

Main components of our solar system acting like boundary objects: the "Science in the Caatinga" project

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Abstract. The "Science in the Caatinga" project, through the transversality of astronomical science and using main components of the solar system (sun, planets, satellites, asteroids, meteors and comets), promotes science teaching and communication activities focusing on public schools in six small cities in the Sertão Pernambucano, all these historically linked to the construction of the Itaparica Hydroelectric Plant. Furthermore, it also contributes to the internalization of scientific knowledge. Covering the period 2013-2022, this work describes key activities directly related to astronomy, as well as those that use the astronomical theme to address important environmental issues for the region, ending with the relevant missions of awakening young scientific vocations and training school teachers.

Resumo. O projeto "Ciência na Caatinga", por meio da transversalidade da ciência astronômica e utilizando os principais componentes do sistema solar (sol, planetas, satélites, asteroides, meteoros e cometas), promove atividades de ensino e comunicação de ciências com foco em escolas públicas de seis pequenos cidades do Sertão Pernambucano, todas estas historicamente ligadas à construção da Usina Hidrelétrica de Itaparica. Além disso, também contribui para a internalização do conhecimento científico. Abrangendo o período 2013-2022, este trabalho descreve atividades-chave diretamente relacionadas com a astronomia, bem como aquelas que utilizam a temática astronômica para abordar questões ambientais importantes para a região, terminando com as missões relevantes de despertar jovens vocações científicas e formar professores escolares.

Keywords. Teaching of Astronomy – Light Pollution

1. Introduction

Astronomy is one of the best tools to promote science culture. The "Science in the Caatinga Project", encompassing a series of science communication activities and using astronomical bodies as boundary objects, aims to contribute to teach science content in public schools of six small cities (Itacuruba, Floresta, Belém do São Francisco, Petrolândia, Jatobá e Tacaratu) in the Itaparica region, semi arid part of the State of Pernambuco, Brazil. These cities were selected since they share a common historical fact—they were (1988), to a greater or lesser extent, submerged by the waters of the artificial lake of the Itaparica Hydroelectric Plant (currently Luiz Gonzaga), with part of their original populations being compulsorily transferred to new locations, with economic and social consequences that still remain today. Additionally, since these cities are more than 430 km apart from Recife, have low IDHMs and belong to the infamous "Marijuana Polygon", the project also contributes to the internalization of scientific knowledge (bringing science to audiences that might not otherwise come into contact with it) and, consequently, to raising the self-esteem of socially vulnerable populations.

Activities started in 2013 (Edital CNPq 46-2013), having reached its 9th edition in 2022 (Edital CNPq 06-2022), funded by the Conselho Nacional de Desenvolvimento Científico e Tecnológico (CNPq), through its public selections (Edital) to promote science fairs and scientific exhibitions, in addition to the institutional support of the Secretaria de Educação e Esportes de Pernambuco (SEE-PE), to which selected schools of this project are subordinate. More, the Centro de Estudos Astronômicos de Pernambuco (CEA-PE), a non-profit private association founded in 1972, contributes with technicians, astronomical equipment



FIGURE 1. Students and educators visiting the São Francisco river and Caatinga biome – Itaparica's lake, Itacuruba, Brazil.

and free access to its observational facilities in Itacuruba-PE, o Observatório Astronômico Jorge Polman (OAJP).

Some key activities directly address astronomical themes (daytime observations of the Sun, Moon and the inner planets; hands-on meteorite exhibition; Solar System model competition; stary night contemplation; sky identification sessions with an inflatable planetarium; lectures and videos on Meteors, Sun, Solar System, Asteroids and Comets, Exoplanets, etc). In other activities, themes that highlight the motto of environmental preservation are explored (daytime contemplation of the Caatinga biome, São Francisco River and Itaparica Lake; lectures and videos about the Itaparica Hydroelectric Plant, the



FIGURE 2. Image of the Milky Way's centre, taken at the surroundings of the Observatório Astronômico Jorge Polman – Itacuruba, Brazil. Photo taken by Thairo Diego Alencar.



FIGURE 3. Student observing the Sun – Escola Técnica Estadual Deputado Afonso Ferraz – Floresta, Brazil.

Transposition of the São Francisco River and the Itacuruba Nuclear Power Plant), all in order to raise awareness among local students and school teachers about combating artificial light pollution.

Also, emphasis is placed on the interrelationships of these activities with the environment where the project is developed - the Brazilian northeastern hinterland (the fight against artificial light pollution in the preservation of dark skies; the support to renewable energies, such as solar and wind, very abundant in the region; the threat of the Near Earth Objects (NEOs) - in Itacuruba, there is an observatory specialized in asteroids, the Observatório Astronômico do Sertão de Itaparica (OASI); the preservation of the Caatinga biome, avoiding fires, which can threaten observatories and the quality of the sky). Finally, results are presented coming from the stimulus that the project has provided for school teachers training and to the emergency of student vocations for scientific monitoring activities.

Next steps are to erect a dedicated solar observatory in order to provide students with more stable and detailed sun observations and to propose the creation of a natural heritage of dark skies, both at the Itacuruba's astronomical site, which hosts the OASI and OAJP facilities.