

ISETCSC acknowledges the receipt of the comments and concerns by NOAA on the ISETCSC performance report for the reporting period 1st March 2011 through 31st August 2011. We thank NOAA for accepting the report and acknowledging the positive aspects about the ISETCSC program.

Below we provide explanations to the concerns in detail with data to support the explanations. Detailed answers and corrections are also provided to the questions raised. The Suggestions are well received and actions are taken or plans provided.

A. REGARDING THE CONCERNS

NOAA identified the following concerns:

- **Even if six students finish their PhD degrees by spring 2012 as claimed, the total number of matriculated doctoral students will fall short of the milestones for Year 5 of this grant where the milestone was 12 and the total graduates will most likely be 10. NOAA requests an explanation as to the cause for not making the performance milestone.**

In the reports we have undercounted the number of PhD's who have graduated by August 2011. The following students have already graduated. - It should be 5 ISET funded and 5 leveraged (working on ISETCSC projects)

<i>Name</i>	<i>Funded or Leveraged</i>	<i>Institution</i>
<i>Robert Mera</i>	<i>Funded by ISET</i>	<i>NCSU</i>
<i>Catrell Shenek</i>	<i>Funded by ISET</i>	<i>NCSU</i>
<i>Jared Bowden</i>	<i>Funded by ISET</i>	<i>NCSU</i>
<i>Matthew Norman</i>	<i>Funded by ISET</i>	<i>NCSU</i>
<i>Tonizzo Alberto</i>	<i>Leveraged</i>	<i>CUNY</i>
<i>Maung Lwin</i>	<i>Leveraged</i>	<i>CUNY</i>
<i>Viviana Vladutescu</i>	<i>Leveraged</i>	<i>CUNY</i>
<i>Chuen Gan</i>	<i>Leveraged</i>	<i>CUNY</i>
<i>Ioannis Ioannou</i>	<i>Leveraged</i>	<i>CUNY</i>
<i>Baylor Wetzel#</i>	<i>Funded by ISET</i>	<i>CUNY</i>

Native American

Since the report was submitted 2 NCA&T students have defended their PhD Dissertation

<i>Name</i>		<i>Status</i>
<i>Mohamed Gibril</i>	<i>Defended</i>	<i>Graduating Dec. 2011</i>
<i>Anthony Cochran</i>	<i>Defended</i>	<i>Graduation May 2012</i>

In general, the length of time it takes to complete the PhD degree is difficult to predict and has a large variability due to a number of factors. Therefore, this is one of the milestones that is most difficult to predict. We have set in place a couple of checks to make sure that the quality of our PhD students is high.

- *They are required to have prepared two journal manuscripts before they can defend their dissertation.*
- *Also, they are required to meet the standards of their NOAA external committee member(s).*

Maintaining these quality checks will in some cases result in students taking longer than anticipated to complete degree requirements. However if we add the leveraged students working on ISET projects we have exceeded the Year V milestone if students graduating in May 2012 are included.

Furthermore the following 23 ISET funded and 4 leveraged students are in the Pipeline expected to graduate with PhD between 2012 and 2015 and 4 students will graduate by spring 2012. THE FATE OF 18 PHD STUDENTS IN THE PIPELINE REMAINS UNCERTAIN BEYOND AUGUST 2012.

Student Name	Institution Name	Expected date of Graduation
<i>Darkus Jenkins**</i>	<i>NCA&T-ISET Funded</i>	<i>Spring 2012</i>
<i>Galen Smith</i>	<i>NCA&T-ISET-Funded</i>	<i>Spring 2013</i>
<i>Cheickna Baber**</i>	<i>NCA&T-ISET-Funded</i>	<i>Fall 2012</i>
<i>James Spinks**</i>	<i>NCA&T- ISET-Funded</i>	<i>2013</i>
<i>Patrick Pete</i>	<i>NCA&T- ISET-Funded</i>	<i>2014</i>
<i>Stefani Taylor</i>	<i>NCA&T- ISET-Funded</i>	<i>2014</i>
<i>Riem Rostom</i>	<i>NCA&T- ISET-Funded</i>	<i>2014</i>
<i>William Wright**</i>	<i>NCA&T- ISET-Funded</i>	<i>Fall 2012</i>
<i>Steve Stegall</i>	<i>NCA&T- ISET-Funded</i>	<i>Fall 2012</i>
<i>Katif Peay</i>	<i>NCA&T- ISET-Funded</i>	<i>Spring 2012</i>
<i>Charla Gaskins</i>	<i>NCAT-ISET Funded</i>	<i>2013</i>
<i>James Faghmous</i>	<i>UM- ISET-Funded</i>	<i>Spring 2013</i>
<i>Karen Cepero#</i>	<i>NCSU- ISET-Funded</i>	<i>2015</i>
<i>Doel Gonzalez</i>	<i>NCSU- ISET-Funded</i>	<i>2015</i>
<i>Michael Diaz#</i>	<i>NCSU- ISET-Funded</i>	<i>2014</i>
<i>David Santoro</i>	<i>CUNY- ISET-Funded</i>	<i>February 2012</i>
<i>Nathan Hosannah</i>	<i>CUNY- ISET-Funded</i>	<i>2012</i>
<i>Sameh Abdelazim</i>	<i>CUNY- ISET-Funded</i>	<i>2012</i>
<i>Amir Ibrahim</i>	<i>CUNY- ISET-Funded</i>	<i>2013</i>
<i>Paulo Castillo</i>	<i>CUNY- ISET-Funded</i>	<i>2013</i>
<i>Ousmane Savane</i>	<i>CUNY- ISET-Funded</i>	<i>2013</i>
<i>Hanna Aizenman</i>	<i>CUNY- ISET-Funded</i>	<i>2013</i>
<i>Matt Mickens</i>	<i>NCAT-Leveraged</i>	<i>Spring 2012</i>
<i>Yi-Chih Huang</i>	<i>NCAT-Leveraged</i>	<i>2012</i>
<i>Fuhong Liu</i>	<i>NCAT-Leveraged</i>	<i>2013</i>
<i>Sujeeta Singh</i>	<i>NCAT-Leveraged</i>	<i>2014</i>
<i>Chaunte Lacewell**</i>	<i>NCAT-ISET Fubded</i>	<i>2014</i>

NOTE: *** The students were recruited for the MS program in physics, math, chemistry and computer science (programs offering only MS) and are retained to continue on a PhD in the EES program. # started as MS students at NCSU and continued for PhD.*

We also would like to bring to your attention the following points regarding the PhD students and programs at NCA&T.

- 1. At the time when the implementation plan was developed, Dec 2006, there were no PhD students in the pipeline at NCA&T. The first ISET supported PhD students at NCA&T started in January 2007.*
- 2. The PhD programs at NCA&T admitting ISETCSC students were the Electrical Engineering and Energy and Environmental Systems(EES) programs. (Program was 2 years old in 2006) only since all the PI's involved in ISET were in departments offering only MS degrees.*
- 3. The PhD level courses in the Atmospheric Sciences Concentration within the Energy and Environmental Systems program were developed and approve by NCAT in 2008.*

4. *Six of the 25 students in the pipeline joined ISET program as MS students. They transitioned to PhD programs after completing their MS degrees and retained. The length of time to do two graduate degrees is usually long since the students also changed majors: from chemistry, mathematics and computer science to EES.*
- **The statistics provided under the Summary of Accomplishments (page v) show that the number of students who participated in summer research at NOAA labs fell continuously from a high of 19 in 2009, to 13 in 2010, and to just 7 this last year (2011). NOAA recognizes that the total number for the award period of 38 exceeds the milestone of 21. NOAA also recognizes that ISETCSC management decided not to fund student travel and lodging costs at the same level as had been the case in the past. NOAA acknowledges being approached for assistance from Earth System Research Laboratory funding sources to help defray the student travel and lodging costs. However, NOAA was concerned by ISETCSC's decision to not support travel costs, while other parts of the program (e.g., funding to conduct research) were relatively unaffected.**

The decision to send students to NOAA labs for summer research experience is made based

1. *The level of preparation of the student*
2. *Consent of the advisor and the NOAA collaborator*
3. *Available funds*
4. *A number of students made multiple trips and advisors decided to keep them on campus.*

In the first two years of the ISETCSC funding we tried to aggressively recruited students, but we always carried a large balance for student support which allowed us to keep adding more students. The balances also helped pay the huge cost of sending students to NOAA labs (we have to pay them regular salary, travel, hotel and per Diem for extended periods in Boulder and Ashville). This became unsustainable with increasing number of students.

*In 2010 ISETCSC requested matching cost from ESRL to cover the **lodging cost only**. This request was made in consultation and with the approval of EPP. **Travel was paid by ISET, and students also received full summer stipend while away**. The length of time the students spent was also longer from a maximum of 4 months to 1month.*

In 2011, most of the senior and junior undergraduates at Fresno, University of Minnesota already graduated and the PI's determined that their students at the time were not adequately prepared (most were in their early career) and were not recommended. All the students were from NCA&T and one student from Fisk

The number of students who participated in the summer 2011 was nine (This was a mistake in reporting as can be seen in the table. The error was because not all students provided a report for inclusion in the performance report). The numbers are shown in the table.

<i>Year</i>	<i>2008</i>	<i>2009</i>	<i>2010</i>	<i>2011</i>
<i>Number of students</i>	<i>12 Total 2-EPP scholarship</i>	<i>19 Total 3-EPP Scholarship</i>	<i>12 Total 2-EPP Scholarship</i>	<i>11 Total 3-EPP Scholarship</i>

Summer 2008 internships (12 students, 2 EPP scholarships)

<i>Last Name</i>	<i>First Name</i>	<i>Institution</i>	<i>NOAA Scientist</i>
<i>Peay</i>	<i>Katif</i>	<i>NCAT</i>	<i>James Wilczak</i>
<i>Cochran</i>	<i>Anthony</i>	<i>NCAT</i>	<i>Jim Roberts</i>
<i>Fuller</i>	<i>Kawana</i>	<i>NCAT</i>	<i>Tracy Hansen</i>
<i>Baber</i>	<i>Cheickna</i>	<i>NCAT</i>	<i>Tracy Hansen</i>
<i>Wright</i>	<i>William</i>	<i>NCAT</i>	<i>Tracy Hansen</i>
<i>Gebril</i>	<i>Mohamed</i>	<i>NCAT</i>	<i>Eric Kihn</i>
<i>Olabode</i>	<i>Robert</i>	<i>UM</i>	<i>Tracy Hansen</i>
<i>Ware</i>	<i>Christopher</i>	<i>NCAT</i>	<i>EPP</i>
<i>Cepero</i>	<i>Keren</i>	<i>NCSU</i>	<i>NOAA/NWS</i>
<i>Jefferies</i>	<i>Johnathan</i>	<i>NCAT</i>	<i>EPP</i>
<i>Ibarra</i>	<i>Yesenia</i>	<i>FRESNO</i>	<i>James Burkholder</i>
<i>Singh</i>	<i>Sukhdip</i>	<i>FRESNO</i>	<i>James Burkholder</i>

Summer 2009 internships, NOAA-ESRL; NOAA-NESDIS, NCDC, GFDL etc (19 students, 2 EPP scholarship)

<i>Last Name</i>	<i>First Name</i>	<i>Institution</i>	<i>NOAA Scientist</i>
<i>Gebril</i>	<i>Mohamed</i>	<i>NC A&T</i>	<i>NGDC-Eric Kihn</i>
<i>Fuller</i>	<i>Kawana</i>	<i>NC A&T</i>	<i>ESRL-Tracy Hansen</i>
<i>Messick</i>	<i>Richard</i>	<i>NC A&T</i>	<i>ESRL-Tracy Hansen</i>
<i>Morrison</i>	<i>Tammy</i>	<i>NC A&T</i>	<i>ESRL-Tracy Hansen</i>
<i>Matthews</i>	<i>Brandis</i>	<i>NC A&T</i>	<i>ESRL-Tracy Hansen</i>
<i>Spinks</i>	<i>James</i>	<i>NC A&T</i>	<i>ESRL-Jin Lee</i>
<i>Nguyen</i>	<i>Van</i>	<i>NC A&T</i>	<i>ESRL-Jin Lee</i>
<i>Hernandez</i>	<i>Samuel</i>	<i>FRESNO</i>	<i>ESRL-James Burkholder</i>
<i>Campbell</i>	<i>Sean</i>	<i>FRESNO</i>	<i>ESRL-James Burkholder</i>
<i>Scott</i>	<i>Wilsharo</i>	<i>FISK</i>	<i>EPP</i>
<i>Ware</i>	<i>Christopher</i>	<i>NCA&T</i>	<i>EPP</i>
<i>Jefferies</i>	<i>Jonathan</i>	<i>NCA&T</i>	<i>EPP</i>
<i>Elliott Foust</i>	<i>William</i>	<i>NCSU</i>	<i>Dr. Anand Gnanadesikan</i>
<i>Olabode</i>	<i>Robert</i>	<i>Minnesota</i>	<i>Tracy Hansen</i>
<i>Blue</i>	<i>Kristopher</i>	<i>NC A&T</i>	<i>NCDC-Russ Vose</i>
<i>Jones</i>	<i>Wilson</i>	<i>NC A&T</i>	<i>NCDC-Glenn Rutledge</i>
<i>Wright</i>	<i>William</i>	<i>NC A&T</i>	<i>NCDC-Rich Baldwin</i>
<i>Gaskins</i>	<i>Charla</i>	<i>NC A&T</i>	<i>NCDC-Karsten Shein</i>
<i>Baber</i>	<i>Cheickna</i>	<i>NC A&T</i>	<i>NCDC-Mike Brewer</i>

Summer 2010 internships (12 students ;2 EPP scholarship)

<i>Last Name</i>	<i>First Name</i>	<i>Institution</i>	<i>NOAA Scientist</i>
<i>Gbril</i>	<i>Mohamed</i>	<i>NCAT</i>	<i>NGDC-Eric Kihn</i>
<i>Cochran</i>	<i>Anthony</i>	<i>NCAT</i>	<i>ESRL -Jim Roberts</i>
<i>Lacewell</i>	<i>Chaunté</i>	<i>NCAT</i>	<i>NCDC- Dave Levinson</i>
<i>Etim</i>	<i>David</i>	<i>NCAT</i>	<i>ESRL-Tracy Hansen</i>
<i>Wright</i>	<i>William</i>	<i>NCAT</i>	<i>NCDC- Rich Baldwin</i>
<i>Duff</i>	<i>Delonte</i>	<i>NCAT</i>	<i>Eric Kihn</i>
<i>Smith</i>	<i>Galen</i>	<i>UM</i>	<i>ESRL- Steven Koch</i>
<i>Spinks</i>	<i>James</i>	<i>NCAT</i>	<i>ESRL-. Jin Lee</i>
<i>Blow</i>	<i>Malcom</i>	<i>NCSU</i>	<i>EPP</i>
<i>Scott</i>	<i>Wilsharo</i>	<i>Fisk</i>	<i>NOAA SEFSC- Carlos Rivero</i>
<i>Blow</i>	<i>Martin</i>	<i>NCAT</i>	<i>EPP</i>
<i>Nguyen</i>	<i>Van</i>	<i>NCAT</i>	<i>ESRL- Jin Lee and Steven Koch</i>

Summer 2011 internships (11 students, 3 EPP scholarship)

<i>Last Name</i>	<i>First Name</i>	<i>Institution</i>	<i>NOAA Scientist</i>
			<i>ESRL- Jian-Wen Bao</i>
<i>Baber</i>	<i>Cheickna</i>	<i>NCAT</i>	<i>NCAR- Chris Davies, Chris Snyder</i>
<i>Boskovic</i>	<i>Stefan</i>	<i>NCAT</i>	<i>EPP</i>
<i>Lacewell</i>	<i>Chaunté</i>	<i>NCAT</i>	<i>NCDC- Kenneth Knapp</i>
<i>Etim</i>	<i>David</i>	<i>NCAT</i>	<i>ESRL- Joanne Edwards</i>
<i>Wright</i>	<i>William</i>	<i>NCAT</i>	<i>NCDC- Rich Baldwin</i>
<i>Hariston</i>	<i>Matthew</i>	<i>UM</i>	<i>ESRL- Jin Lee</i>
<i>Pete</i>	<i>Patrick</i>	<i>NCAT</i>	<i>ESRL-. : Isidora Jenkov, Paula McCaslin</i>
<i>Blow</i>	<i>Malcom</i>	<i>NCSU</i>	<i>EPP</i>
<i>Taylor</i>	<i>Stephany</i>	<i>NCAT</i>	<i>NOAA ESRL- Isidora Jankov</i>
<i>Blow</i>	<i>Martin</i>	<i>NCAT</i>	<i>EPP</i>
<i>Hota</i>	<i>Alok</i>	<i>Fisk</i>	<i>Dan Pisut</i>

B. REGARDING THE QUESTIONS

NOAA kindly requests that ISETCSC provide a response to the following questions:

- Did doctoral student David Santoro graduate in February 2011?

David Santoro is expected to graduate in February 2012. The report from CUNY was a mistake (was not updated when reported)

- **Is Steve Stegall an ISETCSC leveraged student or was he supported by ISETCSC?**

Steven Stegall is supported by ISET; it was mistakenly reported as leveraged. The same correction is also requested for Patrick Pete and Stephaney Taylor. Though their support in the first year came from Title III funding, they have been provided ISET support to travel to ESRL in the summer and funded this year.

- **Did the ISETCSC High School Summer camp on NCA&T State University explore a pre- and post-test instrument to measure student outcomes? If yes, what were the results? How many high school participants transition to ISETCSC as undergraduate students?**

Evaluation of the summer camps at NCAT was done by experts at Penn State [summer program is jointly run with NSF leveraged funding (PI-Bililign) in collaboration with Penn State]. Full report is included as an attachment. Fresno also conducted pre-and post test instruments to measure student outcomes which is also attached.

Workshop participants were given a brief content knowledge quiz at the start of the workshop, and again at the conclusion. The quiz consisted of 10 multiple choice questions, five of which focused on earth science content, and five of which focused on atmospheric science content. The average score of participants on the pre quiz was 32.85% (out of a possible 100%). Scores ranged from 0% - 50%. On the post quiz, participants seemed to have a slightly stronger grasp of content, with the average score of participants increasing to 44.21% with a range of 20% - 60%. Scores for questions which addressed earth science content (questions 1-5) covered during the workshop showed greater improvement than those that addressed atmospheric science content (questions 6-10). Students seemed to strongly grasp the concept of seismic waves, with a dramatic decrease in error frequency from 14 to 0- SEE REPORT FOR DETAILS

The participants are not tracked to determine if they transitioned to ISETCSC as undergraduates, but most have indicated their desire to stay in STEM areas.

- **How effective where the ISETCSC recruitment activities?**

In 2010-2011 ISET developed a very strong recruitment strategy to develop a sustained pipe line of minority students by working closely with local schools in North Carolina, Fresno and Alaska. Center Associate Director (Jessica Bohn) and NSF supported Geosciences Education Specialist (Mike Porter) were responsible for this

- *ISETCSC started developing long term relationships with high school science teachers through the summer workshops. ISET Faculty and staff visited the schools to provide lectures and demonstrations to help teachers (Fresno and NCA&T)*
- *ISETCSC started developing relationships with local school councilors and provide them with materials on career opportunities in geosciences.*
- *Through funding from NASA ISETCSC developed strong partnership with school districts and ISETCSC leadership attended the professional development meetings of the science teachers and ISET offered to provide professional development workshops through the year.*

- *ISET staff and director are involved in the development of an Early STEM College (High school) on the campus of NCA&T*
- *ISET in Alaska started working closely with the Native American communities.*
- *ISET also developed and printed over 2000 personalized brochures and postcards to be mailed to high school seniors throughout the partner institutions.*
- *ISETCSC collaborated with Penn State evaluation experts to evaluate the summer camps and teachers workshops.*

As a result of these and other well planned and executed activities, ISETCSC started receiving a number of applications in the spring and summer of 2011. We were unable to make any commitments due to the uncertainty in funding. Furthermore the de-funding of ISET derailed the activity as the Center lost it's very experienced and well connected educator-Jessica Bohn, and was unable to offer financial incentives for students to come to NCA&T.

However we have continued the activities using leveraged funds and have funds to keep the summer workshops and continue working with teachers.

C. REGARDING THE SUGGESTIONS

NOAA suggests that:

- **ISETCSC provide in the report response information on Martin Blow's award for his oral presentation.**

Martin Blow interned with NOAA's Office of Marine and Aviation Operations (OMAO) under the Emerging Technologies Officer, Commander John Adler in the summer of 2011. He was tied for first place in his category Engagement/Organization & Administration/Science and Technology Enterprise. He was also tied for first place overall (out of all 100+ interns in both programs) with an average score of 99.

Unfortunately this information was not provided to ISET at the time of preparing the Report.

- **ISETCSC increase the student involvement in the peer-reviewed journal publication process. NOAA is looking for both students (co-authored or lead) authored publications.**

ISETCSC plans to increase the number of student co-authored publications. ISETCSC requires that all PhD students have prepared two journal manuscripts before they can defend their dissertation. This will certainly increase the number of publications to increase as the 25 PhD students in the pipeline complete their studies. Currently close to half of the publications have student co-authors.