

ASTRONOMÍA INCLUSIVA

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ABSTRACT

Astronomía Inclusiva (“Inclusive Astronomy” in English) is a multidisciplinary community created in Chile, a country recognised worldwide for the quality of its skies for astronomical observation, which aims to make astronomy an accessible science for everyone. In this contribution, we take a tour of what has motivated us to create this group, mentioning some of the activities we have carried out, and sharing some of the experiences we have learned along the way. Finally, some reflections are made on how we can contribute to creating a welcoming environment in our daily activities.

RESUMEN

Astronomía Inclusiva es una comunidad multidisciplinaria gestada en Chile, país reconocido mundialmente por la calidad de sus cielos para la observación astronómica, que tiene por objetivo hacer de la astronomía una ciencia accesible para todas las personas. En esta contribución se hace un recorrido por lo que nos ha motivado a crear este grupo, se mencionan algunas de las actividades que hemos llevado a cabo, y compartimos algunas de las experiencias que hemos aprendido por el camino. Por último, se hacen algunas reflexiones sobre cómo podemos aportar para crear un entorno saludable en nuestra actividad diaria.

Key Words: miscellaneous — science — sociology of astronomy — standards

1. ASTRONOMY IN CHILE

Chile is considered the world capital for Astronomy. Its world-renowned skies for their quality to study and understand the universe are true natural laboratories for astronomy and related sciences. This has attracted the installation of international astronomical observation megaprojects in the north of the country, which allows the Chilean and international scientific community to study the universe and answer fundamental questions about our origins and our destiny.

Chile is in the process of concentrating more than 50% of the worldwide base ground astronomical observation capacity by 2030, considering optical/IR telescopes larger than 4 m in diameter⁴.

All this drives the generation of technology and highly qualified national human capital in areas re-

lated to astronomy, such as big data and a wide variety of engineering, but also in topics of astronomy education and communication of science to the public.

Continuing with numbers, there are 18 million people in Chile. Of them, 16.7% (more than 3 million people) present some kind of impairment⁵, where 19% are visually impaired and 9% are hearing impaired. That corresponds to about 571000 and 270000 people, respectively. On the other hand, according to the International Agency for the Prevention of Blindness, 4.1 million people were visually impaired in South of Latin America (Chile, Argentina, and Uruguay) in 2020⁶. Therefore the previous number might be underestimated.

2. ASTRONOMY FOR ALL

The facts presented below have generated awareness among some members of the national astronomical community for exploring new methods for communicating astronomy to the general public. This is what motivated Astronomy for All, a team of professional astronomers from different institutions in Chile that joined to bring astronomy to all public,

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⁴<https://sochias.cl/wp-content/uploads/2020/05/2020-05-14-Sobre-la-capacidad-astron\unhbox\voidb@x\bgrouple\unhbox\voidb@x\setbox\@tempboxa\hbox{o}global\mathchardef\accent@spacefactor\spacefactor}\accent19o\egroup\spacefactor\accent@spacefactormica-instalada-en-Chile.pdf>Sobre la Capacidad Astronómica Instalada en Chile, Eduardo Unda Sanzana.

⁵Estudio Nacional de Discapacidad Chile 2015 https://www.senadis.gob.cl/sala_prensa/d/noticias/6503/poblacion-con-discapacidad-cuenta-con-cifras-actualizadas

⁶<https://www.iapb.org/learn/vision-atlas/magnitude-and-projections/gbd-regions/southern-latin-america/>



Fig. 1. Elements of the educational kit created by the AstroBVI project (www.astrobvi.org). The kit is composed of 6 tactile images of 5 galaxies with different morphological types, accompanied by coloured and b/w images of each galaxy, and audio and text descriptions for the tactile exploration. The project also provides a set of lessons and activities to carry out with the kit. The materials are available in Spanish and Portuguese. For an English version, we recommend to visit the Tactile Universe project (www.tactileuniverse.org). Image courtesy of the AstroBVI project.

independently of their physical and mental abilities. Our goal was to remove the existing barriers; therefore if we can do it for Astronomy, we can do it for any science.

Our first challenge to address was how to communicate astronomy without images for Blind and Visually Impaired (BVI) people, and astronomical terms for Hearing Impaired people in sign languages, given that some terms did not even have a designed sign yet. To work with BVI people, we started using simple tactile models with a well-developed story for simple terms, like star-formation (Labbé 2021), planets and asteroids (Paredes-Sabando & Fuentes-Muñoz 2021), and even more complex terms as galaxies (Argudo-Ferández et al. 2019, 2020) as shown in Fig. 1. Many of our pilot materials were presented under the flag “Astronomy for All” in “Inspiring Stars” (see Fig. 2), the first exhibition of inclusive astronomy organised by the International Astronomical Union (IAU) in Vienna in August 2018 during the IAU General Assembly.



Fig. 2. The upper picture shows the “Astronomy for All” stand during the Inspiring Stars exhibition, while the lower picture shows a moment during the interaction with the public that visited the stand. The stand contains tactile materials for some astronomical concepts, like 3D models of ground-based and space telescopes, the prototype version of the model disc of planetary formation designed by the Núcleo Milenio de Formación Planetaria (NPF, <http://www.npf.cl/2020/11/10/2213/>), a prototype version of the AstroBVI project educational kit, a distance and size scale model of the Solar System, and tactile images of emission in different wavelength. Images courtesy of Astronomy for All.

With respect to communicating astronomy with the Hearing Impaired community, we have been working on adding sign language interpretation on astronomy talks. In addition, members of Astronomy for All contribute to the efforts of Chile to be part of the international comparative list of astronomical words in sign languages that the IAU coordinates in the world, a long-term project developed by the IAU Commission C1 Education and Development of Astronomy and its WG3 Astronomy for Equity and Inclusion.

With the project Astronomy for All, we have been carrying out different activities that called the attention of authorities and other institutions, adding more astronomers to the group and creating a network of collaborations, including people with disabilities.



Fig. 3. Collection of the logotypes of all the institutions that participated in “Historias de Astronomía Inclusiva”, an online series of public talks about some of the experiences carrying out inclusive activities by Astronomía Inclusiva group. All the talks were simultaneously broadcast in the social media of all the partner institutions. Institutions participate under the Astronomía Inclusiva logo, which is located the upper left part of the figure.

3. #ASTRONOMIAINCLUSIVA

To generate a significant and long-term impact, we noted that we had to extend our efforts not only with the general public, but also in education and research. For that we need to work with the community of people with disabilities, with the general public, and with professional astronomers. This is how we transitioned from Astronomy for All to create the “Astronomía Inclusiva” community. Astronomía Inclusiva is a multidisciplinary group of more than 100 inclusion enthusiasts composed by professional astronomers, students, anthropologists, computer scientists, science communicators, archaeologists, teachers, artists, etc, including people with disabilities and from different countries. The group coordinates via Whatsapp and publish all its activities using social media⁷ under the hashtag #AstronomíaInclusiva.

The three main pillars of the Astronomía Inclusiva community are:

Collaboration: The group was founded with an open source philosophy. We not only share materials but also experiences, knowledge, and more important, motivation. Carrying out inclusion projects it is not always easy, but it is highly gratifying. By sharing, we avoid making the same mistakes and reinventing the wheel. Our common efforts therefore maximise the impact of our activities. In this regard, the Astronomía Inclusiva collaborate under a common logo, encompassing the different partner institutions (see Fig. 3).

⁷www.instagram.com/astro.inclusiva.

Diversity: The Astronomía Inclusiva community is multidisciplinary in many levels, not only on professional areas but also working with people with disabilities. People with different ways of facing challenges bring creativity and tools to achieve better solutions. But inclusion in astronomy is not only about providing accessibility, it also requires a change of mentality. By working with this group, we have learnt that *Equality* is a more appropriate term to work on than *Equity*. As the Great Britain's Equality and Human Rights Commission defines, equality is about ensuring that every individual has an equal opportunity to make the most of their lives and talents. Equality also recognises the historical experienced discrimination of people with disabilities.

Co-creation: Nothing about us without us is the resonating claim within the disability rights movement global social movement. If we aim to create a social culture of inclusion, we need to work by side with people with different disabilities in every step of the design and execution of our activities. That may imply that we have to start from scratch, and that is perfectly fine. Co-creation is an opportunity for innovation and creativity, for re-thinking and to explore new ways to communicate and maximise the long term impact of our activities.

Working on inclusive astronomy has therefore driven us to be creative, to generate networks, and to collaborate in an interdisciplinary way (Labbé 2021). With our initiatives we seek to extend inclusion to other areas of scientific research. Overall our activities aim to contribute to the United Nation sustainable development goals 4 (quality education), 5 (gender equality), and 10 (reduced inequalities).

4. INCLUSION WITHIN THE PROFESSIONAL ASTRONOMICAL COMMUNITY

We can not reach our goals if as professional astronomers we do not practise with example. Therefore, there are some initiatives that we are promoting from the Chilean Astronomical Society (SOCHIAS).

SOCHIAS is a non-profit scientific society founded on 2000 and the National Committee for the IAU in Chile. The society represents the interests of the professional Chilean astronomical community, which includes more than 1000 people between students and professors, distributed in 24 universities throughout the country⁸. The main objectives of SOCHIAS include the development and dissemination of Astronomy in Chile, facilitating and

⁸Censo de Astrónomos, Sociedad Chilena de Astronomía, <https://sochias.cl/astro-en-chile/censos-de-astronomos/>

stimulating research and teaching of Astronomy in the country, organising scientific meetings and specialised courses and conferences on Astronomy and related sciences, and facilitating the study of Astronomy and related sciences and their teaching by professional astronomers.

As SOCHIAS, we support the project Breaking the Barriers⁹ to promote the use of Chilean sign language interpretation in outreach events. The project offers financial support to all the astronomical institutions in Chile that want to incorporate Chilean sign language interpretation in their activities or educational and outreach products (as videos). For this, the project works in close collaboration with the Foundation Interpreters for Chile¹⁰ with continuous support on management, networking, and participation in the activities.

In conjunction with the outreach inclusive initiatives of SOCHIAS, we also work on creating an inclusive astronomical community through the Inclusion and Gender Working Group¹¹ (I&G WG). The working group is currently carrying out the project Generating a more inclusive astronomical community: Visual, hearing and physical disability (PI E. Labbé). Thanks to this project and the networking with the Astronomía Inclusiva community, the I&G WG collaborates with a team of advisers composed of people with disabilities for the co-creation of recommendations for events, dissemination and research, in the construction of surveys, and to carry out online training on inclusion and accessibility, preparing the way for future astronomers with disabilities.

5. CONSIDERATIONS

As concluding remarks, I would like to share what I have learned during this journey that started in

2017, when I first proposed to carry out the AstroBVI project, up to now, as the current president of SOCHIAS, and elected member of the C1 Astronomy Education and Development IAU Commission.

Inclusion is an everyday job. We can all work on creating a warm and welcoming environment around us. I invite people to think on three actions they can easily implement in their daily work. For instance, I am a professional astronomer, working as Associate Professor in a University. Therefore, my activities can be broadly grouped by research and teaching. In research, we usually have discussions with collaborators about the project we are carrying out. We can dedicate some time to listen and understand their point of view, since different people may have different opinions, and that enriches the project.

In teaching, I can find out if there is any student with special needs, then I can prepare my classes or any supporting teaching material beforehand so all the students can learn the same content in a significant way. As current president of SOCHIAS, I also do some management work. SOCHIAS members participate in various international committees in order to contribute to national and international astronomy. It is our priority to secure diversity and gender balance in committees and making decision bodies.

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⁹<https://sochias.cl/actividades/difusion/breaking-the-barriers/>

¹⁰<https://www.instagram.com/fundacioninterpretes/>

¹¹<https://sochias.cl/actividades/grupo-de-trabajo-en-inclusion-y-genero/>