

# Careers in Science Summary

Colorado & Wyoming Tour :: Fall 2011

## SUMMARY:

The Careers in Science (CiS) team visited four schools in the greater Front Ranges area, including one school in Southern Wyoming, during the month of November 2011, reaching close to 300 people. One of the objectives of the Careers in Science program is to visit accredited post-secondary minority institutions, however there are none located in Colorado. The reason for targeting Colorado students was to encourage them to apply to a new EOL internship that was created to attract and inspire young adults into a technical career. The Technical Internship Program (TIP) was developed in response to a lack of opportunities for this type of student, and to create an opportunity for them that is not currently offered.

While there are no accredited postsecondary minority institutions in Colorado, there is no lack of diversity. We targeted diverse schools in the greater-Denver area in order to attract a qualified applicant pool for the TIP. We found the student body of the schools to be ethnically, racially and socio-economically diverse, as well as well-prepared to enter the work force in a vocational or technical career.

The main message of the CiS presentation was that *science needs more than just scientists*, with an emphasis on the critical jobs in order to conduct atmospheric science field campaigns. We wanted to take the mystique away from science, and let the students know that they do not have to be scientist to be involved in science.

The CiS events each started with at least an hour-long presentation, then followed by the hands-on demonstration. The presentation portion prepared the students for the upcoming demonstration, and the demonstration helped to reinforce what they had just heard in the presentation, therefore both the presentation and demonstration were enhanced by the other. The demonstration of the instruments certainly helped to seal-the-deal, so to speak.

The presentation consisted of the new UCAR introductory video *Air. Planet. People.*, followed by a talk that focused on EOL, the instruments that we use and the types of people that we need to design, develop, and maintain them. The remaining time of the presentation was for the Center for Severe Weather Staff to talk more specifically about a field project, namely VORTEX, to give the students an in depth look at doing atmospheric science field research.

Schools in the Colorado Front Range were located using Google searches for local vocational and technical colleges, and were initially contacted in August 2011. Several responded so there was no need to continue searching for interested schools in the area. Boulder TEC was selected due to prior contact with them regarding the Technical Internship Program, and Western Wyoming was contacted due to having a prior relationship with them and EOL's Summer Undergraduate Engineering Internship Program.

## ASSESSMENT

Measuring success for outreach events has historically been a challenge. There are so many factors that are beyond our control that influence how many people even attend an event like this, such as how well it was marketed to whether the event was a class requirement or not. Once someone has participated in the event, it is still difficult to ascertain precisely how it did or did not influence them.

We can simply provide numbers as far as how many attended each event, and how many applicants we get for the various internships that we offer. Even that is not an accurate assessment of whether or not the event was impactful or not. Perhaps the event struck a chord with a student however it is not realized in a tangible manner for many years to come. So much of assessment relies on immediate outcomes and results that the lasting long-term effects are often overlooked. It is important to keep in mind that education and outreach efforts can not always be measured quantitatively, but need to be assessed and monitored over a period of time. If we reached 10% of the students and they get involved with geoscience in some way, the CiS team would consider that to be a success.

If the Technical Internship Program gets a participant from the CiS events that were held in the greater-Denver area, that would be a mark of success.

## EVENTS:

Western Wyoming Community College	ITT Technical College	Boulder TEC School	Arapahoe Community College
125 High School Students 5 College Students 10 Teachers	28 High School Students 2 College Students 4 Teachers	~ 80 High School Students 15 Teachers	20 college students and teachers 1 high school student & parents

## BREAK-OUT GROUP STATIONS

### Up, Up, and Away! Balloon Launch Data :: Bill Brown

Students looked at real-time data of the balloon that was just launched. This proved to be an effective way to have students look at data and graphs. The connection between the balloon that was just launched from their school parking lot to seeing the data that it was collecting was very real to them.

### Interesting Instruments :: Chris Golubieski & Laura Tudor

Students had the opportunity to get close to and touch some of the instruments used to collect data. This provided them with the opportunity to get up close and personal with research tools and get a better handle of what engineers and technicians design and develop on a daily basis.

### Computer Geeks At Work :: Mike Daniels

Mike Daniels gave a summary of the types of different computer related jobs that are needed to support atmospheric science - from software engineering to radar display. His main message was that *it really isn't as hard as it looks*, in an effort to let the students know that they *can* do this!

### Explore the Doppler On Wheels :: Josh Wurman & Andrew Arnold

The Doppler on Wheels proved to be the main attraction for most participants, which is why it was requested for the Careers in Science events. The excitement, for some, was having seen it on the Discovery Channel's Storm Chasers reality TV show, some found the big truck with a radar on the back to be cool, others simply like the excitement of chasing tornados. Regardless of why the students collectively thought the DOW was one of the best parts of the event, the CiS team hopes that it made a lasting impression and that the students now have a better understanding of what instruments and technology is involved with conducting atmospheric science.

### What's a Tornado Pod? :: Karen Kosiba & Andrew Arnold

Tornado pods are a great piece to show students during the hands-on demonstration because they really can experience them. After the presentation of how they work, when and why they use them, students who want can try to lift them and see what it's really like to deploy them. Understanding how the pods work in conjunction with the DOW, along with intensity that surrounds their deployment, the students certainly learned about this array of instruments.

## WESTERN WYOMING COMMUNITY COLLEGE | TUESDAY, NOVEMBER, 8

Rock Springs, Wyoming

### STAFF:

1. Alison Rockwell
2. Mike Daniels
3. Tim Barnes
4. Bill Brown
5. Chris Golubieski
6. Josh Wurman
7. Karen Kosiba
8. Andrew Arnold

The event at Western Wyoming Community College (WWCC) was the first stop on the CiS Front Range tour, and where we had the largest group and the longest event. About 130 students from two local high schools, Rock Springs and Green River, electively came to the event, with 10 of their teachers, and only about 5 WWCC attended.

When the initial CiS email went out, this school responded in minutes, indicating that they would love to host an event for their students. EOL has had a positive relationship with this school in the past in that they provided the first students for the Summer Undergraduate Engineering Internship Program. For that reason, it was hopeful that there would be a strong interest from their student body. Unfortunately only about 5 WWCC students attended all or part of the event.

The morning portion of the event lasted about 2 hours, consisting of several speakers, multi-media presentations, and question and answer sessions. We knew that 2 hours would be a long time for students to sit and watch presentations, so we tried to keep the presentation moving along with several videos, different speakers, and provided ample opportunities for them to be engaged and ask questions. The questions that they asked indicated that they were interested and paying attention:

- How do you name tornados? Hurricanes?
- Do you love your job? What is your favorite part of your job?
- Where do you mainly go to collect data?
- How much does your smallest sensor cost?
- Have you ever lost anyone? Rescues anyone?
- How long until you get results from when you collect data?
- Were you able to collect data from the Joplin tornados?
- What kind of computer programs do you write to make this research happen?
- Would an applied mathematics major be a good background for me to pursue a career in atmospheric science?
- How long can the planes fly? How long are they in the hurricane?

Lunch was designed to be casual, in an effort for the EOL/CSWR to mingle and talk with the students. The hands-on demonstrations lasted for two hours after lunch. With the amount of people, the Cis staff found it difficult to mingle and sit with groups. It was noted that the high school students are not as willing or eager to sit and talk with adults during their free time.

#### 9:30am-11:30am Presentations

- Air. People. Planet.
- Careers in Science presentation
- Q&A
- CSWR presentation
- Q&A

#### 11:30am-12:30pm Lunch

#### 12:30pm-2:30pm Hands-On Demonstrations

- Everyone watched Weather Balloon Launch
- Students broke up into 5 groups and rotated through the stations at 20 minute intervals
  - Computers Geeks at Work
  - Tornado Pods
  - Interesting Instruments
  - Up, Up, & Away! Balloon Launch Data
  - Tour the DOW

#### NOTES:

WWCC was initially contacted with the idea of offering the CiS event to their college students, as that was who the program was targeting. The school did put forth effort in order to attract their students such as posters about the event throughout their campus, however the end result was not as expected. Only about 5 WWCC students came to the hands-on portion of the event. From observing the crowd in the presentation there were no CCWW students present.

CCWW did however contact two local high schools who brought many interested students to the event. The high school students were not exactly who we were trying to reach, however they are a population who we like to engage with, and they

certainly benefited from the event. Perhaps we should explore this approach for future efforts as a way to connect with high school students, which has proven to be difficult in the past.

The CCWW auditorium for presentation left nothing to spare. The sound system group helped to set up the computer and audio in the sound booth in the back of the auditorium, while the screen on the stage went from the floor to the ceiling and spanned the width of the stage. The production team that they provided was outstanding, which made for a great delivery of the presentation.

## ITT TECHNICAL COLLEGE | MONDAY, NOVEMBER 14

Westminster, Colorado

### STAFF:

1. Alison Rockwell
2. Mike Daniels
3. Tim Barnes
4. Bill Brown
5. Chris Golubieski
6. Josh Wurman
7. Karen Kosiba
8. Andrew Arnold

The CiS event was clearly not promoted or marketed well at ITT Tech. The Thursday before the event, the person coordinating the event indicated that he just got permission from the administration to hang the posters around the single building campus, after having had the poster in his possession for several weeks. Having spent a short period of time in their building, I only saw one black and white photocopy of the poster hanging in the women's bathroom. He also tried to go around to individual classroom on Thursday evening to tell students about the upcoming Monday event. Additionally, ITT Tech only holds classes in the evenings and our event was from 9:30am-11:30am, so there were no students already at the campus, they would have had to make a special trip for the event. However, 2 ITT Tech students did attend the event.

Fortunately we did have a class of 28 students from a local Hispanic high school, Escuela Tlatelolco. A few of the students were very interested in our program, and one student had worked for the National Weather Service launching weather balloons the summer before, so this event was particularly exciting for him.

The CiS event was scheduled for two hours with a lunch afterwards, so we had the presentation for the first hour followed by the hands-on demonstrations. The presentation in the classroom was a bit altered due to lack of audio connection from the computer to the speaker system, therefore no videos could be played.

The hands-on demonstration consisted of everyone watching the balloon launch, then breaking up into 3 groups and visiting three stations:

1. DOW & tornado pods
2. Looking at the balloon launch data
3. Table of instruments

Lunch was kindly provided by ITT Tech for everyone back in the classroom. This provided time for the students to ask additional questions, however we still had the classroom structure of "teachers" standing up front and students sitting facing the front of the room. The students asked some great questions like "what brought you to where you are today", and the three school teachers seemed to dominate the Q&A session with their questions. The lead teacher did a great job relating some of the topics that we talked about to what the students are currently learning in their science class.

### NOTES:

Overall, I would have to question the effectiveness of this particular event. Perhaps more communication with the school staff who is setting up the event to ensure it is being marketed and promoted would have helped. Asking to have someone to help with A/V set up would have made the presentation smoother. Asking more questions about the high school population would have been good too. Some of the students from the high school were ESL learners, so they had a teacher shadowing them to translate.

## BOULDER TEC | TUESDAY, NOVEMBER 15

Boulder, Colorado

### STAFF:

1. Alison Rockwell
2. Mike Daniels
3. Tim Barnes
4. Brigitte Baeuerle
5. Bill Brown
6. Chris Golubieski
7. Junhong Wang
8. Josh Wurman
9. Karen Kosiba
10. Andrew Arnold

The 75-minute presentation was held in the school cafeteria, with 78 students and 13 teachers in attendance. The presentation followed a similar flow from the other events: Air. Planet. People. video, CiS talk, CSWR talk and then Q&A session. The students were from a variety of classes such as automotive repair, cosmetology, and computer science.

The hands-on demonstration followed the presentation, with everyone watching the balloon launch and then breaking up into three rotation groups - the DOW tour, interesting instruments, and observing the balloon launch data. Many of the students did not come prepared with a coat or warm clothes, so several went inside early due to the cold and windy weather, while other groups simply rotated through the stations at their own pace.

However, there was a noticeable draw to Chris Golubieski's display and talk about the various instruments that he brought. His talk was very engaging, enthusiastic, and clearly resonated with many of the students. Students were less likely to leave his station and move on to the others.

## ARAPAHOE COMMUNITY COLLEGE | FRIDAY, NOVEMBER 18

Littleton, Colorado

### STAFF:

1. Alison RockwellA
2. Tim Barnes
3. Brigitte Baeuerle
4. Bill Brown
5. Laura Tudor
6. Josh Wurman
7. Andrew Arnold

The ACC event followed the same structure as the previous events by starting with the Air. Planet. People. video, then moving onto the CiS & CSWR presentations. However this event stood out for several reasons. The first being the 20 people who attended the event were very career focused students and teachers from the college, with one high school student and his parents. Right from the start they asked very targeted questions and displayed a level of interest during the presentation not seen at other events, perhaps due to their age and maturity level.

- What kind of software programs do you use for data collection?
- What is the most common language used for technical discussions while abroad?
- What is a typical salary for someone who works at the lab?

The presentation was held in an auditorium style classroom, with a state-of-the-art audio/visual set up, which helped to make the presentation engaging fun, and easy to give.

The weather was warm and sunny for the hands-on demonstration which helped make it a comfortable event for all, and was a welcome change for the CiS staff. ACC had sectioned off a parking lot for the CiS vehicles, so we had ample room, and with only 25 people, it was easy for everyone to rotate through the three stations at their leisure, and have time to talk with the CiS one-on-one.

Lunch was kindly provided by ACC, which provided time for the participants and the CiS staff to sit and connect more. Several of the CiS sat and talked with students individually during lunch which was very much appreciated by the students. This was a great time to answer additional questions and for the CiS staff to explain more about the available internships that EOL and UCAR offer.

The event was very well promoted by this school. There was an announcement in the local paper, not just the campus paper, a post on their facebook page about it, and even an email sent out to the Colorado Science Education Network email list. Despite their well-rounded and tenacious efforts to promote the event, only 20 people attended, however they were a very interested and driven group of 20!

## LESSONS LEARNED

- Be more involved in how the school is promoting the event. The person who gets tasked with it at the individual schools may not always be the most efficient at this type of thing, so some guidance and or suggestions as to where and how the event is promoted could help CiS in the long-run.
  - School newsletter - email and print
  - Print and send posters rather than relying on them to do it, it also makes it easier for them to simply go around and hang them up
  - Student center display or monitor
  - Contact instructors and department heads individually
  - Careers Services
  - President/Head of Student Body
  - School Facebook Page
- Being adaptable to whatever presentation setting we walk into is a key factor, but also knowing when to ask for help setting up the equipment is important.
- Debriefing after each presentation to see what worked and what didn't work, and then making adjustments to the next presentation was helpful.
- Target member universities in areas of diverse populations and arrange high school CiS events to take place at the university, creating that link or bridge between the two
- Continue to offer CiS for Front Range area high schools and technical colleges so it develops a reputation, drawing more and more people to each event. Make it a destination event, rather than a high school requirement.
- When doing outreach events for specific field campaigns, include a segment on CiS
- Collaborate with Spark on ways to incorporate CiS into larger events that they do
- CiS requires a lot of time and energy by many people to put on such an event, with seemingly little return. As discussed above, the assessment of how successful the event was proves to be quite challenging. We all need to remember that CiS is hopefully planing a seed for the next generation and we may not see immediate results. CiS and other methods to develop our workforce should be included in as many outreach events as possible. Now that we have a solid program many materials have been developed, we can customize them as needed.
- Continue to foster the enthusiasm that we saw at the college level, continue to seek ways to engage and encourage high school students
- Know the student population prior to the event and try to tailor the slides and presentation to them....know the audience.