Section 1: Inventory of Evaluation Resources, June 30, 2012

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*Modified August 31, 2012

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a. Introduction
b. Summary of Evaluation Approach and Resources
c. Logic Model
d. Overarching Evaluation Questions
e. Evaluation Plan Matrix
f. Annotated Bibliography of Evaluation Tools
g. OEIE Statement of Qualifications
Background

The Center for Remote Sensing of Ice Sheets (CReSIS) is a Science and Technology Center (STC) that was established by the National Science Foundation (NSF) in 2005. CReSIS is composed of the University of Kansas (KU), as the lead institution, and six partner institutions: Elizabeth City State University (ECSU), Indiana University (IU), University of Washington (UW), The Pennsylvania State University (PSU), Los Alamos National Laboratory (LANL), and the Association of Computer and Information Science Engineering Departments at Minority Institutions (ADMI). In addition to this core group, CReSIS collaborates with several international institutions and industry partners to produce satellite data products, models, educational programs, and online products in its efforts “to inspire, educate, and train the next generation of scientists and engineers.”

One component of CReSIS is a K-12 Education and Outreach Program. The purpose of the CReSIS K-12 Education and Outreach Program is to create a human resources pool, which ultimately fuels the future Science, Technology, Engineering, and Mathematics (STEM) research and education workforce. A secondary purpose is to encourage underrepresented groups to pursue research in polar sciences and Center-related disciplines (e.g., computer science, education, electrical engineering, geography, geology, mathematics). Retention of underrepresented groups in this STEM pipeline is expected to contribute to a diverse workforce that is qualified to meet the talent demands necessary for future research in polar science.

CReSIS at KU contracted with the Office of Educational Innovation and Evaluation (OEIE) at Kansas State University (K-State) to provide evaluation services for its K-12 Education and Outreach Program. Specifically, the role of the OEIE team was to collaborate with CReSIS staff, provide an external lens and evaluation expertise, present evaluation strategies, and help build capacity for program evaluation for the K-12 Education and Outreach Program. OEIE provided capacity building services to CReSIS toward the program’s vision: “to inspire, educate, and train the next generation of scientists and engineers for the nation in Center-related disciplines”; and toward the CReSIS Strategic and Implementation Plan (SIP) objectives I, J, and K: “I) enhance and increase relevant science content that is taught in K-12 classrooms; J) motivate students to pursue careers in the STEM fields; including reinforcing the necessary foundational skills; and K) improve teacher knowledge of climate science via teacher workshops and in-service days.”

Previously, OEIE collaborated with Darryl Montreau, CReSIS Education Coordinator, to develop a Logic Model to assist with conceptualizing the program components at a glance. Further, OEIE developed nine overarching Evaluation Questions, which aligned to the short, medium, and long-term outcomes from the Logic Model, to serve as a guide for the proposed evaluation activities. Next, an Evaluation Plan Matrix was created to further specify the proposed evaluation activities. Additionally, an annotated bibliography served to provide context and additional sources of evaluation tools. OEIE provided these materials as “preliminary” resources on March 31, 2012. For ease of use, the previously submitted preliminary evaluation resources can be found in Section 2: Prior Deliverable, Preliminary Evaluation Resources, March 31, 2012, appended to this document.
Overview of Current Activities

In spring 2012, OEIE conducted a review of CReSIS evaluation practices to develop capacity-building resources and create a comprehensive program evaluation for the CReSIS K-12 Education and Outreach Program. The purpose of the current document is to further build the capacity of CReSIS staff to administer a comprehensive evaluation of CReSIS K-12 Education and Outreach Program interventions. This document contains a thorough review of existing CReSIS K-12 educational programming instruments for evaluation purposes, provides suggestions to strengthen existing instruments and analyses of the data collected, addresses gaps in instruments, and highlights additional sources of measurement. This document also includes a glossary of evaluation terminology and references.

Review of Existing Instruments

OEIE requested that CReSIS share its existing evaluation materials that were developed and administered by CReSIS staff in 2011. CReSIS shared five instruments and descriptions of administration procedures. The five instruments had either been administered online via SurveyMonkey® or as hard-copy, and had assessed the effectiveness of four educational interventions: Ice, Ice Baby; Freezing Friday; Online Data Portal; and Glaciers in Motion Animation.

The Ice, Ice Baby instruments consisted of a test and two surveys: a hard-copy test and survey that was administered to students both before and after participation in the program and an online survey administered to teachers after participation in the program. The student pre-/post-intervention survey contained a knowledge and scientific process skills section and a scientific awareness and attitudes section. The online teacher survey was administered via SurveyMonkey® and measured their perceptions of student interest in polar science, intentions for integrating the Ice, Ice Baby content into other curriculum, and interest in further participating in CReSIS programming and using their materials.

The Freezing Friday teacher survey was administered to teachers online via SurveyMonkey® after the program (i.e., workshop) was completed. The survey measured teachers’ perceptions of student interest in science and their own interest in additional CReSIS programming and materials. This survey also requested suggestions for improvement to the quality of the program.

The Online Data Portal survey was available to teachers on the Online Data Portal website, www.cresis.ku.edu/education/k-12/online-data-portal, and powered by SurveyMonkey®. This survey required teachers to enter contact information for and characteristics of their school, a description of the participants (i.e., who and how many participated in the lesson), and which lesson was piloted. The survey also contained scaled items that asked teachers to rate observational concepts; these items were adapted from the Reformed Teaching Observational Protocol (RTOP) by the Collaboratives for Excellence in Teacher Preparation (CETP). The final question was open-ended and asked teachers to provide any additional information or suggestions for improvement to the lesson. The survey descriptions provided by CReSIS staff indicated that the Online Data Portal survey was in the process of being revised in June 2012; therefore, recommendations for revisions to this survey are especially timely.
The *Glaciers in Motion Animations* feedback survey was administered online via SurveyMonkey® after the programming (i.e., use of the website) was complete. This survey required teachers to enter contact information and characteristics of their school, a description of the participants (i.e., who and how many participated in the lesson), and which animations were used during class. The survey also contained scaled items regarding the usability of the website animations, which had been modified from the System Usability Scale (SUS) authored by John Brooke at Redhatch Consulting, Ltd. The final question was open-ended and asked for recommendations to improve the glacier animations.

OEIE offers the following general recommendations to guide modification of these surveys. These recommendations refer to the overall approach to data collection and analysis. Suggested modifications to specific instruments are provided in the following section on the next page.

- More detailed and thorough instructions are needed to ensure the participants are clear on what is being asked and what they are to do. This will impact the quality and accuracy of the information they submit. Further instruction may be included in a cover letter or read aloud to students by their teacher. However, instructions should be reiterated briefly in the introduction to the survey instruments.

- Ensure that Institutional Review Board (IRB) approval/exemption for research conducted in established or commonly accepted educational settings involving normal educational practices has sought from the lead and partnering institutions as appropriate. As part of the IRB requirements, the basic details of informed consent must be included in a cover letter and restated in the introductions to the survey instruments. At the very least, the instructions need to include a statement of confidentiality, duration of participation, benefits to the subject and program, who to contact with questions or concerns, and statement of voluntary participation.

- IRB approval allows for respondents to be tracked for follow-up purposes, triangulation of data, and other longitudinal data collection activities and analyses. If the project wants to incorporate longitudinal analyses, review how respondents are currently tracked. It may be necessary to add school, district, and teacher demographic information questions (e.g., size of school, rural/suburban/urban, years of teaching) to the end of the survey instrument to ensure these data are collected and available for analysis.

- Requests for demographic information need to be relocated to the end of the survey. Typically demographic questions are placed at the end of a survey to dismiss any misperceptions the respondent may have on how their personal characteristics will be used by the evaluator to frame the reporting of the results.

- Demographic questions need to be identical across teacher surveys to ensure the tracking of participation is consistent and accurate. Questions must include years of experience in the education field and relevant certifications teachers may hold to provide an accurate representation of qualifications.
Instrument-specific recommendations for modifications to the five surveys are outlined below. In general, these recommendations focus on the improvement of the quality of data collected from educational programs currently being implemented or planned for the near future. Efforts to reduce the burden on participants by improving clarity and relevancy of questions and response options was considered foremost in the review of existing instruments. Suggestions for resources to consult when analyzing the data collected are also recommended, below.

1) Ice, Ice Baby Student Test and Survey Recommendations:

- Revise the 3-point response options for Questions 10-15 to 5-point Likert-type scale response options ranging from Strongly Disagree to Strongly Agree with a neutral scale point of Neither Disagree nor Agree.
- Revisit the Student Survey items using the recommendations provided by the OEIE team on August 9, 2012.
- See Pages 9-10 and 14-17 of the Instrument Inventory Matrix for valid and reliable instruments and resources to design student surveys and other evaluation strategies.

2) Ice, Ice Baby Teacher Survey Recommendations:

- Revise instructions to scaled items that ask respondents to evaluate the program by “ranking” their agreement to statements. It is more accurate to instruct them to “select” or “rate” their level of agreement.
- Present scaled item response option labels from the most negative response on the left to the most positive response on the right to ensure that higher scores represent more positive responses (e.g., more agreement) to an item. Therefore, the scale points are to be reversed to “Strongly Disagree” on the left end of the scale and “Strongly Agree” on the right end of the scale.
- Include a scale mid-point with a label of “Neither Disagree nor Agree.”
- Questions 4 through 8 are behavioral; these questions ask whether or not the respondent has conducted activities in their classroom (Questions 4-6) or has interest in using additional CReSIS materials or participating in teacher workshops (Questions 7-8). Remove Questions 4 to 8 from the agreement scale, and include them in their own section with “yes”/“no” response options.
- Modify the final open-ended question to be specific to Ice, Ice Baby rather than overall K-12 educational outreach (i.e., “Please tell us how we could improve Ice, Ice Baby using the space below.”).
- See Page 11, 16, and 18 of the Instrument Inventory Matrix for valid and reliable instruments and resources to design teacher surveys and other evaluation strategies.

3) Freezing Friday Survey Recommendations:

- Revise instructions to state that the survey is confidential, rather than anonymous, as responses will be tracked.
- Present scaled item response option labels from the most negative response on the left to the most positive response on the right to ensure that higher scores represent more positive responses (e.g., more agreement) to an item. Therefore, the scale points are to be
reversed to “Strongly Disagree” on the left end of the scale and “Strongly Agree” on the right end of the scale.

- Change the scale mid-point label to “Neither Disagree nor Agree” rather than “Not Sure”.
- Remove the “Not sure” response option for Question 2, and include an open-ended response option for further comments regarding their responses.
- Modify Question 3 to ask “Please tell us how we could improve Freezing Friday using the space below.”
- See Page 11, 16, and 18 of the Instrument Inventory Matrix for valid and reliable instruments and resources to design teacher surveys and other evaluation strategies.

4) **Online Data Portal Survey Recommendations:**

- On Question 1: Change “School” to “School Building Name” and add an item for “District” before “School Building Name.”
- On Question 2: Correct the spelling of “Rural.” To increase respondents’ understanding of their school setting, more explanation is needed. “Urban” schools are considered to be in a large central city/core of a large metropolitan region, “suburban” schools are in a smaller municipality within a metropolitan region (not the core city), and “rural” schools are in a small town not near a metropolitan region. In addition, these options should be relevant to the types of school settings the services are being provided.
- On Question 3: Add “Gifted” as a response option.
- On Question 5: Add “Kindergarten” as a response option.
- On Question 7: Change the instructions from asking respondents to “rank” key indicators, rather ask them to “select” or “rate” their “level of agreement.”
- Include a scale mid-point of “Neither Disagree nor Agree.”
- Ensure that no statements are double, triple, or quadruple barreled. Many currently are, and these need to be separated into distinct concepts. For example, the second statement is “This lesson encouraged students to seek and value alternative modes of investigation or of problem solving,” which could be broken out into several separate concepts:
  - This lesson encouraged students to seek alternative modes of investigation.
  - This lesson encouraged students to value alternative modes of investigation.
  - This lesson encouraged students to seek alternative modes of problem solving.
  - This lesson encouraged students to value alternative modes of problem solving.
- Use the RTOP Manual as a guide when analyzing responses to this survey.
- See Pages 11 and 15-18 of the Instrument Inventory Matrix for valid and reliable instruments and resources to assess online educational methods and materials.

5) **Glaciers in Motion Animation Feedback Survey Recommendations:**

- On Question 1: Change “School” to “School Building Name” and add an item for “District” before “School Building Name.”
- On Question 2: Correct the spelling of “Rural.” To increase respondents’ understanding of their school setting, more explanation is needed. “Urban” schools are considered to be in a large central city/core of a large metropolitan region, “suburban” schools are in a smaller municipality within a metropolitan region (not the core city), and “rural” schools are in a small town not near a metropolitan region.
are in a small town not near a metropolitan region. In addition, these options should be relevant to the types of school settings the services are being provided.

- On Question 3: Add “Honors” as a response option.
- On Question 5: Add “Kindergarten” as a response option.
- On Question 7: Change the scale mid-point from “Neutral” to “Neither Disagree nor Agree.”
- Revise the second scaled item so it is no longer triple barreled; this scale item needs to be separated into distinct concepts.
- Use caution when analyzing responses to negatively worded (i.e., those associating disagreement with a positive response/agreement with a negative response) in Question 7 by reverse coding items, or subtracting rather than adding, for analysis. For example, agreement to the item “I have difficulties downloading the animation” suggests the usability of the animations is in need of improvement.
- Use the SUS as a guide when analyzing responses to this survey.
- See Pages 11, 16, and 18 of the Instrument Inventory Matrix for valid and reliable instruments and resources to assess online educational methods and materials.

These recommendations for modifications to existing instruments are meant to serve as a starting point for further adaptations to measures for CReSIS educational interventions for the upcoming year. The OEIE team is available to provide ongoing feedback on iterations of the surveys.

**Inventory of Instruments**

As described in the previous section, the existing instruments for the CReSIS K-12 Education and Outreach Program consisted of pre- and/or post-intervention hard-copy and online surveys for several educational interventions with specified populations (e.g., *Freezing Friday* teacher survey). The pre-post student instrument primarily contains measures to allow assessing gains in skills and knowledge of scientific processes, as well as changes in attitude, behavior, interest, and motivation to pursue science. The teacher instruments assessed perceptions of the value of the interventions, observations of student enjoyment and interest, intentions to integrate resources into existing curriculum and other content areas, usability of educational tools, and interest in further participation.

The Evaluation Plan Matrix, presented in the Preliminary Evaluation Resources document dated March 31, 2012, provided a detailed map consisting of evaluation questions, potential/recommended methods and metrics, and the parties responsible for carrying out the data collection activities. After review of the instruments used by CReSIS to evaluate the 2011 K-12 Education and Outreach Program, OEIE determined there are gaps in regard to measurement and evaluation of program components and outcomes. The matrix below provides an inventory of instruments that may be used to fill these gaps. This Instrument Inventory Matrix re-states the evaluation questions; solidifies the methods; and expands on metrics to include reliable and valid instruments, citations for the instruments, and the intended participants. Intended participants are expected to be from the following CReSIS K-12 Education and Outreach Program populations: K-12 students (i.e., grade school, middle school, and/or high school), teachers of K-12 students, parents of K-12 students, and the general citizenry.
Valid and reliable instruments included in the Instrument Inventory Matrix were compiled by OEIE from resources provided in the Annotated Bibliography of Evaluation Tools in the Preliminary Evaluation Resources document dated March 31, 2012, recent literature searches, and experiences with evaluating education programming for water restoration and protection, climate change, and other environmental issues. CReSIS staff, the internal evaluation team, or external evaluators, may administer the instruments included in the inventory, and analyze and maintain the data, either as singular entities or collaboratively. Instruments should be piloted with the project team or relevant stakeholders prior to wider use.

The Instrument Inventory Matrix relates back to the program outcomes identified in the Logic Model created for the CReSIS K-12 Education and Outreach Program as described in Section 2 of this document. The Instrument Inventory Matrix is not an inclusive list of all possible evaluation methods, metrics, and instruments. These resources should be used as a starting point for evaluating the CReSIS K-12 Education and Outreach Program initiatives and fulfilling NSF reporting requirements.
**Instrument Inventory Matrix**

**Evaluation Question 1. What were K-12 students’ levels of awareness, attitudes, knowledge and process skills related to polar science and climate issues before participation and how did they change as a result of participation in activities or events?**

<table>
<thead>
<tr>
<th>Methods</th>
<th>Metrics</th>
<th>Instruments</th>
<th>Citation</th>
<th>Participants</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td><em>Ice, Ice Baby</em> Student Test and Survey</td>
<td><em>CReSIS existing instruments</em></td>
<td>4th grade students</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Changes in Attitudes about the Relevance of Science (CARS) Questionnaire</td>
<td>Siegel, M. A. &amp; Ranney, M. A. (2003). Developing the Changes in Attitude about the Relevance of Science (CARS) Questionnaire and assessing two high school science classes. <em>Journal of Research in Science Teaching</em>, 40(8), 757–775.</td>
<td>Middle and high school students</td>
</tr>
</tbody>
</table>
### Evaluation Question 1. What were K-12 students’ levels of awareness, attitudes, knowledge and process skills related to polar science and climate issues before participation and how did they change as a result of participation in activities or events?

<table>
<thead>
<tr>
<th>Methods</th>
<th>Metrics</th>
<th>Instruments</th>
<th>Citation</th>
<th>Participants</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Relevant student demographic characteristics</td>
<td>Rubrics</td>
<td></td>
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<tr>
<td>Methods</td>
<td>Metrics</td>
<td>Instruments</td>
<td>Citation</td>
<td>Participants</td>
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<td>---------------------------------------------------</td>
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<td>----------------------------------------------------------------------------</td>
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<td>--------------------</td>
</tr>
<tr>
<td>Post-participation survey instruments</td>
<td>Effectiveness of initiatives and relevant demographic characteristics</td>
<td>Ice, Ice Baby Teacher Survey, Freezing Friday Survey, Online Data Portal Survey, Glaciers in Motion Animation Survey</td>
<td>CReSIS existing instruments</td>
<td>K-12 teachers</td>
</tr>
<tr>
<td>Content analysis of educational materials and lesson planning</td>
<td>Content analysis of educational materials and lesson planning</td>
<td>Applicability to lessons, CReSIS documentation</td>
<td>Not applicable</td>
<td>K-12 teachers</td>
</tr>
<tr>
<td>Database entry and management</td>
<td>Increase in the number of teacher workshops held</td>
<td>CReSIS documentation</td>
<td>Not applicable</td>
<td>CReSIS staff</td>
</tr>
</tbody>
</table>
### Evaluation Question 3. How did the educational outreach materials and programming contribute to the expanded understanding of polar science and climate issues by K-12 students, their parents, and the greater citizenry?

<table>
<thead>
<tr>
<th>Methods</th>
<th>Metrics</th>
<th>Instruments</th>
<th>Citation</th>
<th>Participants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Database entry and management</td>
<td>Publications and conference presentations related to K-12 activities</td>
<td>CReSIS documentation</td>
<td><em>Not applicable</em></td>
<td>CReSIS researchers</td>
</tr>
</tbody>
</table>


**Evaluation Question 4. How did the educational outreach materials and programming influence enrollment and student success in advanced math and science middle school courses?**

<table>
<thead>
<tr>
<th>Methods</th>
<th>Metrics</th>
<th>Instruments</th>
<th>Citation</th>
<th>Participants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Database entry and management</td>
<td>Student enrollment and success in math and science coursework</td>
<td>CReSIS documentation</td>
<td>Not applicable</td>
<td>K-12 students</td>
</tr>
<tr>
<td></td>
<td>increase enrollment and success in middle school algebra</td>
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</tbody>
</table>
**Evaluation Question 5. What components of the educational outreach materials and programming effectively increased students’ motivation and readiness or desire to pursue STEM careers?**

<table>
<thead>
<tr>
<th>Methods</th>
<th>Metrics</th>
<th>Instruments</th>
<th>Citation</th>
<th>Participants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Post-participation survey</td>
<td>Motivation, readiness or desire to pursue STEM careers</td>
<td>Ice, Ice Baby Student Test and Survey</td>
<td><em>CReSIS existing instruments</em></td>
<td>1st - 5th grade students</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Applicability to lessons</td>
<td><em>Not applicable</em></td>
<td></td>
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</tbody>
</table>
**Evaluation Question 6. Which educational outreach materials and programming were appropriate to the interests of the target audiences, had the most potential for impact and were of high quality? Which materials and programs have the most potential for sustainability?**

<table>
<thead>
<tr>
<th>Methods</th>
<th>Metrics</th>
<th>Instruments</th>
<th>Citation</th>
<th>Participants</th>
</tr>
</thead>
</table>
| Post-participation survey      | Effectiveness of initiatives; increase in interest for educational outreach materials and programs; improvements in quality and relevancy of educational outreach materials and programs; relevant demographic characteristics | *Ice, Ice Baby Teacher Survey*  
*Freezing Friday Survey*  
*Online Data Portal Survey*  
*Glaciers in Motion Animation Survey* | *CReSIS existing instruments*                                      | K-12 teachers                                  |
| Content analysis of educational materials and lesson planning | Applicability to lessons                                                | *CReSIS documentation*                                                                | *Not applicable*                                      | CReSIS Staff                        |
### Evaluation Question 7. How did the educational outreach materials and programming impact the quantity and quality of science taught in classrooms or qualified teachers?

<table>
<thead>
<tr>
<th>Methods</th>
<th>Metrics</th>
<th>Instruments</th>
<th>Citation</th>
<th>Participants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Post-participation surveys</td>
<td>Relevant demographic characteristics</td>
<td><em>Ice, Ice Baby Teacher Survey</em></td>
<td><em>CReSIS existing instruments</em></td>
<td>K-12 teachers</td>
</tr>
<tr>
<td></td>
<td></td>
<td><em>Freezing Friday Survey</em></td>
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<td></td>
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<td><em>Online Data Portal Survey</em></td>
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<td></td>
<td></td>
<td><em>Glaciers in Motion Animation Survey</em></td>
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</tr>
<tr>
<td>Content analysis of educational materials and lesson planning</td>
<td>Applicability to lessons</td>
<td><em>CReSIS documentation</em></td>
<td><em>Not applicable</em></td>
<td>CReSIS Staff</td>
</tr>
</tbody>
</table>
### Evaluation Question 8. How have the educational outreach materials and programming increased the number of underrepresented groups with interest to pursue higher education and careers in STEM fields?

<table>
<thead>
<tr>
<th>Methods</th>
<th>Metrics</th>
<th>Instruments</th>
<th>Citation</th>
<th>Participants</th>
</tr>
</thead>
</table>
| Post-participation surveys       | Demand for participation in STEM-preparatory courses and extra-curricular activities; relevant student demographic characteristics (e.g., underrepresented status) | *Ice, Ice Baby Teacher Survey*  
*Freezing Friday Survey*  
*Online Data Portal Survey*  
*Glaciers in Motion Animation Survey* | *CReSIS existing instruments*                                      | K-12 teachers                     |
| Database entry and management    | Enrollment and student success in STEM prep courses for college  
More minority students enter STEM-based undergraduate studies | *CReSIS documentation* | *Not applicable*                               | K-12 students       |
### Evaluation Question 9. Have the educational outreach materials and programming created wider and broader exposure of polar and climate science, and what impact has increased knowledge had on the decision-making abilities of the target audiences (students, teachers and general citizenry)?

<table>
<thead>
<tr>
<th>Methods</th>
<th>Metrics</th>
<th>Instruments</th>
<th>Citation</th>
<th>Participants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tracking of web activity</td>
<td>Number of teachers engaged in CReSIS teacher discussions</td>
<td>Google Analytics, Facebook Insights, Twitter feed responses</td>
<td><em>Not applicable</em></td>
<td>K-12 teachers</td>
</tr>
<tr>
<td></td>
<td>Volume of education web activity</td>
<td></td>
<td><em>Not applicable</em></td>
<td>CReSIS Staff</td>
</tr>
</tbody>
</table>
Glossary of Evaluation Terminology

This glossary contains a list of evaluation terms and descriptions adapted from Frechtling’s (2002) User-friendly Handbook for Project Evaluation. This is not a comprehensive list, but it may be used to clarify terminology presented in this document’s narrative and Instrument Inventory Matrix.

Assessments: Often used as a synonym for evaluation.

Attitude: A person’s opinion about another person, thing, or state.

Audience(s): Consumers of the evaluation: those who will or should read or hear of the evaluation, either during or at the end of the evaluation process. Includes those persons who will be guided by the evaluation in making decisions and all others who have a stake in the evaluation (see Stakeholders).

Background: Information that describes the project, including its goals, objectives, context, and stakeholders.

Baseline: Facts about the condition or performance of subjects prior to treatment or intervention.

Case study: An intensive, detailed description and analysis of a single project, program, or instructional material in the context of its environment.

Coding: To translate a given set of data or items into descriptive or analytic categories to be used for data labeling and retrieval.

Conceptual framework: A set of concepts that generate hypotheses and simplify description, through the classification and categorization of phenomena, and the identification of relationships among them.

Context (of an evaluation): The combination of factors accompanying the study that may have influenced its results, including geographic location, timing, political and social climate, economic conditions, and other relevant professional activities in progress at the same time.

Design: The process of stipulating the investigatory procedures to be followed in doing a specific evaluation.

Dissemination: The process of communicating information to specific audiences for the purpose of extending knowledge and, in some cases, with a view to modifying policies and practices.

External evaluation: Evaluation conducted by an evaluator outside the organization within which the project is housed.
Focus group: A group selected for its relevance to an evaluation that is engaged by a trained facilitator in a series of discussions designed for sharing insights, ideas, and observations on a topic of concern to the evaluation.

Formative evaluation: Evaluation designed and used to improve an intervention, especially when it is still being developed.

Goal: A broad-based description of an intended outcome.

Instrument: An assessment device (test, questionnaire, protocol, etc.) adopted, adapted, or constructed for the purpose of the evaluation.

Internal evaluator: A staff member or unit from the organization within which the project is housed.

Intervention: Project feature or innovation subject to evaluation.

Longitudinal study: An investigation or study in which a particular individual or group of individuals is followed over a substantial period of time to discover changes that may be attributable to the influence of the treatment, or to maturation, or the environment.

Mixed-method evaluation: An evaluation for which the design includes the use of both quantitative and qualitative methods for data collection and data analysis.

Objective: A specific description of an intended outcome.

Observation: The process of direct sensory inspection involving trained observers.

Outcome: Post-treatment or post-intervention effects.

Participants: Those individuals who are directly involved in a project.

Population: All persons in a particular group.

Qualitative evaluation: The approach to evaluation that is primarily descriptive and interpretative.

Quantitative evaluation: The approach to evaluation involving the use the numerical measurement and data analysis based on statistical methods.

Stakeholders: One who has credibility, power, or other capital invested in a project and thus can be held to be to some degree at risk with it.

Summative evaluation: Evaluation designed to present conclusions about the merit or worth of an intervention and recommendations about whether it should be retained, altered, or eliminated.
**Triangulation:** In an evaluation, an attempt to get corroboration on a phenomenon or measurement by approaching it by several (three or more) independent routes. This effort provides confirmatory measurement.

**Underrepresented Groups in STEM:** Demographic categories of individuals traditionally underrepresented in the STEM fields. These groups could include women, race/ethnic minorities, first generation to college students, rural or inner city populations, tribal groups, individuals with disabilities, low socioeconomic status, etc.

**Utility:** The extent to which an evaluation produces and disseminates reports that inform relevant audiences and have beneficial impact on their work.

**Validity:** The soundness of the inferences made from the results of a data-gathering process.

**Verification:** Revisiting the data as many times as necessary to crosscheck or confirm the conclusions drawn.
References

