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GLOBE BRAZIL

2018 ANNUAL REPORT

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INTRODUCTION

The 2017/2018 cycle was a period of consolidation of activities for GLOBE Brazil. The Program has continued its science promotion flow, in coherence with the country's continental size. With our arrival in the Amazon region, we have managed to disclosure the Program in each one of the five regions of Brazil. Seven workshops were organized im 2018, with thousands of Citizen Science miles traversed. And the year 2018 marked GLOBE with an strategic novelty – that of a GLOBE diffusion with a design that seeks to unite specific local needs in Brazil to the internationalized communicational GLOBE model. We were in search of a better comprehension of what is happening in schools, the real/digital path, trying to enhance e-learning without losing local perspective. Much of our effort last year was to understand how children learn basic Science in Brazil and how to augment GLOBE data points. We have been successful in kickstarts and now we are finding ways to maintain motivation, with especial attention to what happens when educators come workshops and face a new world with Science possibilities – and how they can effectively apply that to their daily routines.

We are also experiencing a phase of digital expansion in Brazil and the Internet represents the answer to many demands for Knowledge democratization. The Brazilian government is putting efforts into its digital transformation but many regions – especially in the North – still face a severe digital exclusion, among other social exclusions.

This report will show how we have addressed GLOBE in Brazil, our effort to reach more citizens and in a more democratic way, regardless of geographical limitations or infrastructure. It also measures our performance and shows trails to what is coming in our future – the use of audiovisual pieces, understood as a necessary, and somewhat urgent, paradigmatic adaptation.

EDUCATION

On April 15-23, 2017, the Brazilian Space Agency (AEB) held a series of workshops related to NASA's GLOBE program. The cities included were Rio de Janeiro, São José dos Campos (SP), Paranaguá (PR), Brasília and, for the first time, Natal, in Rio Grande do Norte (Northeast Brazil). The place chosen for this premiere was the CVT-Space, in the launch center of Barreira do Inferno. The arrival of the GLOBE Program in Northeast was marked by a lecture by Master Trainers Russanne Low and Renée Codsí. Inês Mauad and Rodrigo Reis helped in south/southeast editions.

On August 2 and August 15, 2018, it was the Triple Frontier and Manaus' turn. The triple Frontier with Argentina and Paraguay is located in the extreme south of Brazil, and Manaus is a city in the Amazon Region. The GLOBE Zika Education and Prevention Project helped get over a 100 people to these two events, while a third one is being planned to happen in Brasília in September 2018. They were attended by authorities in the areas of health and education and discussed, among other topics, the impact of climate change on the proliferation of mosquitoes as well as the need to coordinate efforts to identify and prevent epidemics of the Zika virus and other arboviruses.

The triple frontier had Argentina participate by videoconference, extolling the results of the program at local and international level, and enriching her intervention with data from the activities carried out by the schools in her country. Paraguay spoke on the epidemiology of mosquitoes. Brazil commented on the importance of space applications, such as satellite images, in the construction of a global map of possible foci of vectors as *Aedes aegypti*. In the Amazon region, the city of Manaus followed the same tendency with Renée Codsí and Inês Mauad's presence, creating the opportunity to work on a propositional agenda in remote sensing with the Medicine Department of the Federal University of the Amazon - UFAM and the motivation of teachers and students to participate in Zika research and Science since elementary School.

SCIENCE

The GLOBE - NASA Program proposes access to a network of international scientific projects and data open in a friendly way. One way to call people to be in this network is through virtual Science fairs. The 2017 and 2018 GO Mosquito virtual Science fairs offered cash prizes to Brazilian schools that carried out scientific research and had collected larvae. Six schools got prizes for very interesting projects that covered subjects as the correlation between mosquito breeding sites and temperature, mosquito breeding preferences in natural or artificial deposits and ideas such as gamification of the Mosquito Habitat Mapper app and breeding flowers that would naturally kill mosquitos. All of the winning schools are located in the centre/south of Brazil. The places that show more GLOBE data points are not only places where workshops were made but they are places where someone was accompanying the teachers and helping them out. Distance learning is a very important asset but a close follow up plays a magnificent role, especially in developing communities.

Through interviews with both winning schools and schools that didn't qualify / finish a project, we learned that the lack of the English Language is a major barrier for schools entrance in the GLOBE Program. Basically teachers feel that they are not qualified enough to access something so fancy as the GLOBE program. In order to fight that dynamic, we decided to team up with a project called Clima Escola which is basically a local project, Portuguese spoken, that captures data such as temperature, atmospheric pressure, and relative humidity with simple school stations and sends them to a server. The Brazilian Space Agency donated 16 didactic meteorological stations to schools that participated in the training of the Globe program in Brazil and now we are showing them how to do the next step, which is to get data just like that but fitting the GLOBE Atmosphere Protocols parameters.

TECHNOLOGY

As AEB is actively developing a scientific outreach program on CVT-E (Barreira do Inferno Launch Center), GLOBE-Brasil is studying the possibility of having a space devoted to GLOBE protocols at this location. There are NASA Webinars related to GLOBE campaigns such as La Niña-ENSO, GPM and SMAP which could be included in the live CVT-E programming or be recorded and shared. Students would thus be engaged in educational experiences rich in space, technological, and engineering data, and perhaps even propose improvements to the GLOBE protocols. Remote sensing related to Citizen Science can approach remote sensing technologies to basic education projects that can inspire teachers to study real problems in their surroundings, and that is a mission that involves both The Brazilian Space Agency and the GLOBE Program, through axes like Zika eradication. AEB has approached partners like INPE (Brazilian Institute of Space Research) and universities to start teaching GLOBE STEM professionals how to use satellite images in the construction of a global map of possible foci of vectors as *Aedes aegypti*.

Dengue and Zika are also education axes in the south of Brazil, where a Zika Bus is being built by GLOBE Master Trainer Rodrigo Reis and his team. Most of the science centers and museums in Brazil are located in large urban centers, mainly due to the fact that they are linked to universities. In this way, his proposal provides roaming as a guiding principle among the activities carried out for the region's schools, taking GLOBE activities not only to urban centers, but also for schools and peripheral communities, which are historically deprived of access to culture and education. Among the actions focused on the activities related to Dengue and environmental injustice, the exhibition that will be structured in a micro-bus and on scientific theater plays. They also target minorities such as women and disabled audiences.

COMMUNITY

Our main community accomplishment was the election of Brazilian Master Trainers in 2018 (see curricula in Appendix). They have done great plans for 2019.

The main aspects we need to address for next year are:

1. Improve ways to handle English language (led to difficulties in registering and submitting data).
2. In the case of the Mosquito Larva Protocol, the application requires modern smartphones.
3. Support for the adaptation of the GLOBE - NASA curriculum to the Brazilian reality.
4. Emphasize synergies between GLOBE and space activities.

In an effort to understand how GLOBE can be adapted to the Brazilian curricula basis, we also had a meeting at Ministry of Education in 2017 and we are studying the possibility of expanding the project to incorporate more municipal schools in Brasília and Paranaguá (South of Brazil).

COMMUNICATION

We are aware of the urgent need of having a GLOBE Brasil website and Audio-visual pieces, several meetings were organized to address that.

Still, every time AEB throws a new workshop we get media coverage, like the video attached to this report. Underneath here is an extract of some piece of news that came out when we were in the Amazon, in August:

“The Globe-Nasa Environmental Education Program, which involves citizens in scientific research and the protection of the Earth, has reached all regions of Brazil. The first workshop in the Northern region was held on August 15 in Manaus (AM), with the participation of teachers and health professionals. The Brazilian Space Agency (AEB) and Globe coordinators in Brazil, Rodrigo Leonardi and Nádia Sacenco, presented the program and its space applications. The master trainers of Globe, Inês Mauad and Renée Codsí were responsible for the theoretical, practical and pedagogical activities of the workshop, which took place at the National Institute of Amazonian Research (INPA). mosquito *Aedes Aegypti* and the atmosphere. According to Professor Inês Mauad, the training aims to encourage the participation of citizen science, that is, to awaken both teachers and students the interest and involvement in issues related to preserving the environment.”

BRAZILIAN GLOBE TEAM MEMBERS

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APPENDIX

Brazil Country GLOBE coordinator CV

Dr. Rodrigo Leonardi joined the Brazilian Space Agency in 2017, and became GLOBE Country Coordinator for Brazil in early 2018. He was recently appointed deputy-director of Satellites, Applications and Development and coordinates a portfolio of nanosatellite projects and initiatives to promote space related science and technology. He received his PhD in Astrophysics from the Brazilian National Institute for Space Research in 2006 and his BS degree in Mathematics from the University of Brasília in 1999. He was a Postdoctoral Research Fellow at the Department of Physics of the University of California at Santa Barbara, USA, from 2007 to 2009. He joined the European Space Agency in 2009 and worked as a scientist at ESTEC, in the Netherlands, and at ESAC in Spain. At ESA, he gained experience with science operations, as well as working with a large number of scientists spread geographically. More specifically, he worked as the Community Support Scientist for the Planck mission. In 2015, Leonardi returned to Brazil and worked at CGEE, a think tank center for strategic studies in technology and innovation, where he conducted prospective studies for the Brazilian space sector. He has coauthored 156 papers in peer reviewed scientific journals.

Master Trainers Curricula:

Aline Bessa Veloso– Master Trainer for Atmosphere, Hydrosphere and Mosquito Protocols She has attended 5 GLOBE workshops as a trainer

She holds a degree in Physics from the University of Brasília (2004), a Masters in Physics from the State University of Campinas (2007) and a PhD in Physics from the University of Brasília (2015). She has developed research in Experimental Physics with emphasis on optical properties of nanostructured and biological systems. She has taught in several institutions of High School and Colleges. She has experience in dissemination and scientific education. She has worked for 3 years at the Ingersoll Physics Museum, museum of the Department of Physics of the University of Wisconsin in the United States and 3 years in the Channel Science Portal of the Brazilian Institute of Information in Science and Technology (IBICT / MCTIC). Currently, she is staff at the Brazilian Space Agency (AEB), working on the Directorate of Satellites, Applications and Development (DSAD).

Inês Mauad - Master Trainer for Mosquito and Atmosphere Protocols

She has attended 8 GLOBE Workshops as a trainer

She holds a degree in PHYSICAL AND BIOLOGICAL SCIENCES from Universidade Gama Filho (1981). She is currently a teacher of the Municipal Secretary of Education of the Rio de Janeiro and of the State Secretariat of Education. She has 20 years of experience in Environmental Sciences teaching and has collected over 1000 data with her students. She is Brazil's GLOBE most dedicated teacher.

Nádia Kornijezuk – Master Trainer for Mosquito Protocol

She has attended 5 workshops as a teacher

Social Scientist, Bachelor's degree from the State University of Campinas; Master and PhD from the Sustainable Development Center of the University of Brasília, with a doctoral degree from the Sorbonne Nouvelle University - France. Areas of interest: socio-environmental policies, The GLOBE Program and its connection to Space Policies and Science and Technology. Currently works at the Brazilian Space Agency.

Rodrigo Reis – Master Trainer for Mosquito and Atmosphere Protocols

He has attended 2 workshops as trainer and 2 as a teacher

Associate Professor at the Federal University of Paraná, Setor Litoral. Graduated in Biological Sciences from the Federal University of Paraná, Master and PhD in Sciences (Biochemistry) from the Federal University of Paraná (2001). Permanent Professor of the Postgraduate Program in Sustainable Territorial Development of UFPR. He is currently vice-leader of the UFPR Litoral Research Group and Coordinator of the Mobile Laboratory of Scientific Education Program at UFPR Litoral. Participates in the Board of Directors of the Brazilian Association of Centros and Museums of Sciences (ABCMC) Management 2015-2019. He develops researches and works in the areas of Scientific Divulcation and Air Pollution and Health.

Izaías Cabral – Master Trainer for Atmosphere Protocol

He has attended 2 workshops as a trainer and 1 as a teacher

He holds a bachelor's degree in Mathematics from the University of Brasília (1996). Specialization in Teaching Higher Education at Estácio de Sá University (2006) is currently a professor at the Education Department of the Federal District. He is doing his Masters at Interaction Design at the University of Brasília. He works at the Technical School of Brasília ETB, working mainly in the following subjects: mathematics, electronics, atmosphere. He has experience at Atmospheric data collection and has created a Meteorological station to collect temperature data and atmospheric pressure in over 80 schools in Brazil.
