

# *Impact of astronomy education on our society and community engagement (through examples)*

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Changing the scope:  
→ long-term measures  
for the benefit of our  
society



To fight poverty in  
the long-term

- education
- science
- strong technological development
  - innovation
- empowering women, girls, and minorities

→ ASTRONOMY and SPACE SCIENCE:  
important tools for development

"A blueprint to achieve a better and more sustainable future for all people and the world by 2030."

(Mission Statement)

SDG4 and SDG5 play a fundamental role in the world agenda.



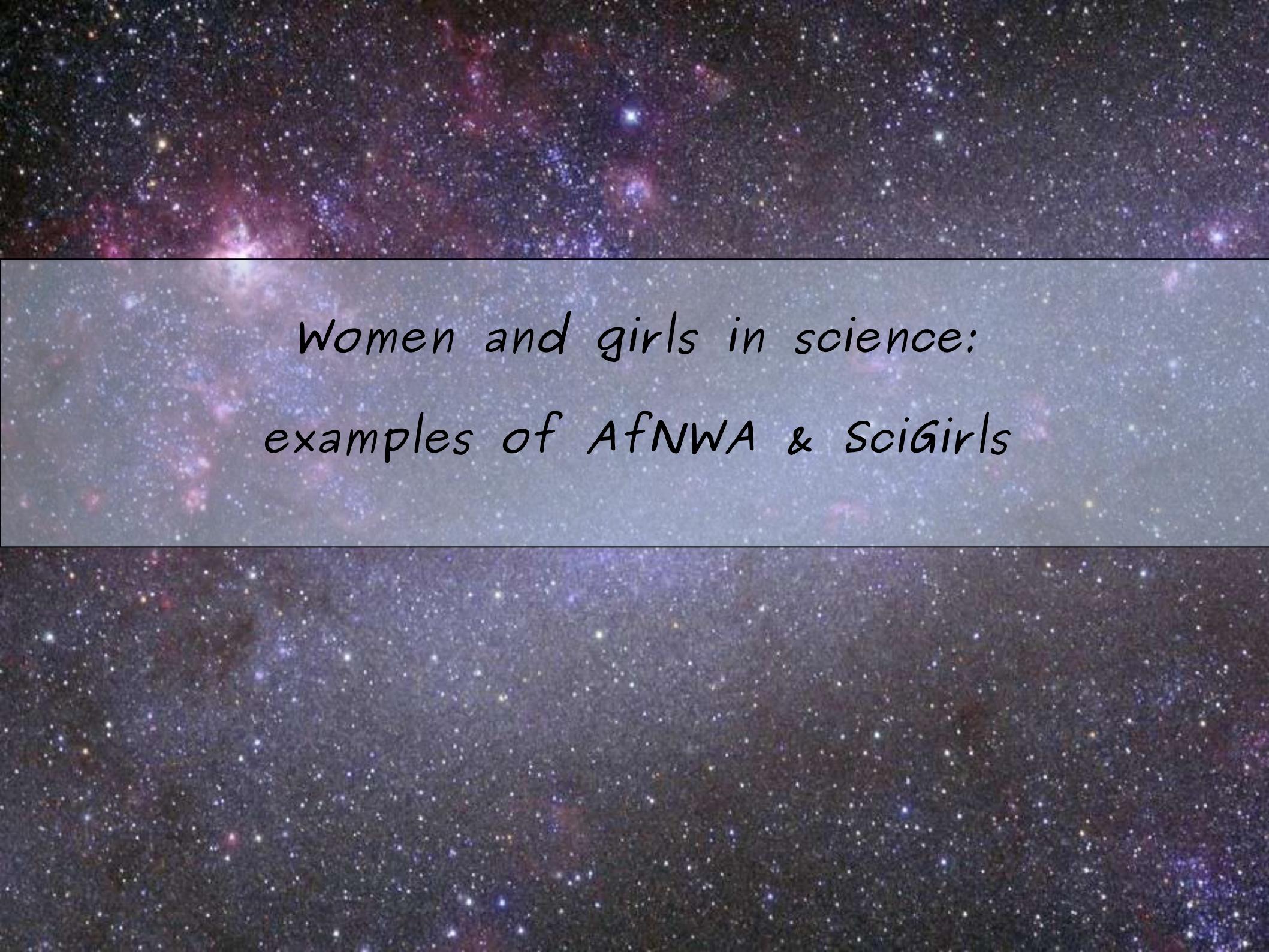
Astronomy contributes to all UN and AU SDGs!!  
&  
Astronomy is an emerging science in Africa!!

## Content of the talk:

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- Women in Astronomy in Africa, AfNWA
- SciGirls: empowering girls and female teachers in STEM through astronomy
- Teachers trainings through NASE
- Astronomy in conflict-affected areas
- Community engagement  
at Entoto Observatory





*Women and girls in science:  
examples of AfNWA & SciGirls*

# The current gender gap in science

The number of female researchers in the world is on average < 30%

In most of the African countries, it is < 25%, and even lower when considering fundamental sciences

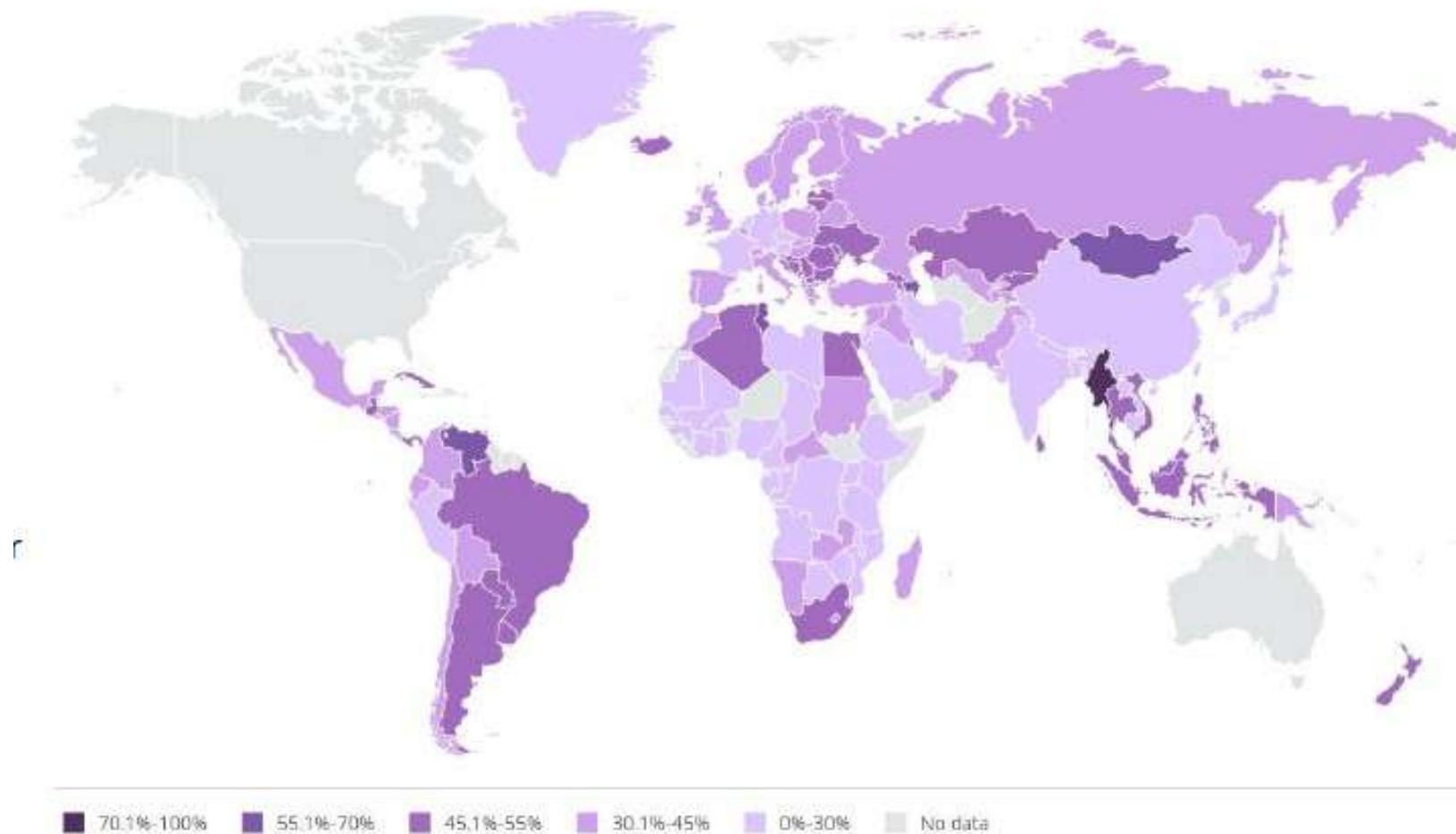


Image credits: UNESCO, 'Women in Science' report, 2019

# Background and motivation for AfNWA & SciGirls



→ is fundamental for achieving

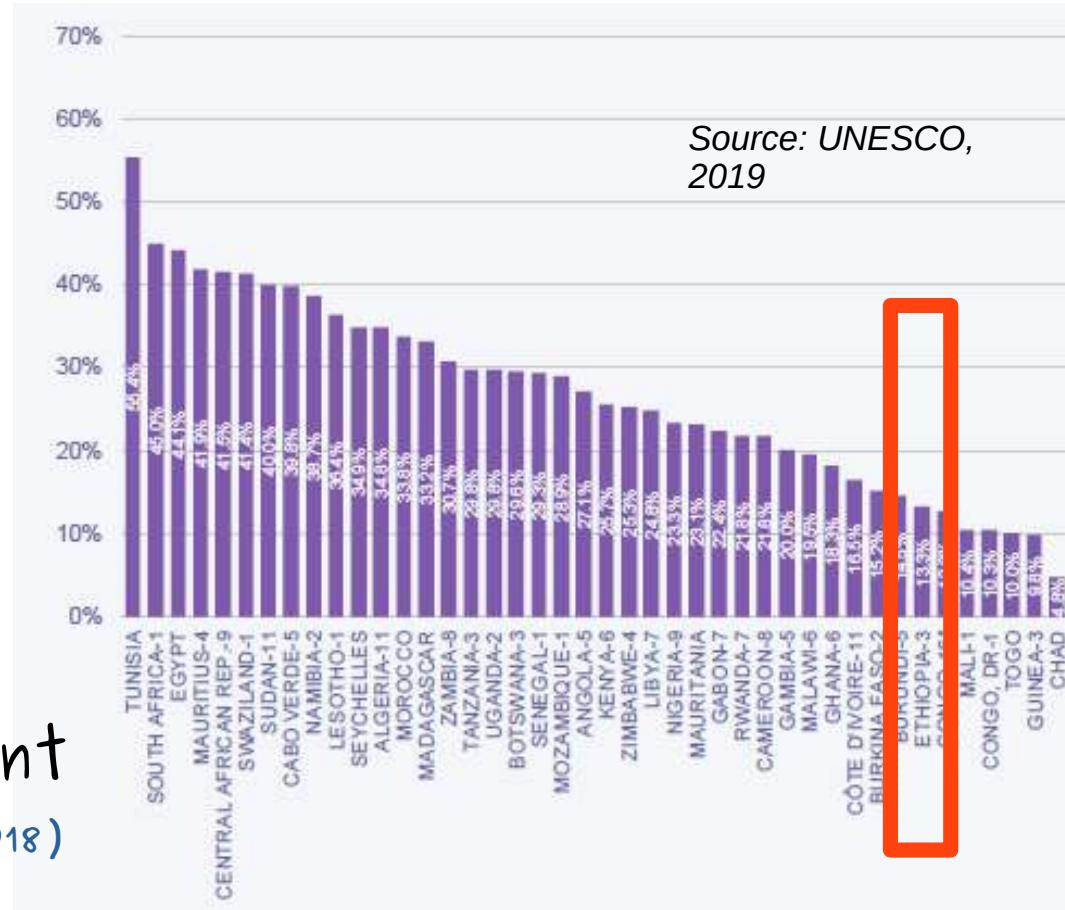


→ gender gap in science worldwide,  
in Ethiopia ~ 13% of all  
scientists are women  
(UNESCO, 2019 report)

→ astronomy is an emerging  
science in Africa and  
is important for  
socio-economical development

(McBride et al. 2018; Pović et al. 2018)

→ many women scientists in Africa work in  
male-dominated environments



# Is the gender gap in science really important?

Why do we care so much about the gender gap in science?

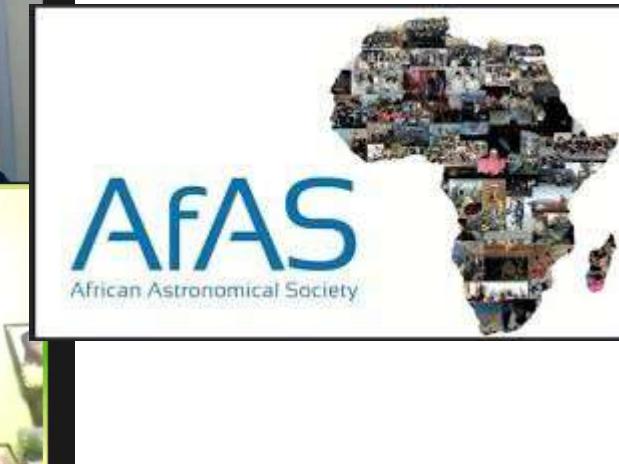
Does it really matter who do we empower, girls or boys, men or women, as long as the job is done?



We can also ask the question in a different, very simple way, however in line with previous:

If rich people can do all the job in high positions, is it really important to empower poor and underprivileged groups?

The first conversations started in 2019 and 2020, after 2018 Nature Research Award for Inspiring Science



In line with  
re-establishement of  
the African  
Astronomical Society  
in 2019

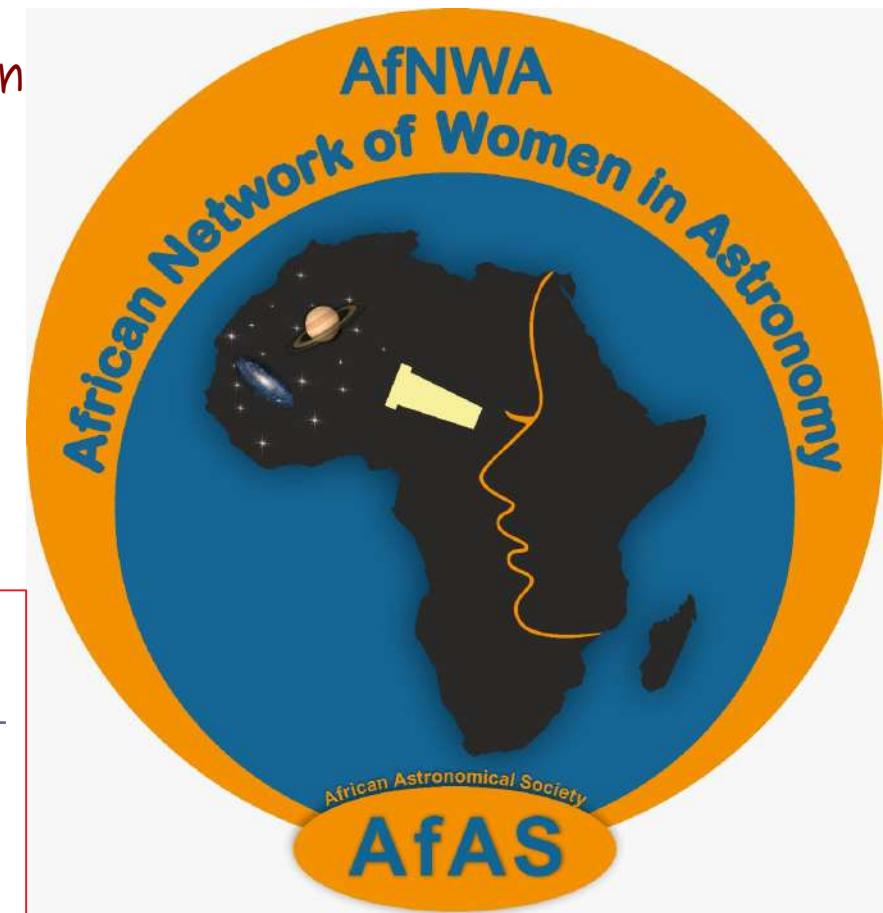


# Empowering women and girls across Africa through astronomy and science → need for AfNWA

The African Network for Women in Astronomy (AfNWA) is an initiative that aims:

- to improve the status of women in science in Africa,
- to guarantee the future participation of girls and women at all levels in astronomy and science developments,
- to use astronomy to inspire more girls to do STEM,
- to empower girls and women.

Established in 2020 under the African Astronomical Society (AfAS) as one of its sub-committees, to empower women and girls in science through astronomy.



# Who is behind AfNWA and its current status?



AfNWA Board  
Past Board members



Nana Ama  
Brown Klutse



Carolina  
Odman-Govender



AfNWA Call for Board Members

## Current status:

- Publicly launched in January 2021
- By now > 170 members from > 30 countries (~ 80% women, ~20% men)
- Only ~ 20% are senior/faculty members,  
~ 80% are early-career researchers, PhD and MSc students

# Who is behind AfNWA and its current status?



## AfNWA Board

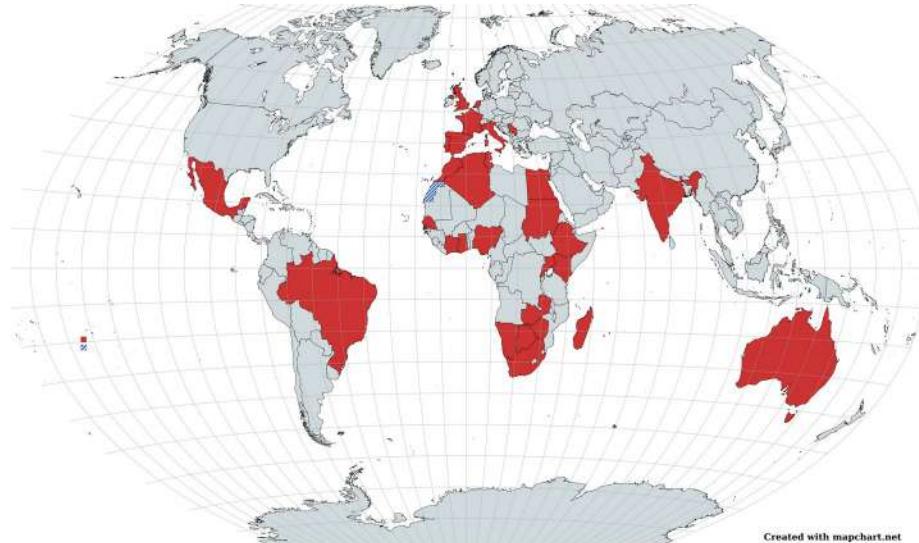
### Past Board members



Nana Ama  
Brown Klutse



Carolina  
Odman-Govender



Created with mapchart.net

## AfNWA is timing to:

- strengthen the links between female researchers,
- strengthen their professional and leadership skills,
- attract girls to STEM through real role models,
- understand the main factors behind the lack of women in science and retain women in astronomy.

# Some of the main AfNWA activities and impact

- Creation of the Network, bringing us together, managing the email list → stronger connections
- Virtual trainings (e.g., in scientific writing, presentation and CV preparation, funding opportunities, etc.) → capacity building
- Several organised public events (including March 8 and World Space Week) → public awareness



AFRICAN WOMEN  
IN ASTRONOMY AND  
SPACE RESEARCH

WORLD SPACE WEEK 4-10 OCT. 2021



Welcome to AfNWA-AfAS talk!



# Some of the main AfNWA activities and impact

- AfNWA-ISP Awards for Women in Astronomy in Africa (2021, 2022, 2023, 2024) → recognition, role models



2021 Early Career Award:  
Dr. Marie Korsaga, Burkina Faso & France



2021 Senior Astronomer Award:  
Prof. Renée Kraan-Korteweg, South Africa

2022 Prof. Carolina Odman-Govender Early Career Award:  
Dr. Al-Shaimaa Hassanin

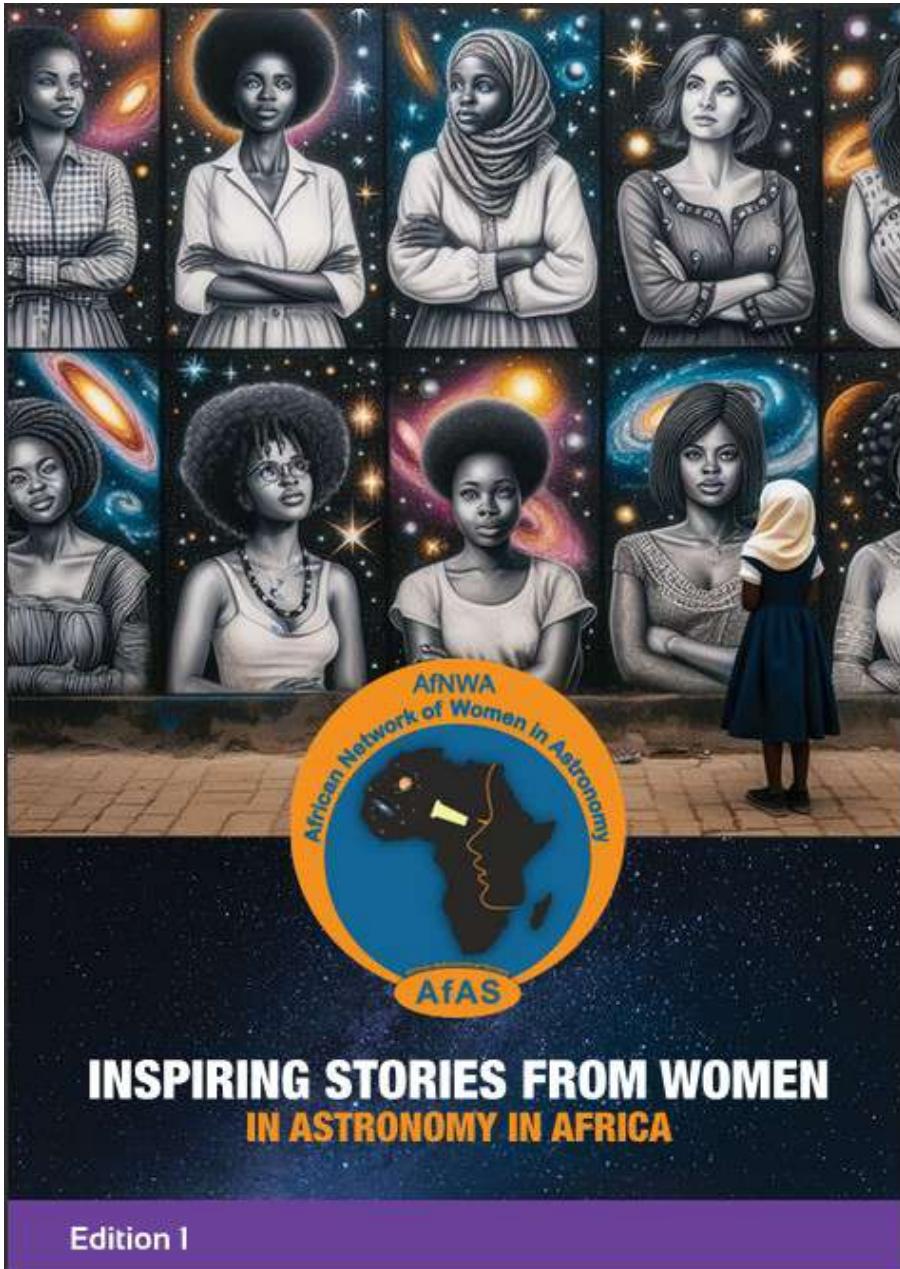


2023 Prof. Carolina Odman-Govender Early Career Award:  
Dr. Brenda Namumba, South Africa

2023 Senior Astronomer Award:  
Prof. Hashaa Chennaoui Aoudjehane

# Some of the main AfNWA activities and impact

- The 1<sup>st</sup> storytelling book about women in astronomy in Africa



- stories from ~ 50 women
- from MSc/PhD students to senior astronomers
- from 22 countries



→ recognition, visibility, role models

**Ola Ali M.  
M. Saad**



Egypt  
Assistant Researcher - National Research Institute of Astronomy and Geophysics - Egypt

**“**  
Be sincere to your dream,  
time will respond to you,  
even if it takes a while.”

76 AFRICAN NETWORK OF WOMEN IN ASTRONOMY



Main editor, Dr. Priscilla Muheki

study of the bigger universe. This profound connection between ourselves and the cosmos continues to resonate with me to this day.

Cairo University's Faculty of Science made my dream come true, with its bachelor's degree program in astronomy. After graduating in 2011, I pursued a master's degree,

focusing on the beautiful open star clusters, which I chose because of my love for the beautiful visible to the naked eye Pleiades.

My research delves into the secrets of these celestial families. Using powerful tools like observations from the Kotamia Observatory in Egypt, the 2MASS Catalog (which maps the infrared sky), and the Gaia Catalog (which tracks the motions of billions of stars), I uncover new details about open star clusters. Revealing previously unknown parameters, like their age or composition, brings me immense satisfaction. It's a constant process of peeling back the layers, expanding our understanding of these celestial wonders.

Science, for me, is more than just the pursuit of knowledge; it's a source of solace and inspiration. During challenging times, I find comfort in the vastness of the night sky, especially the breathtaking dance of countless stars on a clear night in the desert, far from the city lights. Sharing this passion through outreach programs, especially with children, brings me immense joy. Witnessing their wonder as they gaze at the stars for the first time is a truly magical experience.

Astronomy isn't just about celestial objects; it also connects me to something larger than myself. Contemplating the universe and its creation fills me with a sense of awe and deepens my spiritual connection with Allah.

My journey as a female astronomer hasn't been smooth sailing. There have been societal expectations and moments of doubt. However, the unwavering support of my family and friends has been my guiding

light, as well as my professors at the university and institute, especially the guidance of my mentor and scientific role model, Professor Somaya Saad.

During this journey, I've learned and achieved so much. I operate small telescopes, conduct outreach events using them, and utilize the Kotamia Astronomical Observatory to take observations and publish them. I'm also a member of two scientific programs:

• "Observing and studying astronomical transient phenomena using the Kotamia Astronomical Telescope," STDF Egypt project No. 45779, from 1/8/2021 to 1/4/2024.  
• "Poor Open Cluster in the GAIA Era," IM-HOTEP program No. 425682K, between Egypt and France - 2019 to 2021.

In addition, I'm a member of Egypt's National Astronomical Education Coordinators (NAECs) and the Scientific Society of Astronomy & Space (SSASEgypt).

My dreams are vast; I want to continue exploring the universe, unravelling its secrets, and contributing to humanity's collective knowledge. Knowing that I am a part of something so vast and magnificent fills me with a sense of purpose. I also dream of creating a comprehensive outreach program to teach children astronomy.

Remember, never let societal norms dictate your passions. Pursue what ignites your curiosity, for the universe awaits!

Awards

1. Community Service and Science Communication Award from the National Research Institute of Astronomy and Geophysics December 2023

2. Best poster prize of Arabic Conference of Astronomy & Geophysics (ACAG 6) 2018 for a poster titled "2MASS study of Ptole J1655+10.4, Ola Ali et al."

# Some of the main AfNWA activities and impact

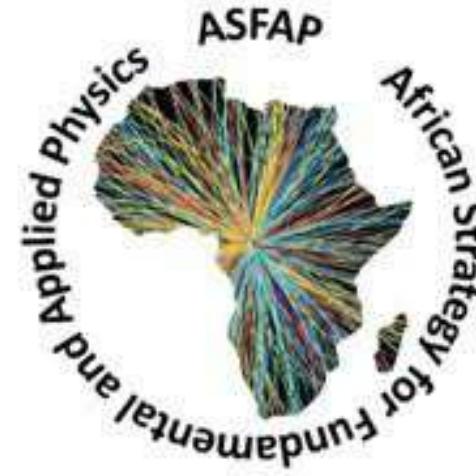
- Organised multiple discussion sessions and talks on women in science at international meetings (e.g., AfNWA annual special sessions since 2021, IAU GA 2024, IAU East-Africa Regional meeting, EAS annual conferences, etc.)



→ visibility given to female astronomers among academia

- Developed a list of recommendations about women and girls in science and astronomy and shared through various international conferences (including several Africa-EU and UN conferences) → visibility to challenges and needs

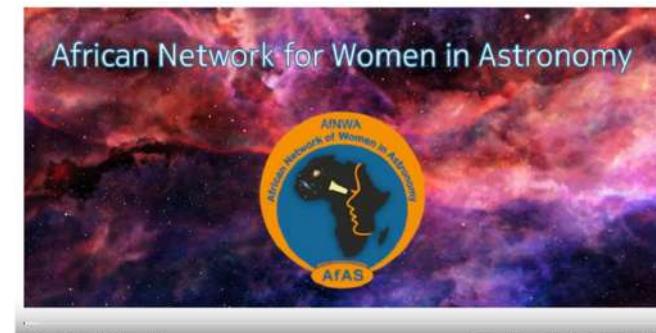
- Invitation to participate in Women in Physics chapter of the African Strategy for Fundamental and Applied Physics (ASFAP), under UNESCO



→ political impact

# Some of the main AfNWA activities and impact

- outreach activities (outreach videos, outreach seed grants)
  - promotion of women in science, and gender balance in schools



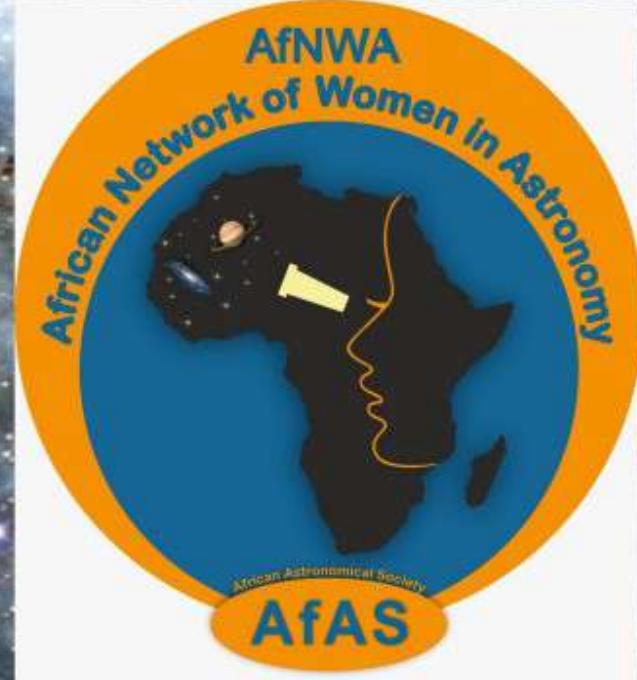
African Network for Women in Astronomy (AfNWA) outreach video 1 for promoting STEM



African Network for Women in Astronomy (AfNWA) outreach video 2 for promoting STEM

# Some of the main AfNWA activities and impact

- Outreach seed grants in collaboration with the AfAS Education/Outreach Committee → girls empowerment



AfNWA call for seed grants in support of projects focusing on empowering girls from disadvantaged communities

- 30 proposals received
- 13 projects funded in 10 countries across Africa
- includes girls in remote and rural areas, IDP settlements, townships



Activities in Mozambique and Nigeria

# SciGirls - Empowering girls in science through astronomy

Ethiopia

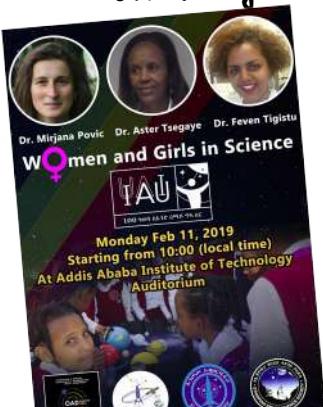


→ OAD-IAU 2022 and 2024–2026  
multiyear funded project with the  
support of SSGI

Example of the impact of astronomy on  
empowering girls

# Background: STEM for GIRLS in Ethiopia

- Since 2019 in collaboration with the Society of Ethiopian Women in Science and Technology (SEWiST)
- Work with ~ 1000 secondary school girls
- Work with > 30 teachers
- Strengthening the role-modeling and mentoring
- Survey conducted about girls in STEM



# Background: STEM for GIRLS in Ethiopia

Main lessons learned:

- strong interest observed for astronomy and science
- lack of support for choosing STEM
- lack of information
- lack of role models
- difficulties faced in particular in remote and rural areas (80% of Ethiopian population)

The slogan of the Ethiopian Great Run, 2018



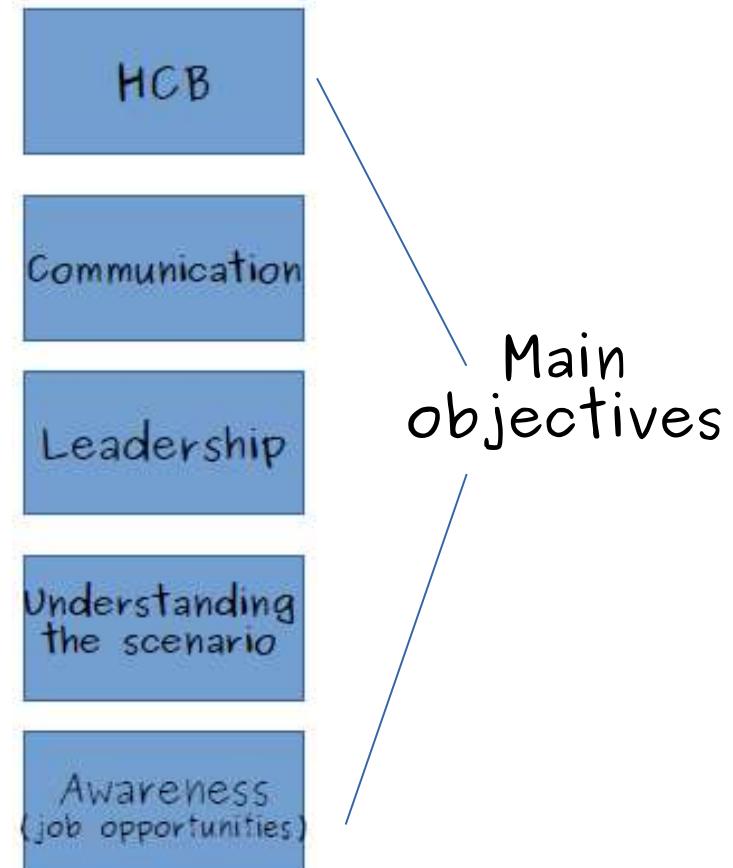
Motivation for the SciGirls project under the OAD2022 call and after its success under the 2024–2026 multiyear call

- Empowering girls and female teachers in remote and rural areas in science through astronomy

# Idea behind SciGirls and main objectives

- to promote STEM through astronomy and its multidisciplinarity.
- to organise a strong capacity-building workshop + follow-up activities in communities.
- to bring a sort of pilot project for creating advocates of STEM.

Focus on the secondary school girls in remote/rural areas and their female science teachers.



# SciGirls: team and organizers



International  
Astronomical  
Union | Office of  
Astronomy  
for Development

- SSGI A&A Department and Instrumentation Unit
- Ethiopian Space Science Society (ESSS)
- EA-ROAD
- STEM Power
- Ministry of Innovation and Technology

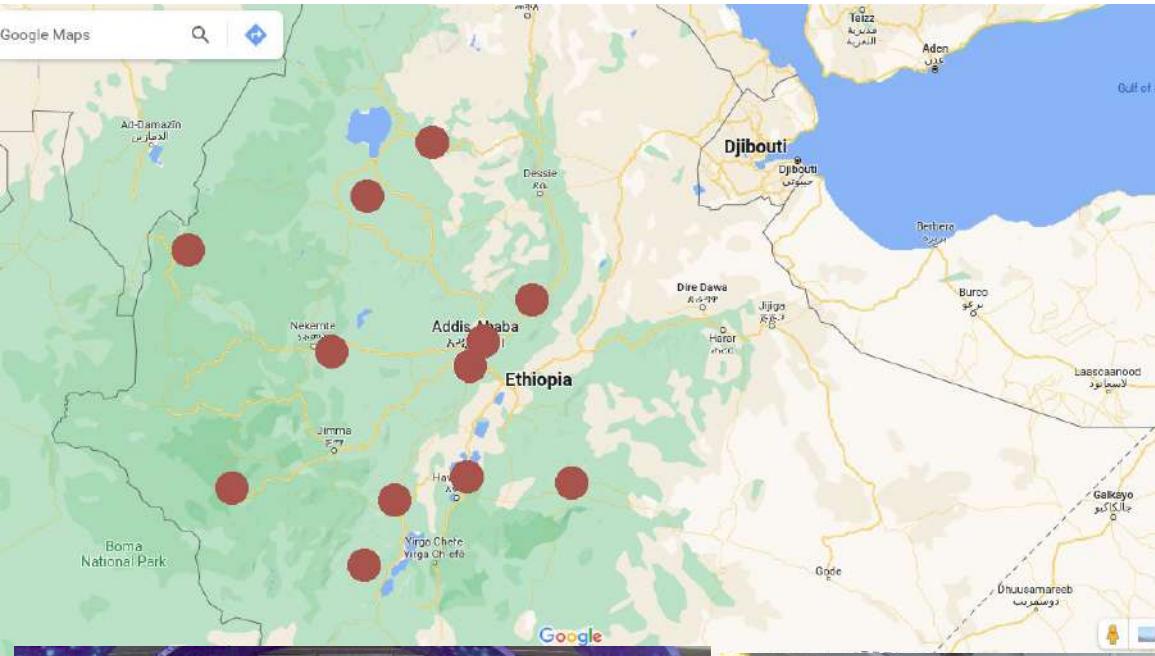
With the strong help of the SSGI Gender Office, Partnerships Department, Training Department, Purchasing Department, General Services, Finance Department, Remote Sensing Department, Space Engineering Department, and Space Science and Applications Department.



*In collaboration with*



# SciGirls program: 1st edition in 2022 (trained 30 participants from different parts of Ethiopia as indicated in the map)



Group SciGirls picture in 2022.  
Credits photos: A. Solomon/



# SciGirls program summary: 2024 training

1st year of the 2024–2026 OAD multiyear project



## SciGirls

*Empowering girls and female teachers across Ethiopia  
in science through astronomy and space*

28 October - 2 November 2024  
Addis Ababa, Ethiopia

*Support our girls to become professionals and future advocates in STEM  
(Science, Technology, Engineering, and Maths) for the benefit of our  
society and for Ethiopia's growth.*

*In collaboration with*



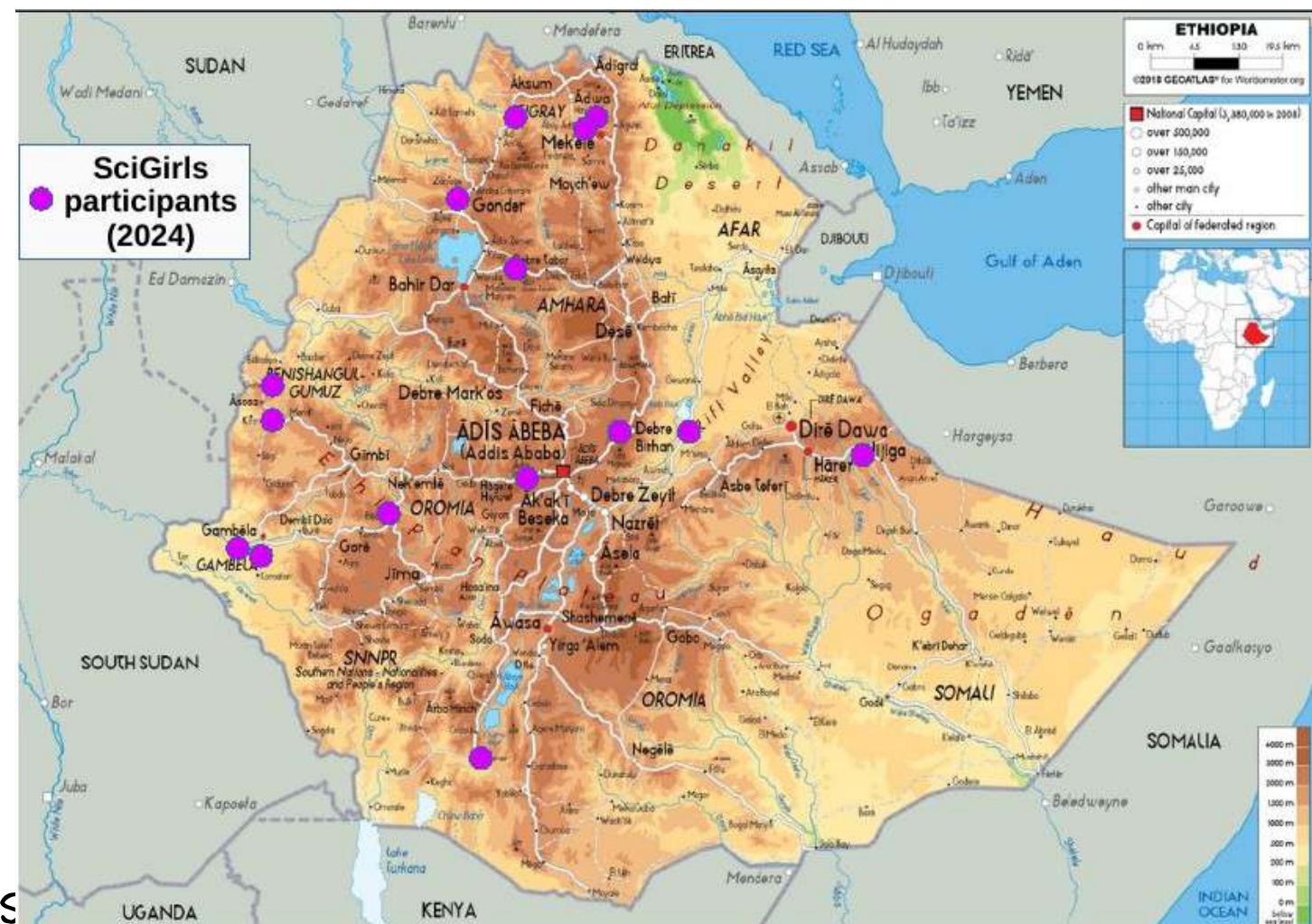
→ selected 32 participants, 16 secondary school girls and 16 female teachers from remote/rural areas, many affected by conflicts and/or in the process of the post-conflict recovery

→ selection through Regional Science and Technology Offices

→ 2 teachers attended the training with their babies

→ Diverse selection criteria!!

→ Main difficulty in bringing girls and teachers to AA



SciGirls workshop was officially opened by  
the Minister of State for ICT and Digital  
Economy, Dr. Yeshurun Alemayehu,  
from the Ministry of Innovation and  
Technology (MINT).

His presence was very important to  
motivate the girls and teachers and to  
show the relevance of the training.



Make your event important!

SciGirls attracted the attention of the local media, who interviewed the State Minister Dr. Yeshurun Alemayehu, SSGI Deputy Director General Ms. Betelehem Nigussie, SciGirls PI Dr. Mirjana Pović, and several participants.



Promote your event!

# Make your event to be diverse!

- Diverse organising team (> 15 people)
- Diverse trainers (> 20)
- Used languages: Amharic and English (with Amharic translation)
- Intensive and diverse program



# SciGirls with different lecturers



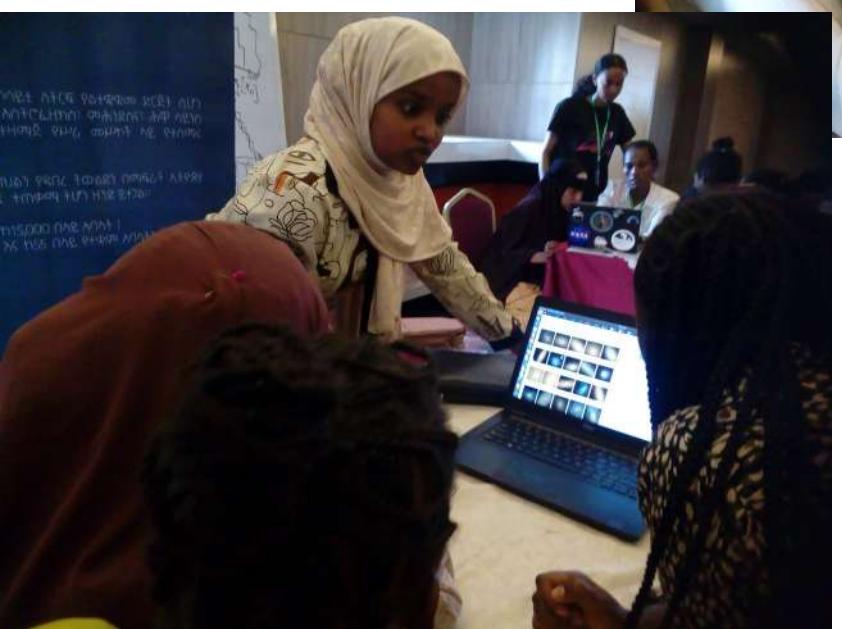
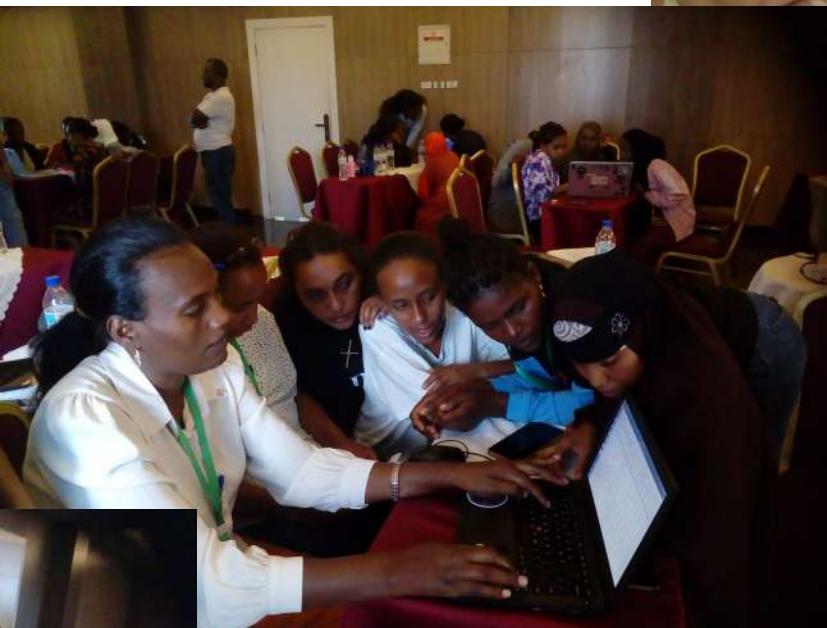
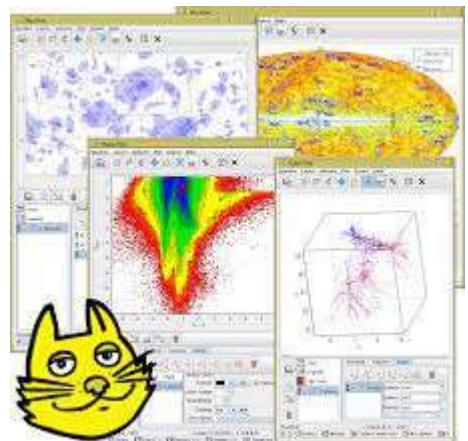
→ Intensive and diverse program:

- introduction to the teaching materials and experiments of the Network for Astronomy Schools Education (NASE)



## → Intensive and diverse program:

- research projects and their presentations
- importance of STEM and career opportunities in STEM, and
- women and girls in science



- 7 research groups
- all girls presented their results

→ Main points raised during the open discussion:  
challenges faced by girls in rural/remote areas

- workload and family/household duties
- cultural perception of girls and women
- lack of support (in family and school)
- restrictions to go out (they can not study with their classmates)
- lack of self-confidence
- early and forced  
marriage
- menstrual cycle

Community  
feedback is  
fundamental!



Boarding schools  
evaluated positively

2022 SciGirls discussion

- SSGI visit
- Entoto Observatory visit
- Entoto planetarium visit



# 2024 SciGirls feedback and outcomes

## Evaluation form

### 2nd SciGirls - Empowering girls and female teachers in science through astronomy and space

B T U G X

The 2nd edition of the SciGirls capacity building training for the secondary school girls and their female science teachers coming from rural areas of Ethiopia took place in Addis Ababa from 28 October until 02 November 2024. This is the evaluation form, to be filled by all 82 participants coming from Afar, Amhara, Benishangul-Gumuz, Gambela, Oromia, Somali, Southern Region, and Tigray. Thank you very much in advance for filling the form and for your time. Your feedback is very much important for our future activities.

Título de la imagen



Your full name.\*

Texto de respuesta corta

Contact phone number (optional).

Texto de respuesta corta

Do you want to be added to the SciGirls Telegram group and stay in touch with organizers and participants?

yes

Evaluate your activity! Think of the best form.

Very positive feedback has been obtained:

→ approx. 90% ranked the training as an 'excellent' or 'very good' experience (including program, trainers, organisation, etc.).

→ experience with research projects evaluated very positively.

→ approx. 90% fill SciGirls improved significantly their knowledge and skills.

→ approx. 90% changed their opinion about the importance of astronomy for society and STEM.

→ approx. 90% felt empowered after SciGirls training.

→ 94% became more inspired and motivated by STEM.

→ 97% expressed they want to become advocates of STEM in their communities.

# SciGirls - post-training activities

- received feedback about the activities carried out by the participants
- talks given in the schools by participants
- some participants organised weekly STEM sessions in their schools
- drawing activities
- creation of science clubs  
(at least in 3 schools)



Examples: Promoting astronomy and STEM with girls in Wolaita Sodo region and in Oromia (Adama) region.

Credits images: Helen Bekele (SciGirls teacher) and Betelhem Zewude

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Examples: Promoting astronomy and STEM with girls around Addis Ababa

# SciGirls - educational material, translated into 4 languages (Afaan Oromo, Amharic, English, and Tigrinya) and shared with girls and teachers



# SciGirls - the way forward

- visits to the schools of 2022 and 2024 participants, and support with activities and educational material
- follow-up on the activities organised by past participants
- 2025 SciGirls training
- improving and extending the educational material and working on its translation
- improve communication with SciGirls participants
- preparation of the website
- awards for the most active 2022 and 2024 participants
- preparation of the post-follow-up survey
- presentation of SciGirls at international and national meetings
- publications about SciGirls

# Other examples of girls empowerment through astronomy:

- AWB IDP camps work in Nigeria
- Ikala STEM in Madagascar
- BIUST activities in Botswana
- Emeja project in Kenya
- Thabita Girls project in Morocco

→ bringing all efforts together in the future to overcome challenges through AfNWA



# Some of the main AfNWA activities and impact



## Call for Applications: African Network of Women in Astronomy National Point of Contact

The African Network of Women in Astronomy (AfNWA) is seeking National Points of Contact (NPOCs) to represent and promote its mission across Africa! This initiative aims to enhance the representation of African women in astronomy and STEM fields. As an NPOC, you will serve as a representative of AfNWA in your country, coordinating local activities, fostering engagement with women and girls in astronomy, and supporting the network's initiatives.

Please see the link below for more information and more information

Application Deadline: 01 March 2025



Call for  
AfNWA  
National  
Coordinators

→ sign of  
growth

# Some of the main AfNWA activities and impact

- Recognition of AfNWA during the IAU General Assembly in South Africa, by the South African Government

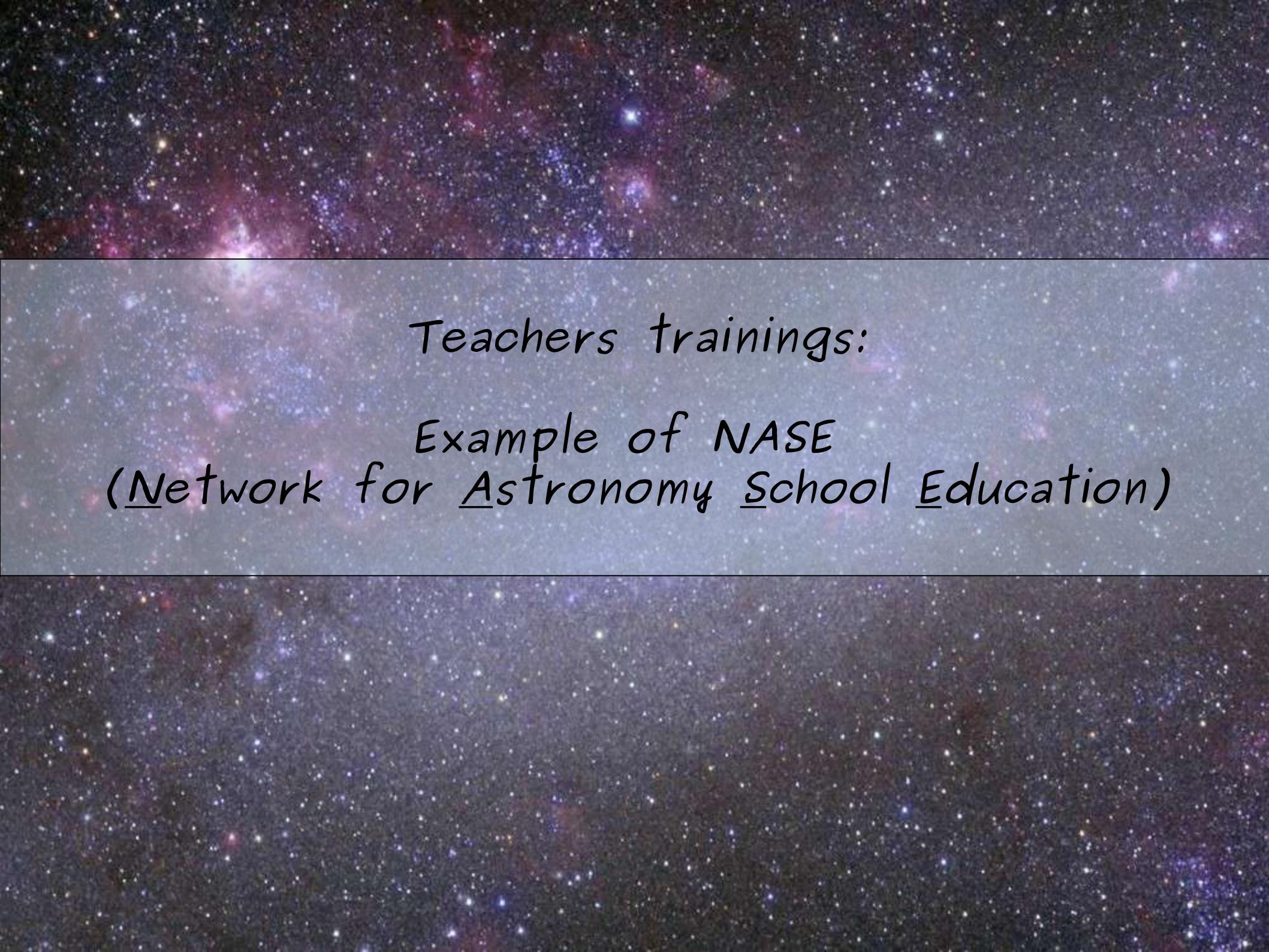


# Join us in AfNWA efforts:

- participate in our activities,
- strengthen your research collaborations with African female astronomers,
- share training/HCD opportunities,
- host African female astronomers at your institution,
- do outreach activities in collaboration with AfNWA
- include AfNWA recommendations in your policies/strategic plans.



Join AfNWA independently on your gender and location!!



Teachers trainings:  
Example of NASE  
(Network for Astronomy School Education)

# Teachers trainings through the Network for Astronomy School Education (NASE)

- 1) Teaching teachers astronomy
- 2) Teaching teachers how to teach astronomy



Founded in 2009 - IYA (IAU)



Rosa M. Ros  
(Spain)



Beatriz Garcia  
(Argentina)

Currently > 800  
members

> 380 organised NASE trainings, and > 70 courses in collaboration with NASE, in > 70 countries



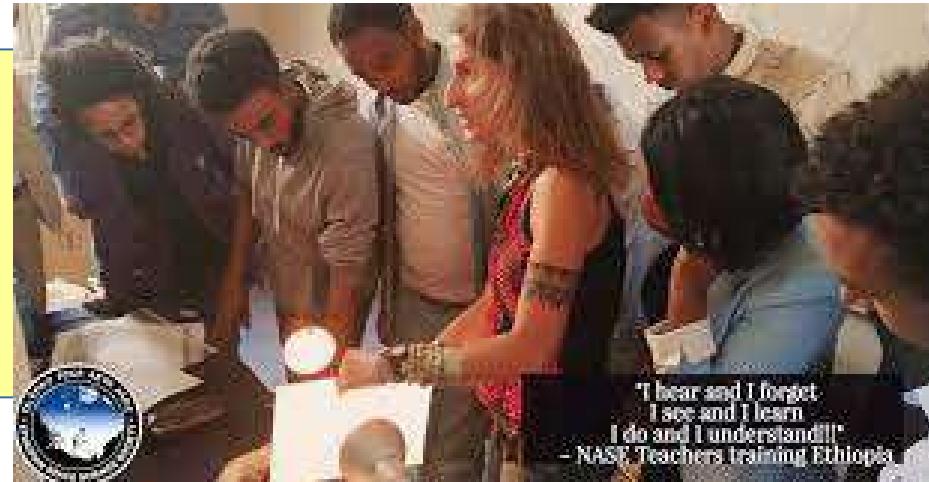
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## NASE CONNECTIONS MAP



# Teachers trainings through the Network for Astronomy School Education (NASE)

- 1) Teaching teachers astronomy
- 2) Teaching teachers how to teach astronomy



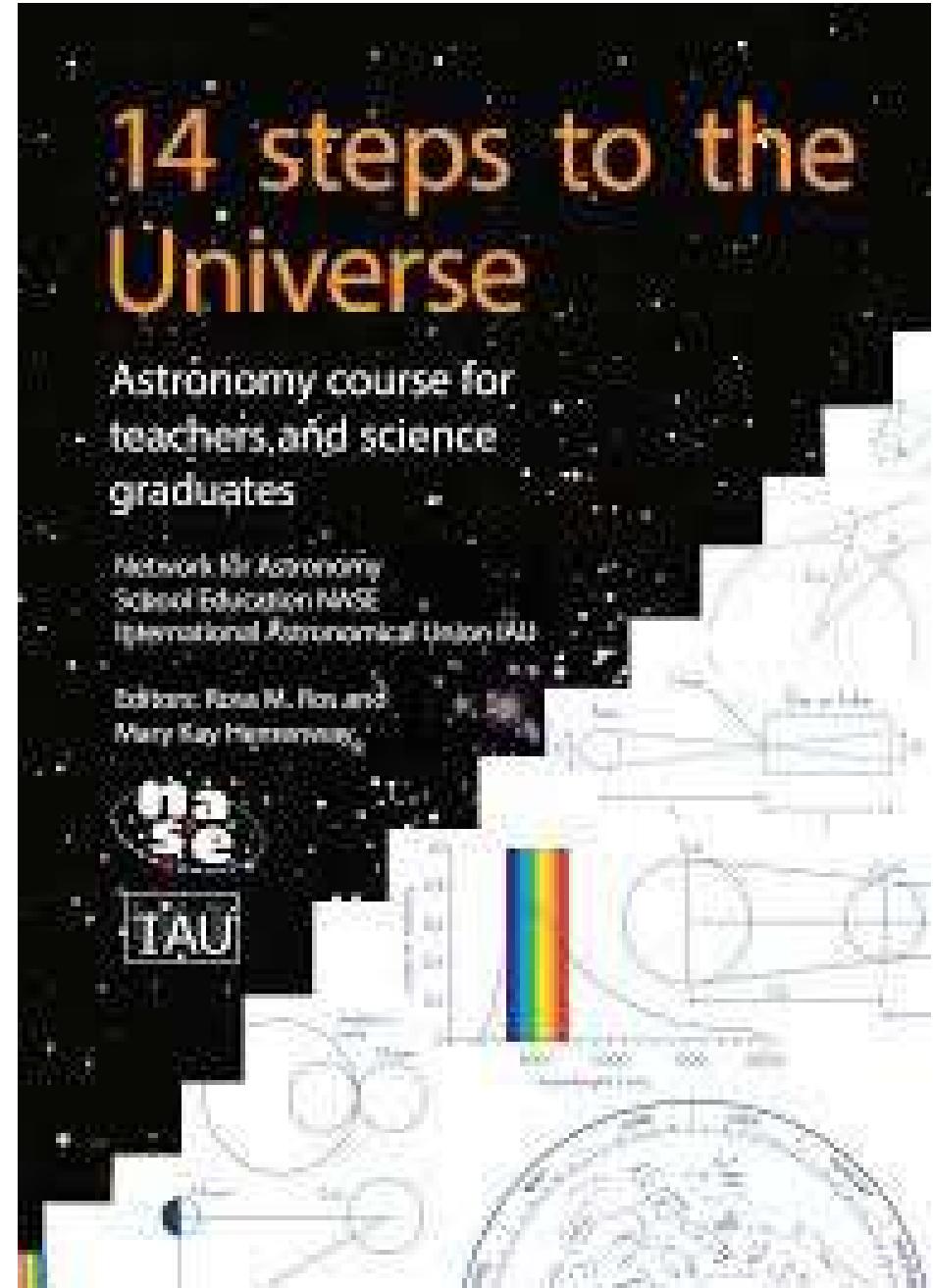
"I hear and I forget  
I see and I learn  
I do and I understand"  
- NASE Teachers training Ethiopia

- 3–4 days training (focused on secondary school physics teachers)
- 4 conferences + 10 workshops (5 in astronomy, 5 in astrophysics)
- > 40 activities (experiments) through the use of cheap and recycled materials
- introduction to the night sky (our free laboratory) and Stellarium
- Aim: creation of the local NASE working groups



# Teachers trainings through the Network for Astronomy School Education (NASE)

- NASE book
- available material: presentations, workshops, videos
- all material is available and free to download
- material available in 22 languages, including English, Arabic, and Swahili





*Photometer (Uganda, 2019)*



*Polarisation of light (Ethiopia, 2018)*



*Making the spectrograph  
(Uganda, 2019)*



*Herschel experiment (Kenya, 2013)*



Show videos as examples  
(e.g., W6/A7, W8/A1)

and NASE's webpage



*Making the spectrograph  
(Uganda, 2019)*



*Herschel experiment (Kenya, 2013)*

20 organised **NASE teachers trainings** in Ethiopia, Uganda, Zambia, Kenya, Ghana and South Africa  
(~ 400 trained teachers)



Kenya, 2013



Ghana, 2013



Ethiopia, 2018



Ethiopia, 2019



Uganda, 2019



Zambia, 2019



# Ensure inclusive and quality education for all and promote lifelong learning

## Teachers trainings through NASE

Improving the level of primary and secondary school education

- very positive feedback received from teachers during all given courses

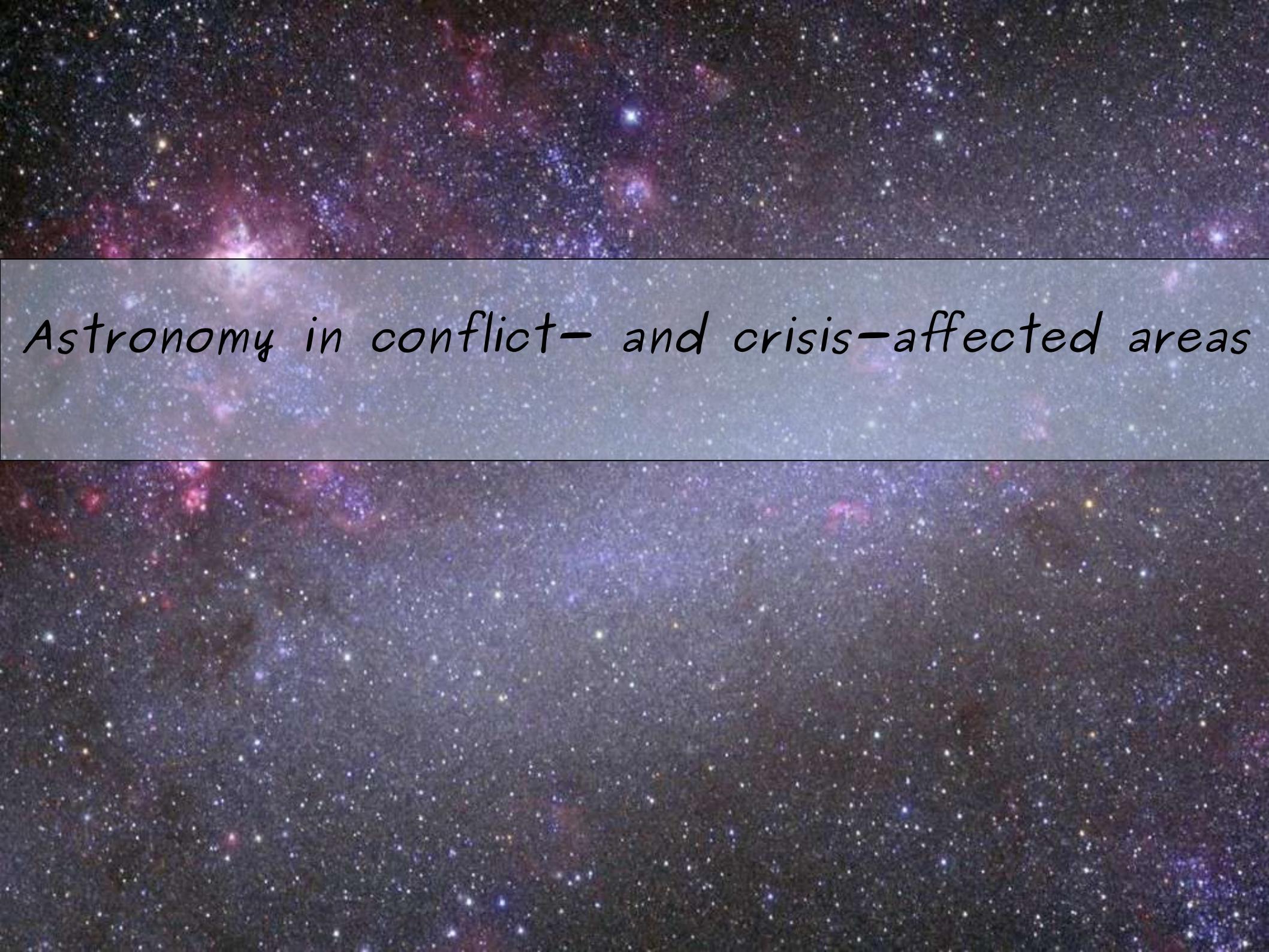


Credits: NASE/GSSTI/ESSTI/ESSS



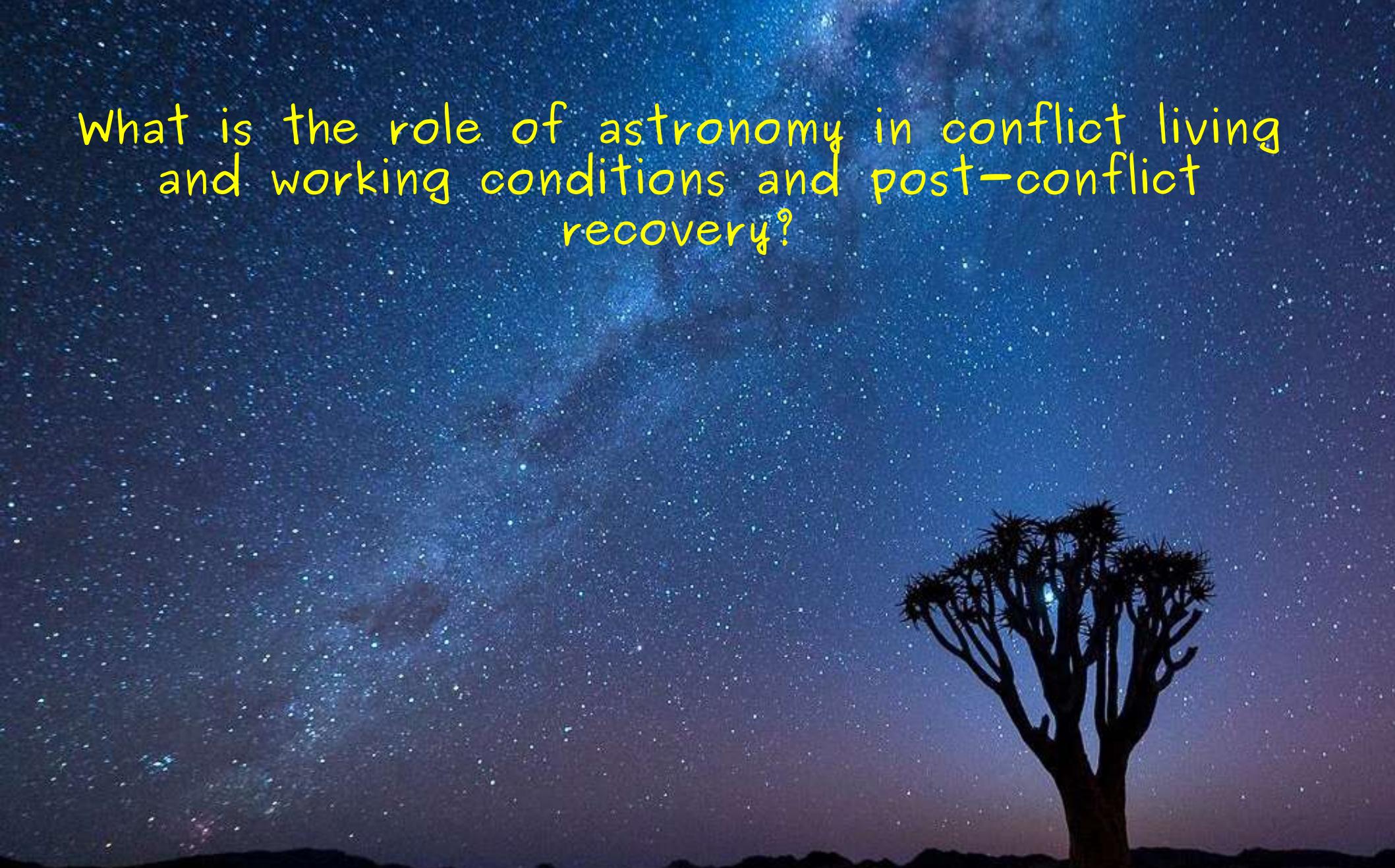
I hear and I forget.  
I see and I learn.  
I do and I understand.

Confucio      551 AC – 478 AC

The background of the slide is a deep space photograph showing numerous stars of varying brightness against a dark, textured background. A few small, colorful nebulae or star-forming regions are visible, appearing as wispy clouds of red, blue, and purple.

Astronomy in conflict- and crisis-affected areas

What is the role of astronomy in conflict living and working conditions and post-conflict recovery?



*Image credits: Melissa Siebert*

The night sky as a source of hope



Education as the most important tool to transform lives and society → power of astronomy in promoting education and science → support and encouragement of students through astronomy



**Visits to Adigrat and Mekelle Universities after 2 years-war and total closure.**

Education as the most important tool to transform lives and society → power of astronomy in promoting education and science → support and encouragement of students through astronomy



*Visits to schools and universities in Ukraine, November 2024.*

Education as the most important tool to transform lives and society → power of astronomy in promoting education and science → support and encouragement of students through astronomy



**Astrobus 2021 and outreach**

**Activities in Ethiopia.**

Credits: ESSTI/ESSS/SSGI,  
A. Solomon,  
A. Mamo, M. Pović

Education as the most important tool to transform lives and society → power of astronomy in promoting education and science → support and encouragement of students through astronomy



**Astronomy and STEM activities  
in Nigeria in IDP camps**

Credits: Astronomers Without Borders  
Nigeria,  
OAD-Nigeria

**Astronomers Without Borders  
Nigeria**  
**OAD funded project**  
**AfNWA-AfAS supported project**



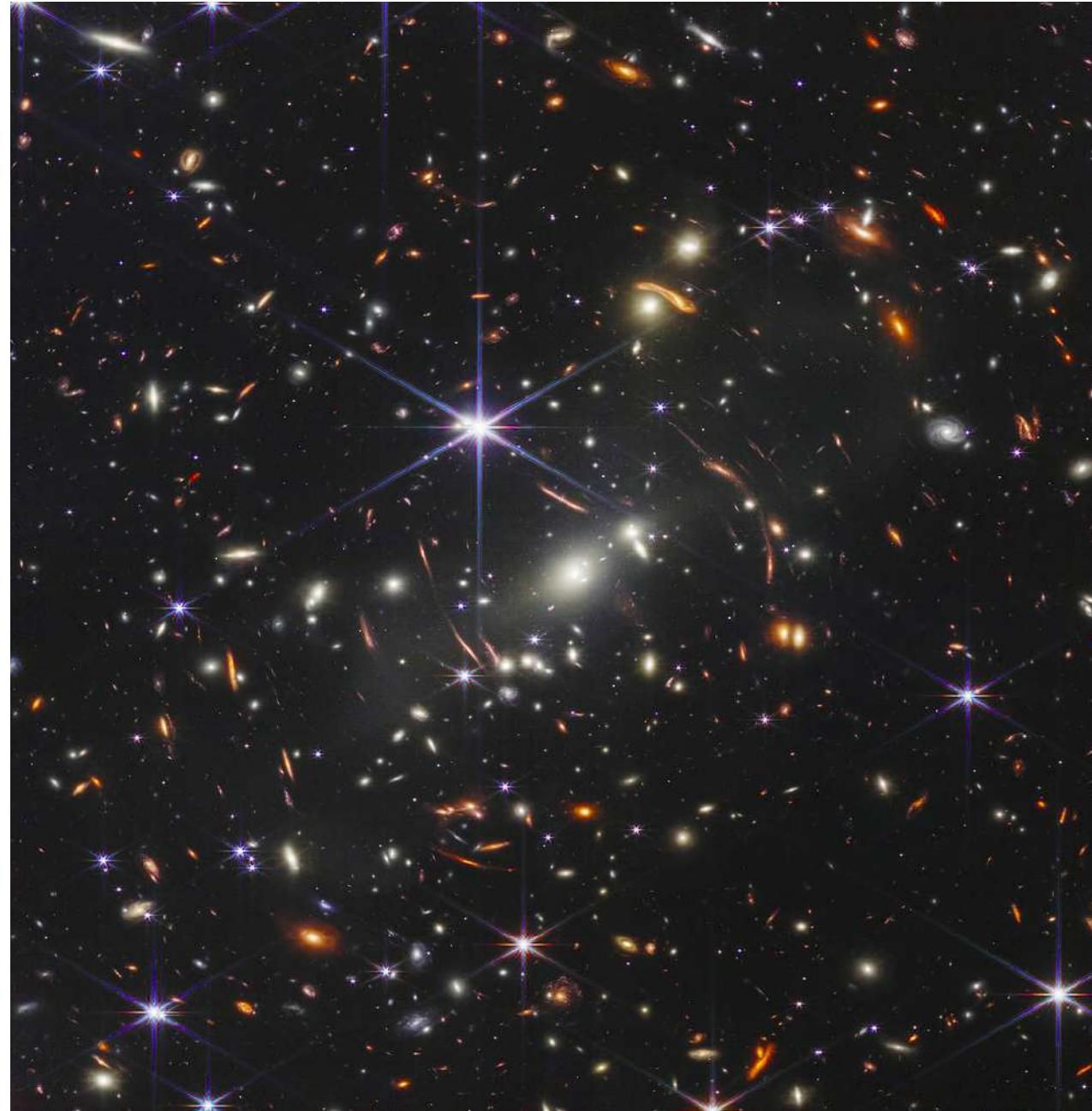
Education as the most important tool to transform lives and society → power of astronomy in promoting education and science → support and encouragement of students through astronomy

*Jamal Mimouni's visit to Mali under the AfAS Education and Outreach activities.*



Astronomy research  
as a tool for  
managing emotional  
and psychological  
stress

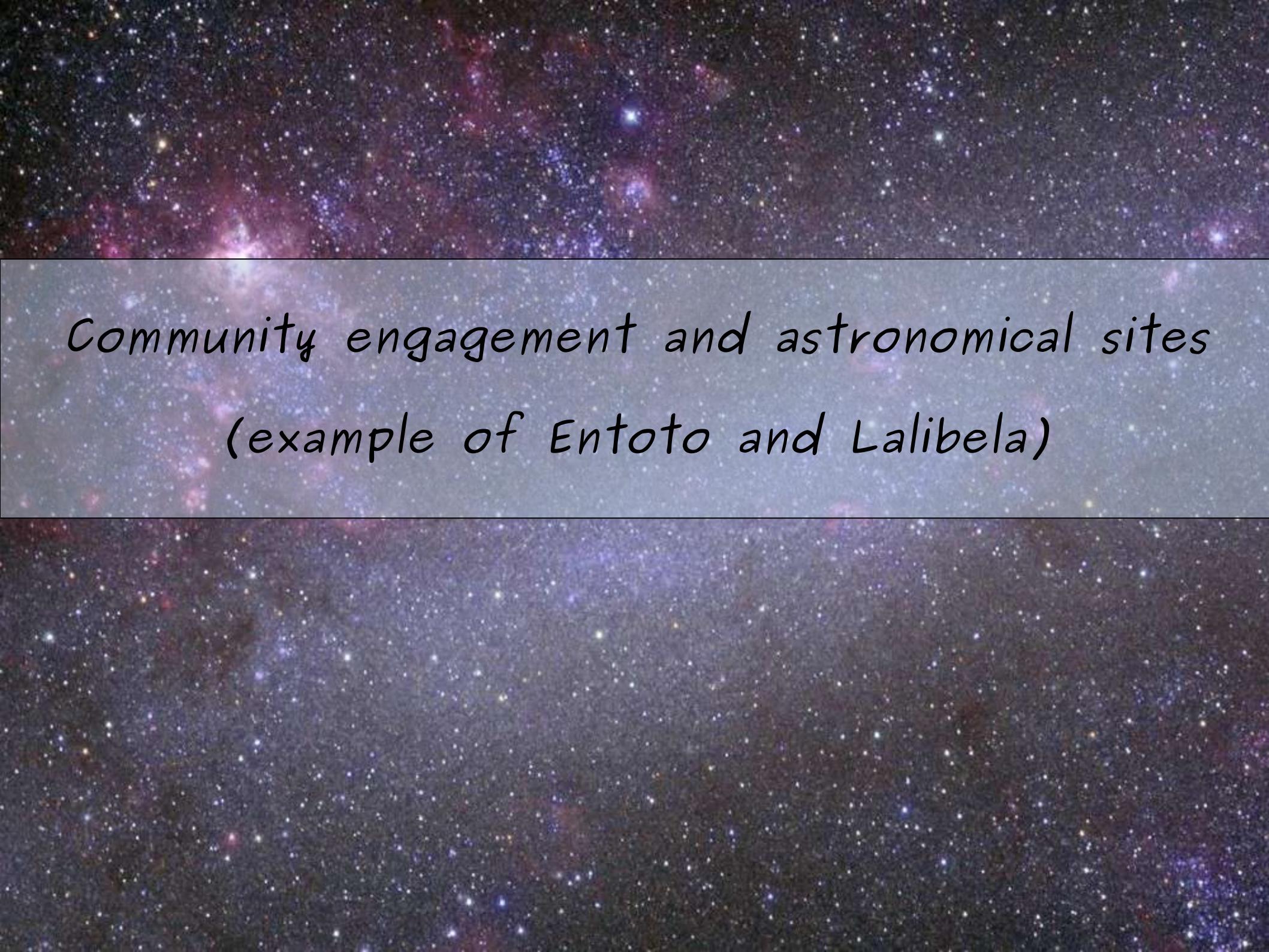
→ important mental  
therapy



Astronomy and science as a tool for bringing people together through research and strengthening the dialogue

(Example of the IAU 386 Symposium on dark skies in Ethiopia, Nov 2023, after the Tigray's war and during the state of emergency in Amhara)



The background of the slide is a photograph of a dark, star-filled portion of the night sky. The stars vary in brightness and color, with many appearing as small white dots against a dark blue and black background. There are also some larger, more prominent stars and a few small, faint nebulae or galaxies visible.

Community engagement and astronomical sites  
(example of Entoto and Lalibela)

The local community should be actively involved in all stages of development of the astronomical sites and observatories. They play an important role in project development and their voice must be heard and respected. → continuous dialogue, common understanding, continuous building of trust and confidence, strong collaborations

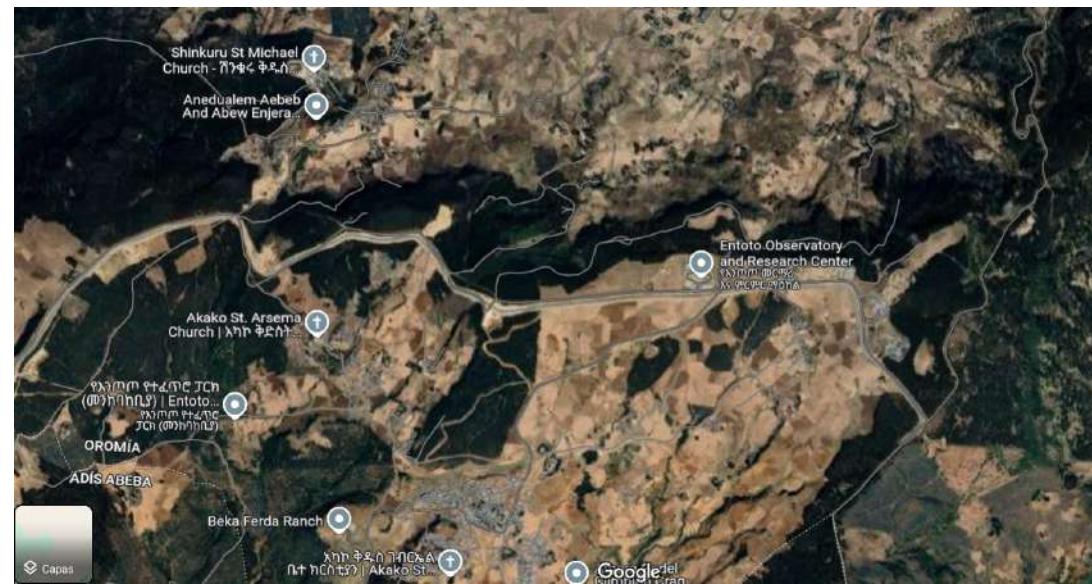
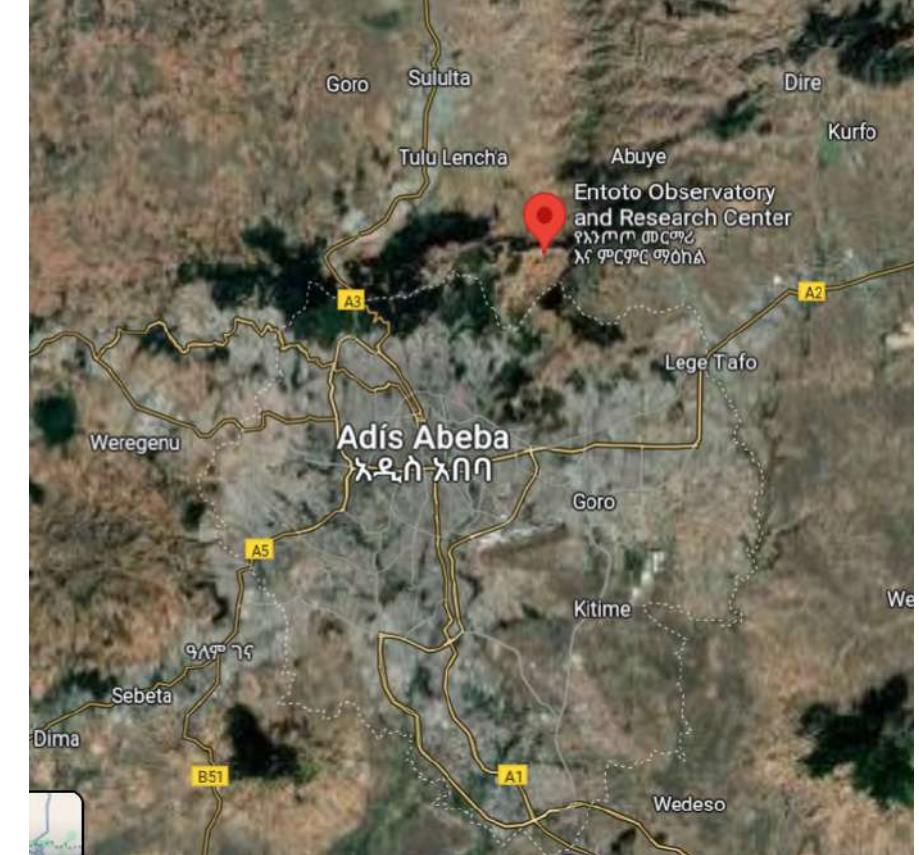
The local community should benefit from the project, both in the short and long term.

### Examples of possible activities:

- Improvement of access to basic needs (water, electricity, mobile clinics...)
- Improvement of access to basic infrastructure (roads, internet, mobile data...)
- Support of local businesses (e.g., restaurants, local shops, ...)
- Support of local production (buying the necessary products from the local farmers and pastors and not elsewhere)
- Employment (jobs generated during the project)
- Education and outreach activities on all levels
- Offering specific trainings (in line with needs of the local communities)
- Improving conditions in local schools (e.g., facilities, school material, etc.)
- Offering scholarships to bring more professionals in the field from the local community
- Build possibilities for astro-tourism, train the local guides
- Development of rural tourism (e.g., building facilities)
- Development of cultural astronomy
- Promote and protect culture and values of local communities (through organised activities, ...)
- Promote, respect, and protect the holy places of local communities
- Give visibility to challenges that local communities are facing and search for solutions

## Examples of activities carried out at Entoto (Afan Oromo communities) and Lalibela (Amhara communities):

- Access to water
- Improved access to electricity
- Improved access to mobile data (building of nearby Ethiotelecom station)
- Road building (both Entoto and Lalibela)
- special care taken regarding the land issues
- Buying the necessary products from the local farmers and pastors
- support of local restaurants
- Job creations within the observatory, at Entoto and in Addis (security guides, construction support, cleaning staff, observatory kitchen)
- School visits, education and outreach activities





Thank you very much for your  
attention!!