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Antofagasta: Astronomy education on the shoulders of giants

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Abstract. This work presents the motivation, history and current status of the *Primera Luz* initiative, a long-term educational project run by researchers and professionals of the Astronomy Center (CITEVA) at Universidad de Antofagasta (UA, Chile), primarily focused on connecting Astronomy with the people living in the Region of Antofagasta (Chile) but producing results designed to be shared with international audiences.

Keywords. education, schoolchildren, space

1. Introduction

It is expected that in 2025 the European Southern Observatory (ESO)'s ELT, the largest optical astronomical facility in the world, will attain first light. ELT will be hosted by the Region of Antofagasta in the North of Chile. This is the same region which currently hosts ESO's Very Large Telescope (VLT); also the Atacama Large Millimiter/submillimeter Array (ALMA) one of the largest radiotelescopes worlwide; the highest telescope worldwide, MiniTao, and soon the Tokyo Atacama Telescope (TAO); and it is getting ready to host the largest gamma-ray observatory worlwide, the Cherenkov Telescope Array (CTA). However, in the past, the local public reaction about these developments has been mild and sometimes critical, perceiving the astronomical observatories as disengaged from the life of the local community. As an effort to build a bridge between the local community and the many opportunities provided by the presence of these large facilities the author proposed in 2014 to the Regional Government of Antofagasta (GORE) a long-term program called *Primera Luz* (First Light, PL from now on). PL is esentially a set of educational and outreach activities aimed to strengthen the foundations for the teaching and communication of Astronomy in the Region of Antofagasta. However, several of its products have been developed with an international audience in mind, doubling as promotional materials acting in support of the development of special interest tourism in this region.

During the last decade GORE decided to strengthen the public funding devoted to Astronomy, using it as a tool for cultural change, funding its own education and astro-engineering projects. The author has been the PI of several of these projects, joined by several researchers and professionals of CITEVA, and has thus made progress in the construction of PL.

2. Main work

Given the lack of funding opportunities for long-term educational projects, PL has been built on the basis of a series of short-term projects or portions of projects. The first

years of PL were spent in producing educational materials and infrastructure. The main landmarks of this period are:

• 2015: Opening of Ckoirama, the first Chilean-State owned observatory under the skies of the north of Chile, including one 14-inch telescope devoted to educational activities (see Char *et al.* (2016)).

• 2016: First collection of educational videos explaining why Astronomy is important from a regional perspective.

• 2018: Creation of "Region of Antofagasta, Gateway to the Universe", an astrophotography exhibition of 30 panels depicting regional sites by night, updated in 2020 to encompass all the counties of the Region of Antofagasta.

• 2020: Second collection of educational videos, portraying sites of value for astronomical educational, as well as a series of Astronomy lessons and accompanying activity boxes and videos to be used by local schools.

In the development of the educational products an inclusive and international approach has been used, often providing English subtitles or translations when applicable. In 2016 an agreement was signed between ESO and UA, formalizing ESO's support to the efforts of UA in the context of this program of activities. This has helped to make the materials of PL reach an international audience. In 2020 UA took steps to formalize PL as an "emblematic outreach program" of CITEVA.

The ongoing pandemic of COVID-19 has affected progress in the next step of PL, which aims to connect the regional community with its products through workshops and other interactive activities. A fraction of these activities had been been executed already thanks to a program of public observations carried out monthly since 2013, and through a program of yearly teacher schools organized since 2014. In 2020 a first series of online workshops was offered to schoolchildren from 4 regional counties (out of a total of 9 counties) in the context of a regional astroengineering project. Given the constraints set by the pandemic the focus of these workshops has been programming as a tool for working with astronomical technologies. In 2021 the author expects to run a pilot of a massive open online course (MOOC) using the educational materials developed so far.

3. Related developments

One regional project of astroengineering is connected to PL, aiming to develop modern portable telescopes to strengthen local education and tourism. Also, the increasing concern over light pollution from ground and space sources has led the team to engage in the scientific and technical study of the problem by using Ckoirama (see Char *et al.* (2016) and by participating in projects attempting to measure it by using drones and new satellites. The output of these efforts will be integrated in the educational materials of PL. All the PL products are available to the public in http://www.astro.uantof.cl/primeraluz.

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