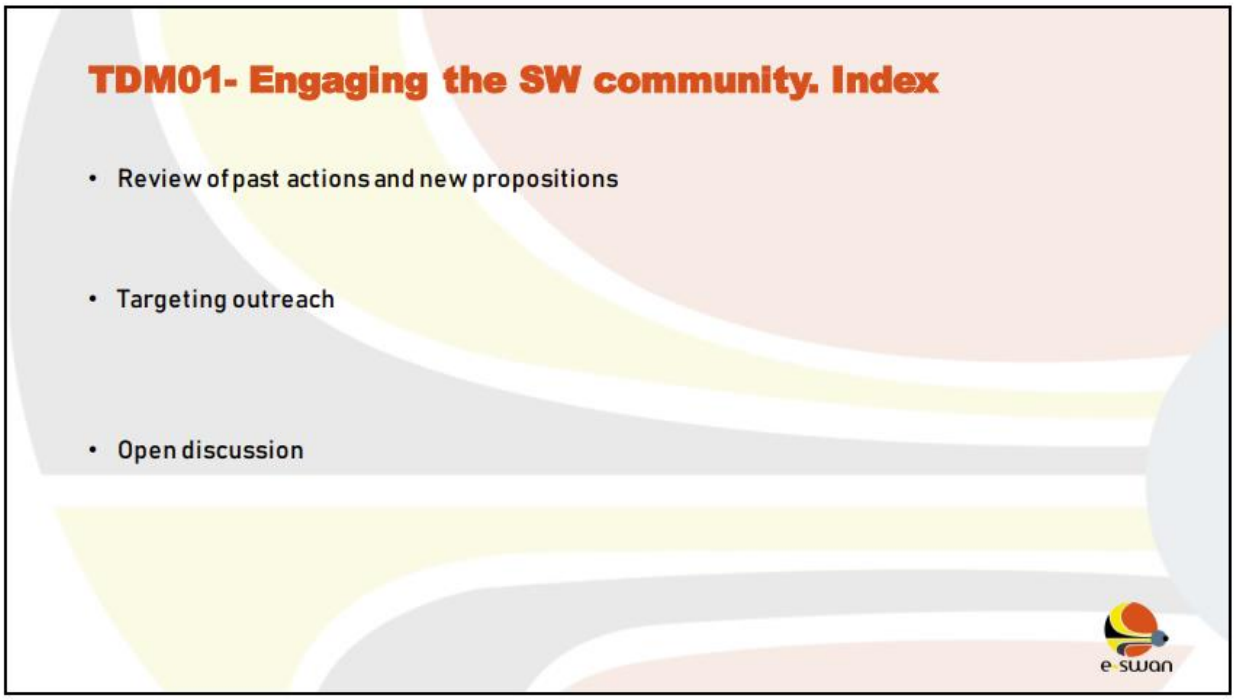
TDM01- Engaging the SW community. Index
• Review of past actions and new propositions
• Targeting outreach
• Open discussion
e-SWAN

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TDM01- Review of past actions

- Transition to a committee.
  - Bylaws have been written and approved by the EB
- Organize Space Weather and Space Climate school series
  - 1st E-SWAN school: Space Weather Data, Models and Services
- Publication of Space Weather and Space Climate book
- Support community initiatives
  - 3rd edition of the Iberian Space Science and Summer School 2023 (i4s 2023)
- Survey on Education and Outreach activities
- Booklets

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TDM01- Targeting outreach

- High priority sectors to target our outreach activities
  - Outreach to media
  - General Public Awareness
  - Primary/Secondary School Education
  - Science Centers and Museums
  - Public Lectures and Workshops
  - Online Resources

It is easy to reach out to already interested people, but it is challenging to reach out to people who are unaware.

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TDM01- Targeting outreach
High priority sectors to target our outreach activities
Public Lectures and Workshops
Outreach to Media ⟹ Presented by Jean Lilenstein
Online Resources
General Public Awareness ⟹ Educational programs and public awareness campaigns
Primary/Secondary School Education ⟹ Lessons creation
Science Centers and Museums ⟹ Cooperation
Are you aware of any examples of such outreach activities? Do you have any other proposals?
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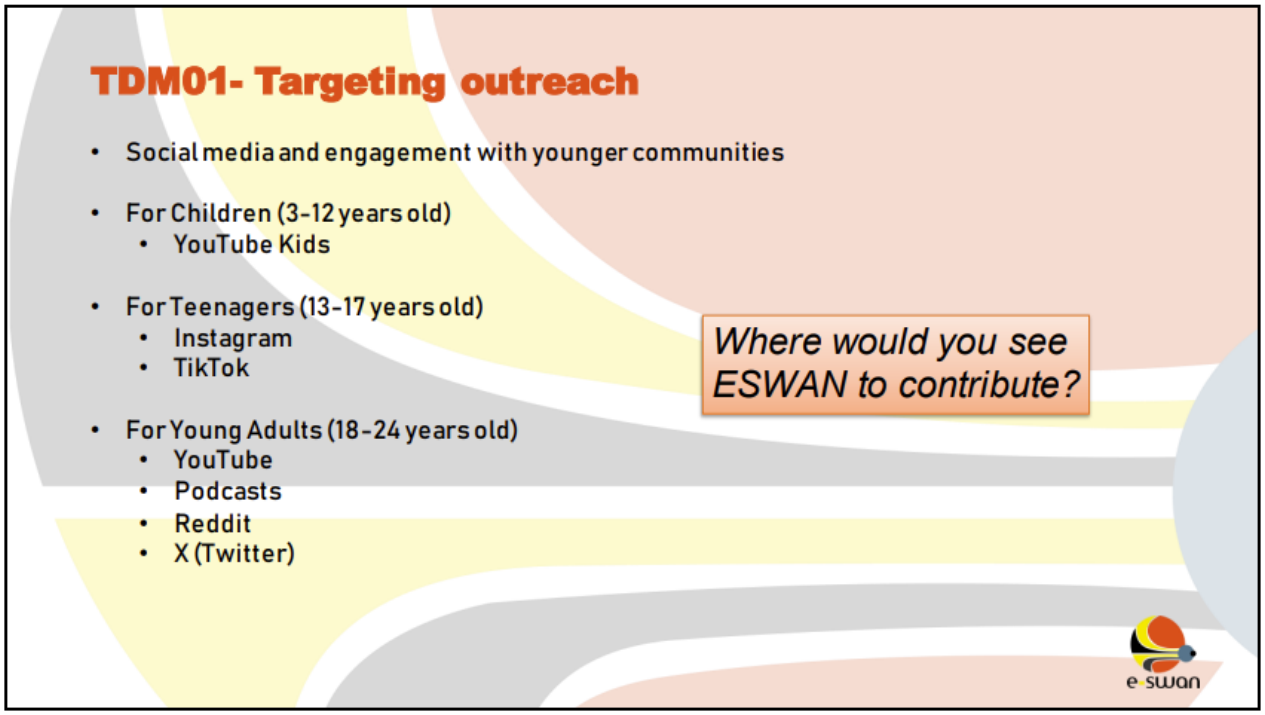
TDM01- Targeting outreach
Social media and engagement with younger communities
For Children (3-12 years old)
YouTube Kids
For Teenagers (13-17 years old)
Instagram
TikTok
For Young Adults (18-24 years old)
YouTube
Podcasts
Reddit
X (Twitter)
Where would you see ESWAN to contribute?
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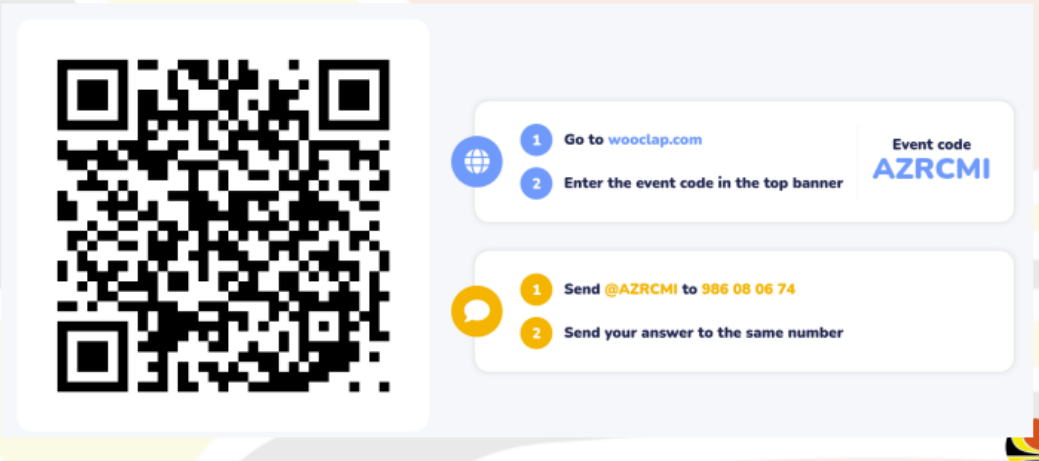
TDM01- Open discussion. Brainstorming

- What word would fit better to this sentence: 'Engaging the Space Weather Community: Education and Outreach Initiatives?'



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TDM01- Open discussion. Questions

- Which suggestions do you have about in-person outreach activities?
- And about online activities?
- Which type of activity you think that would be better?
- Do we need in-person meetings?
  - The future of meetings (https://tfom.org/)