URGE Policies for Working with Communities of Color for

Hangar One

NASA ARC

This is what was found by Hangar-One Earth Scientists at NASA Ames Research Center on Policies for Working with Communities of Color as well as plans for improved processes and/or needed resources.

**Audit of previous interactions with communities of color at our organization:**
- Tribal College summer students / teachers
- BOREAS – First Nation representative speaking at planning workshop
- HAPEX/SAHEL (Niger) - work with local meteorologists for flight planning
- MUREP students – facilitated visit, career-path talks by SG folks
- Underserved Space Cookies (Girl Scouts), I was on a question / answer panel about attending college -> NASA

**Briefly describe one or more example projects to provide context for the following questions.**

ORACLES: an aircraft-based field campaign over the southeast Atlantic (SEA) ocean which was based out of Namibia (in 2016) and São Tomé and Príncipe (STP) (in 2017/2018). While the science focus was over the SEA, it involved biomass burning aerosols from widespread agricultural fires over southern Africa. The success of the mission depended on infrastructure and logistical cooperation from local communities and governments.

**What worked well in these interactions?**
- Building longer term relationships, before and after internships.
- Invitations to events.
- The student shadowing program in Namibia was good and exposed (estimated) 7 students to a high level of field work that they may not otherwise have been able to experience.

**What did not work well, and how can this be better addressed in future plans?**

**Did not work well:**
- Internal communication regarding best practices, opportunities and transition to Bay Area (e.g. from Res or small town)
- STP speaks Portuguese so it was difficult for US scientists to communicate
- The necessity of switching deployment sites from Namibia to São Tomé made it difficult to sustain the relationships established in the first year.
- “One-time” outreach event model
  The deployment of instrumentation in STP focused overly on the needs of the international scientists, without adequately considering the priorities of the local scientists (or the limitations at their site).
**How can this be better addressed in future:**
- Increase funding, specifically to support outreach and mentoring.
- Improve communication.
  - Reach out to more scientists on the project.
  - Increase knowledge of mentorship opportunities.
  - Prioritize outreach rather than follow the unspoken culture of “just stick to the science, the science is most important”
- Hire local translators to be involved in outreach, not just logistics
- Improve relationships with local scientists/communities before deployment.

**Are there ways to improve the outcome of projects already undertaken?**
- Translate research results into Portuguese.
- Acknowledgments in paper currently in review “We thank the ORACLES deployment support teams, the ORACLES science team, and the governments and people of Walvis Bay and Swakopmund, Namibia, and São Tomé, São Tomé e Príncipe for a successful and productive mission.”

**Are there specific resources or guidelines that are needed to improve the process for planning ahead and working with communities of color?**
- Increased funding specifically to support outreach and mentorship across all career levels
- Addressing shortcomings of current 3-year, 0.25 FTE per-project funding framework which is not conducive to establishing meaningful relationships with communities of color, either in the US or abroad.
- For international field work (or establishing international collaborations which may then better facilitate international field work), the situation is also definitely complicated by the rule that the US government cannot fund foreign scientists. This requires international collaborations either to be semi-volunteer, limited to whoever has funding through e.g. an academic appointment (rare), or somehow coordinated with multiple proposals which are selected at the same time (more rare).
- Providing supportive and structured pathways for students who contribute to projects to continue advancing in science after the project ends.

Excerpt below of the outreach section for the ORACLES campaign (addressed above) overview paper (https://acp.copernicus.org/articles/21/1507/2021/):

**2.5 Outreach efforts**

**2.5.1 Namibia – 2016**

During the field campaign held in Namibia in 2016, the gathering of science data not only benefited the scientists directly involved in the project; through an outreach program the science was extended to the Namibian population (and to some extent the broader southern African region). The outreach effort was multi-tiered and aimed to inform the public, develop young scientists, and encourage children to enter into STEM fields of study. Outreach activities included public lectures, interviews with local radio
and newspapers, and open days at the airfield. In addition, ORACLES scientists traveled to northern Namibia for several days to participate in the Ongwediva Annual Trade Fair (OATF) together with students, staff, and faculty from the University of Namibia (UNAM), the Namibia University of Science and Technology (NUST), and the Gobabeb Research and Training Center. The OATF showcased collaborative environmental research from participating research institutes and was attended by Ongwediva-area students, business leaders, and local dignitaries.

In addition to these broader public engagement outreach activities, a targeted science development program was initiated with support from the US Embassy in Namibia and NUST. This 3-week full immersion outreach program was developed to provide promising local and regional young scientists with an opportunity to experience different components of a large complex airborne research field campaign. In total, seven postgraduate students (master's and PhD level), from Namibia (five students) and South Africa (two students), participated in the student guest program (Fig. 4). Student guests were exposed to the planning, modeling, and instrumentation used within the ORACLES field campaign. In addition to these broad field campaign skills, they received a solid foundation in basic atmospheric science through tutorials from the participating campaign scientists, some introductory programming tutorials, and an opportunity to interact with scientists aligned with their field of research. Within the duration of the program they also all had an opportunity to join a science flight. Further regional expansion of this student guest program was planned for the 2017 and 2018 field campaigns in collaboration with the CLARIFY and AEROCLO-sA campaigns, but with the move of the ORACLES field campaigns to São Tomé this expansion outreach effort could not be implemented.

2.5.2 São Tomé and Príncipe (STP) – 2017 and 2018
To understand the challenges of implementing an outreach program as part of a scientific project like ORACLES in São Tomé and Príncipe (STP), one needs to know a little about the history of this young country of just over 200,000 inhabitants. Previously uninhabited, the STP Archipelago was colonized by Portugal throughout the 16th century, when it served as a warehouse for the slave trade and established itself as a producer of sugarcane, coffee, and cocoa. STP independence from Portugal came in 1975, keeping Portuguese as its official language, although minority groups also speak at least four other dialects.

During an initial exploratory visit in 2015, built on a previous NSF-sponsored site visit, the ORACLES team contacted the Instituto Nacional de Meteorologia (INM) to establish collaborations. The INM operates at STP airport facilities and showed great initial enthusiasm for ORACLES deployments from STP. During the 2 years of ORACLES operations in 2017 and 2018, INM kindly issued daily weather reports tailored to ORACLES needs. There were several visits from the ORACLES team to INM, and Aristómenes Amadeu do Nascimento of INM attended various ORACLES weather briefings.
The only public university in STP and the most important one, the University of STP (USTP), was established only in 2014. The creation of USTP came to address fundamental and emergency problems of the country, which included training of personnel for the health and education sectors, agriculture, and food production. When the ORACLES team deployed to STP in 2017, USTP had, in its current format, only 2 years of existence, still consolidating its vocations and priorities. Nevertheless, the institution represented by Aires Bruzaca (dean), João Pontífice (vice dean), and Manuel do Sacramento Ramos Penhor was enthusiastic about establishing scientific collaborations with NASA.

The ORACLES team organized a series of seminars about ORACLES scientific objectives for the USTP and INM communities. The seminar themes also included the AERONET (Aerosol Robotic Network) and Pandora NASA projects, global networks of spectrometers designed to retrieve, respectively, aerosol optical depth and microphysical parameters (Holben et al., 1998; Dubovik and King, 2000), and total columns of ozone and other trace gases in the atmosphere from direct-Sun measurements (Herman et al., 2009, 2015; Tzortziou et al., 2012). All lectures were presented by ORACLES science team members in Portuguese to address potential language barriers.

A Pandora Spectrometer Instrument (PSI) and an AERONET instrument were brought to STP as part of the ORACLES deployment. The main goal, especially for the PSI deployment, was to assess whether mutual goodwill, interest, and capabilities exist for NASA, USTP, and INM to collaborate scientifically long term. The team was successful in training professors of the USTP to operate the PSI and the AERONET instruments (Fig. 5), and this resulted in additional aerosol measurements beyond the campaign periods. Moreover, it laid the foundation to have STP as one of the sites of the Pandora network, with an official agreement between NASA and the USTP signed in 2018.

The ORACLES team found in STP a community open to and eager for the establishment of a fruitful scientific cooperation. Our experience points out that involvement with the local community is of extreme importance, not only for the dissemination of scientific knowledge but also to facilitate engagement between the young scientists from both communities. Collaboration with local scientific communities during field deployments such as ORACLES has the dual benefits of enhancing local scientific capabilities in under-resourced areas of the world and producing tangible benefits for this and future missions in the region.