EDUCATION & OUTREACH SUMMARY

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EDUCATION & OUTREACH OVERVIEW

Public outreach is an important component of any field campaign, particularly when the field campaign is in a foreign country. Establishing trust; informing the local communities about the presence of “odd looking” instrumentation; offering opportunities for local meteorologists to learn; and engaging the public in the science that is being conducted - all have many benefits to those who are involved. The Public Information Program (PIP) that is outlined below was designed specifically for the DYNAMO (Dynamics of the Madden-Julian Oscillation) field project that took place in the Maldives from 1 October 2011 - 31 March 2012.

A group of people interested in being involved at some level with education and outreach surfaced after the initial DYNAMO meetings. From that group, people were designated into three groups depending on their level of interest and the time they could give. The top level group was dubbed the Education and Outreach Working Group, the secondary group was the Update/Check-In Group and the tertiary group was the University & PI Group.

The Working Group consisted of Alison Rockwell, the EOL/NSF representative and Working Group coordinator; Lynne Roeder of DOE/ARM; and Jana Goldman of NOAA; and Scott Harper of the Office of Naval Research.

Several areas of outreach and communication were developed for the DYNAMO PIP such as online materials, printed information and public outreach events, all of which are detailed in this document. Each organization within the Working Group put forth their own outreach efforts, and we would convene to talk about them to be sure that we are connecting and making it as well-rounded as possible. The EOL portion of the DYNAMO outreach efforts were the most comprehensive and detailed.

OUTREACH EVENTS

The Maldives Meteorological Service (MMS) was very instrumental in arranging the school visits for the DYNAMO outreach efforts that took place from October 1 - October 14, 2011. The outreach events were largely organized by the MMS. Several attempts were made to contact schools on Addu Atoll and Malé, however nothing developed from those attempts. It certainly seems that one needs to be introduced from
an inside source within the community. The MMS played a crucial role in the outreach events in that they were the catalyst to access the school system. Being personally available for the majority of the visit made it particularly easy for them to make arrangements with the schools.

In all, 5 school presentations were given, including a workshop for high school science teachers and four presentations given to students in 6th-12th grades, some of their teachers, and parents. Two of the schools were on Addu Atoll, while the other two were located in the capital city of Malé.

We reached over 215 students, and close to 40 teachers, many of who attended the workshop. The school presentations were given by Alison Rockwell, Eric DeWeaver of NSF, and Courtney Schumacher of Texas A&M University. Alison also gave the teachers workshop presentation.

Overall impressions were that the level of attention given to education in the Maldives is quite high. The students were well-versed in Earth science topics, which could be detected by the level and range of questions they were asking. We met with several of the school principals before the presentations, and they were all very appreciative of our efforts and willingness to come to their school. Brochures and other educational materials were highly sought after by both students and teachers, as all the material was taken by them.

The most rewarding aspects of each talk came after it was over and the students had a chance to come up to us in small groups and ask us questions. All the groups were very shy to ask questions when asked if there were any after the presentation in the large group setting. However, once the presentation was over and they were able to approach the presenters in small groups, mostly segregated by gender, and the questions were plentiful and very inquisitive. It was clear that our message was heard and that they were interested in current science issues that not only affect their country, but the entire world.

A considerable amount of preparation and reading about Small Island Developing States (SIDS) was done before arriving in the Maldives. It was important to come to their country informed about environmental issues that directly affect them, so when talking with them those issues could be addressed and related to the research that was being conducted during DYNAMO. Water availability and conservation, as well as sea level rise were definitely at the top of their lists.

Several climate science educational activities were brought that could be done with students, if the opportunity arose. However, the time that we did have with students was always filled with the presentation and a question and answer session, so the opportunity did not arise to do any of the prepared activities with the students.
Several NCAR 50th Anniversary coloring books and boxes of crayons were brought to the Maldives, that Courtney Schumacher was able to use with her daughter’s elementary school on Hithadoo.

**MEETING WITH HIGH SCHOOL PRINCIPALS AT ADDU HIGH SCHOOL & FEYDHOO SCHOOL | THURSDAY 6 OCTOBER 2011**

**Hithadoo & Feydhoo, Addu Atoll**

Before doing any presentations at schools, meetings with the principals from two different schools on Addu Atoll were arranged. This provided a better feel for what type of information they were looking for and would be most useful to them, gauge the students level of education, and get a better understanding of their curriculum models.

It was clear from the beginning that the Maldivian’s are very dedicated to their education system and level of education of their students certainly reflects that. The students of Addu High School follow the French curriculum method, which seems to be a cyclical style of teaching from grades 1-8, then another cycle from 8-12. Students are mainstreamed into either a business or science track in 8th grade. The question came up of what percentage of students were in science track, but no one seemed to have a clear answer. It was disappointing to hear that only 10% of students go onto higher education after graduating from high school. There is a higher education institution in Malé, otherwise students have to leave the county, generally to India, for a college level education.

It was not until the first meeting with the principal at Addu High School that it came to light that the last day of school coincided with the start of the available outreach period, and that final exams were taking place. However, the principal was still confident that the students could get together for a presentation. When it was suggested to have a teacher’s workshop as well, the principal loved the idea and arranged it for that evening. He indicated that many of the teachers learn much of their science directly out of text books and have difficulties relating it to real life applications. He asked that during the talk with the teachers to really bring out the science application of DYNAMO, atmospheric science, climate science, etc. so the teachers could make those connections.

The meeting with the principal at Feydhoo School was more of an opportunity to see the school, learn about the students, and to ask what topics they would like addressed during the presentation. He asked that the topics of sea level rise and climate change be discussed, as it one of the countries top concerns. While DYNAMO is not directly studying the effects of climate change on sea level rise, his questions were addressed by saying that the research being conducted during DYNAMO will hopefully allow...
scientists and climate models to better predict climate change, and indirectly, sea level rise.

**TEACHERS WORKSHOP AT ADDU HIGH SCHOOL | THURSDAY 6 OCTOBER 2011**

**Hithadoo, Addu Atoll**

20 high school science teachers, all from Addu High School arrived for the teachers workshop. Of the 20, only 3 were originally from the Maldives, the rest were from India, Sri Lanka, and Pakistan. They were given an overview of DYNAMO, an explanation of what the S-Pol radar is doing right across the street from the school, and discussed what the broader impacts of the research has on a local, as well as global scale.

As the principal has indicated, some of the physics teachers had a very difficult time understanding why the project was called Dynamics of the Madden-Julian Oscillation. A physics book may define oscillation as a regular variation on magnitude or position around a central point, and does not expand on other interpretations such as a repetitive variation usually over time. This had some of the teachers confused, and it was also a valuable learning opportunity for everyone present. As an educator, one needs to be more aware of words and terms that might not be familiar to all, and that in this case someone had the definition purely out of a text book. Even how the term oscillation was being used in this scenario, it still was not clear the physics teacher.

A tool that was very useful for this environment was the Radar & Weather Together booklet, that was produced by UCAR Office of Education and Outreach. Since DYNAMO relies heavily on radars, this was a fantastic tool to be able to share with the teachers and demonstrate real life applications of the activities in the booklet. Several copies were given to the teachers, as well as other information such as the DYNAMO brochure and stickers, and An Eye on Climate Change brochure. The teachers seemed very hungry for information and resources, and asked great follow-up questions.

**DYNAMO/AMIE OPENING CEREMONY | MONDAY 10 OCTOBER 2011**

**Gan International Airport, Addu Atoll**

The DYNAMO Opening Ceremony was held at the Gan International Airport, with a crowd of more than 80 people in attendance. The ceremony was held in the firehouse open garage providing shade and protection from the mid-morning sun.

The ceremony was opened by a 6th grade girl reading a passage from the Quran, which was perhaps the highlight of the ceremony. The beautiful passage was from Soorah Noor, Chapter 24, verse 35-46, read in the native Islamic language, and when translated on paper appropriately mentioned many meteorological events.
Jim Moore shared some opening words for the event, followed by Ali Sharif, head of the MMS. Eric DeWeaver (NSF), Chidong Zhang (DYNAMO PI), and Chuck Long (AMIE PI) also spoke. More than 20 people from within the MMS and other organizations based in the Maldives were then acknowledged and honored for their support and contributions for making DYNAMO a reality, by receiving a DYNAMO & AMIE engraved plaque. It was evident that publicly acknowledging these people was a cultural significance and greatly appreciated.

The opening ceremony was punctuated with the Addu City Mayor launching a weather balloon, indicating the official start to the DYNAMO & AMIE field campaigns.

Several people from the local media were invited, however only two were able to attend. A DYNAMO Media Packet with ample information about the project and the facilities were provided for them. The remaining media packets were set out on a table during the “short-eats and drinks” portion of the ceremony for the public to take.

Media Packet Contents:
- UCAR/NCAR brochure
- DYNAMO brochure
- DYNAMO sticker
- DYNAMO Media DVD: related images & MJO movie
- EOL S-Pol Radar brochure
- EOL Atmospheric Profiling Group brochure
- EOL Sounding System brochure
- EOL Integrated Sounding System brochure
- R/V Revelle brochure
- ORV Sagar Kanya brochure
- R/V Mirai brochure
- R/V Baruna Jaya 1 brochure
- SAFIRE Falcon-20 brochure
- NOAA P-3 brochure
- AMIE brochure
- AMIE bookmark

**Feydhoo School Presentation | Monday 10 October 2011**
Feydhoo, Addu Atoll
The first school presentation was at Feydhoo School with 20 8th & 9th grade students and 5 parents and teachers. Eric DeWeaver from NSF joined for the presentation, providing an additional scientific view of DYNAMO.
The audience was quiet and hard to engage during the talk, however once the talk was over, even after the “formal” question and answer period was when they really all livened up. They came right up to us and asked great questions, and we played around with the weather balloon a bit. It seemed that it was a cultural shyness or show of respect that they exhibited during the talk, however they opened right up, once the presentation was over. The “post-presentation” time was quite fun, engaging and very rewarding.

Note:
At each presentation participants were given:

- Visual Presentation (Props Used: beach ball globe, weather balloon & sonde demonstration)
- DYNAMO sticker
- DYNAMO brochure
- Cloud Viewer (from Spark)
- AMIE brochure & bookmark
- Eye On Climate Change brochure (ARM)

Irushadiya School Presentation | Tuesday 11 October 2011

Miradoo, Addu Atoll
Courtney Schumacher and Alison Rockwell gave the presentation at Irushadiya School to 60 9th grade students and 10 teachers and parents. The tag-team style of the presentation gave it a fun organic feel, which the students enjoyed, and they could tell the presenters were having fun as well.

The students paid close attention to us during the presentation, and again after the presentation portion they came right up to us to ask question and to look at the weather balloon up close.

Dharumanvantha School Presentation | Wednesday 12 October 2011

Malé, North Malé Atoll
Dharumanvantha School was an all boys school, so it was fitting that Eric DeWeaver was able to help with this presentation. The boys seemed to pay more attention to him while he was talking, so he gave most of the presentation to the 68 students and 5 parents and teachers.

The presentation was held in the outside courtyard of the school, which was lovely, however there was some construction work taking place near by that was bit distracting.

A special part of the evening was after the presentation the staff from the school arranged to have fresh orange juice served to us in the cafeteria, which
provided a valuable time to talk one-on-one with a few of the teachers. The teachers were very appreciative of us for taking the time to come talk to their students.

**Madhurasathul Ahmadiyya School | Thursday 13 October 2011**

Malé, North Malé Atoll

The last of the school visits was at the Madhurasathul School, where a meeting with the school principal prior to the presentation was arranged. He informed us that they have adopted the Cambridge and Edexcel curriculum, which is a UK standard teaching curriculum. The school itself is very large, with 2600 students.

43 students and 2 teachers attended the presentation. A reason for low attendance at this school could have been that many students were preparing for their final exams.

Eric DeWeaver and Alison Rockwell gave this presentation to this group. After the presentation the students wrote their names on a weather balloon that was then launched at the Malé International Airport site. It was a great way to connect students to the research and get them excited about atmospheric science.

**Dynamo Presentation at Ocean First Diver | Wednesday 25 January 2012**

Boulder, Colorado

One of Boulder’s local scuba diving shops, Ocean First Divers (OFD), is very engaged in ocean conservation, and puts on a monthly “social” on a variety of topics from trip reports to science research. The DYNAMO project was featured for the January OFD monthly social. The event was advertised on the their website, sent out in their monthly newsletter, and posted on the UCAR Staff Notes and EOL Facebook page. Jim Moore & Alison Rockwell gave the presentation to the very inquisitive audience.

45 people attended the event, which was a strong turn out compared to other events at OFD. The large number of citizens who showed up for the event indicates that there is an interest in the community on such topics. The level and quantity of questions from the audience also shows that the audience has a strong base knowledge of Earth science and related fields.
ONLINE MATERIALS

DYNAMO OUTREACH WEBSITE
www.eol.ucar.edu/dynamo
Web Pages:
- DYNAMO 2011-2012
- 5 Quick Questions
- Facility Locations
- Platforms & Instruments
- Science Team
- In the News
- Educational Resources

DYNAMO ON FACEBOOK & TWITTER
www.facebook.com/ncareol
As of 12.21.11 - 28 DYNAMO related FB posts

DYNAMO ON YOUTUBE
www.youtube.com/ncareol
Only one video has been published to date, however the plan is to do more in the coming months

DYNAMO ON GOOGLE EARTH
http://www.eol.ucar.edu/field_projects/field-projects/dynamo/DYNAMO%20on%20GE.kmz
This outreach piece is designed for the public so they can get a better understanding of the breadth and depth of DYNAMO and the instrumentation involved. It also serves a something that scientists and others who are involved with DYNAMO can use for presentations, etc.

DYNAMO CITIZEN SCIENTIST BLOG
http://dynamocitsci.blogspot.com/
The DYNAMO Citizen Scientist Blog was set up for one of the PI’s mother-in-law who expressed interest in getting involved in outreach. However, child care probably got in the way of her writing many posts.

Having a Citizen Scientist blog for DYNAMO was the first time that this has been done, and deserves additional efforts and methods to make it a success for future project. It’s a great start to an interesting idea.

PRINTED MATERIALS

BROCHURES
Below is a list of printed material that were produced or obtained for DYNAMO
- DYNAMO brochure
- DYNAMO sticker
• R/V Revelle brochure  
• ORV Sagar Kanya brochure  
• R/V Mirai brochure  
• R/V Baruna Jaya brochure  
• SAFIRE Falcon-20 brochure  
• NOAA P-3 brochure  
• Media DVD: DYNAMO related images & MJO movie (with printed DVD label)

The brochures were used in the Media Packet, as well as to give out at the outreach events. The DYNAMO brochure has also been available at the Mesa Lab Visitor Center, and the FL Main Lobby.

**DYNAMO & AMIE AWARD**

A DYNAMO & AMIE award was made by a local-Boulder awards shop, out of acrylic, with the intention to give out at the Opening Ceremony to people where instrumental in facilitation and logistical planning of D, particularly from the MMS and other Maldivian organizations.

**DYNAMO HATS & T-SHIRTS**

Several DYNAMO hats, T-shirts, and mugs with the DYNAMO logo were printed and given to members of the participating communities who helped with coordination and logistic of the project. Without the help of the local community, a project of this caliber would be very difficult to complete. Showing our appreciation with a token of gratitude was greatly appreciated by those who received the memorabilia.

**S-POL RADAR/DYNAMO KIOSK POSTER**

A large hard-back poster was made and printed that was sent over with the S-Pol radar, and was put up in front of the seatainers so the public could learn about the project and understand what the radar was doing on their Atoll. Having an informational poster such as this helps to keep the public informed and established trust for future field projects.  

**DYNAMO OPENING CEREMONY INVITATION**

The DYNAMO/AMIE Opening Ceremony invitation was ultimately printed up in Addu, however it had to go through several iteration before being completed. The design needed to be simple and elegant, and contain the appropriate logos, as it was going to be sent to government officials, including the President of the Maldives.
DYNAMOMedia Documentation

Close to 2000 pictures and several hours of video were taken; including interviews with:

- Chidong Zhang
- Eric DeWeaver
- Bob Houze
- Scott Ellis

Interviews, video and still pictures will be used to create DYNAMO videos in the coming months.

Lessons Learned

Time
I was a bit skeptical that I was going to be able to keep myself “work” busy for two weeks while in the Maldives. However I worked almost every waking hour and the time was certainly needed. The jet-lag was not too bad when I arrived, which allowed me to get my feet on the ground right away. It was great to have the time to get a feel for the area and get my bearing straight before venturing into outreach events.

Local Pictures
I used the time wisely in the beginning of the trip to prepare the outreach presentation. Getting to know the audience, take pictures and to understand their culture, way of life, environmental concerns, level of education, etc., was a very important part of putting together an effective presentation. The pictures I found to be of utmost importance and subsequently the presentation had more of an impact because the picture were of places that they could relate. These things are virtually impossible to do without being on location.

Inside Connections
In these small close-knit communities where outsiders are not the norm, it is very important to have a trusted local person from the community to make the connections and introductions to the group that are being targeted. I tried very hard to establish contact with schools before arriving in the Maldives, but to no avail. To my surprise, the MMS had school visits arranged for me already by the time I arrived. Knowing this however, would have helped to ease some of my concerns. The MMS staff was immensely helpful in guiding me to the schools, introducing me to the principals, helping to clarify miscommunications due to language barriers and to set up times for the outreach events.