Introduction to Weather and Climate (VSU)

Jason Allard  
_Valdosta State University_, jmallard@valdosta.edu

Weimin Feng  
_Valdosta State University_, wfeng@valdosta.edu

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Introduction to Weather and Climate
Grants Collection

Affordable Learning Georgia Grants Collections are intended to provide faculty with the frameworks to quickly implement or revise the same materials as a Textbook Transformation Grants team, along with the aims and lessons learned from project teams during the implementation process.

Each collection contains the following materials:

- Linked Syllabus
  - The syllabus should provide the framework for both direct implementation of the grant team’s selected and created materials and the adaptation/Transformation of these materials.
- Initial Proposal
  - The initial proposal describes the grant project’s aims in detail.
- Final Report
  - The final report describes the outcomes of the project and any lessons learned.

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Initial Proposal
Application Details

Manage Application: Textbook Transformation Grants Round Seven

Award Cycle:  Round 7
Internal Submission Deadline:  Sunday, September 4, 2016

Application Title:  272
Application ID:  #001175
Submitter First Name:  Jason
Submitter Last Name:  Allard
Submitter Title:  Associate Professor
Submitter Email Address:  jmallard@valdosta.edu
Submitter Phone Number:  229-249-2745
Submitter Campus Role:  Proposal Investigator (Primary or additional)

Applicant First Name:  Jason
Applicant Last Name:  Allard

Co-Applicant Name(s):  Weimin Feng
Applicant Email Address:  wfeng@valdosta.edu
Applicant Phone Number:  229-333-7030
Primary Appointment Title:  Associate Professor
Institution Name(s):  Valdosta State University
Proposal Category:  Specific Top 100 Undergraduate Courses
Submission Date:  Tuesday, September 6, 2016

Team Members (Name, Title, Department, Institutions if different, and email address for each):

Jason Allard; Department of Physics, Astronomy, and Geosciences; Valdosta State University; jmallard@valdosta.edu

Weimin Feng; Department of Physics, Astronomy, and Geosciences; Valdosta State University; wfeng@valdosta.edu

Sponsor, (Name, Title, Department, Institution):

Dr. Edward Chatelain, Department Head and Associate Professor; Department of Physics, Astronomy, and Geosciences; Valdosta State University; echatela@valdosta.edu
Course Names, Course Numbers and Semesters Offered:
GEOG 1112K: Introduction to Weather and Climate

The course is offered every semester. Enrollment is ~125 in fall, ~75 in spring, and ~25 in summer.

Average Number of Students per Course Section: 25
Number of Course Sections Affected by Implementation in Academic Year: 9
Total Number of Students Affected by Implementation in Academic Year: 225

List the original course materials for students (including title, whether optional or required, & cost for each item):
Lutgens, F.K. and E.J. Tarbuck, 2016: The Atmosphere: An Introduction to Meteorology, 13th Ed. Pearson Education. 462 p. The textbook used to be required, but is now listed as recommended. The instructor of the course felt that the cost of the textbook was too excessive to require its use. A new paperback copy of the textbook costs $191.75.

Requested Amount of Funding: $10,800
Original per Student Cost: $191.75
Post-Proposal Projected Student Cost: $0
Projected Per Student Savings: $191.75
Projected Total Annual Student Savings: $43,144

Creation and Hosting Platforms (Use "n/a" if none):
BlazeView D2L and VSU Digital Repository (VText)
Project Goals:

1. To provide no-cost, high-quality, web-based educational material to replace the current textbook for students in the introductory weather and climate course (GEOG 1112K) on a department-wide basis at Valdosta State University (VSU). With an average 9 sections per year and 25 students per section, the projected annual savings would be $43,144.

2. Develop and deliver targeted, online, open-source material (e.g., text, movies, animations, websites, interactives, or other educational resources) presented as modules (i.e., course specific materials divided into modules according to broad conceptual themes) that more closely align with the learning outcomes of VSU and the Department of Physics, Astronomy, and Geosciences.

3. Redesign the syllabus and PowerPoint lectures to match the new educational material presented in the OER modules.

4. Create a BlazeView course that provides the OER modules to the students and make the modules available via the VSU Digital Repository (VText) for use by other faculty.

5. By offering these new and free OER modules, increase student enrollment and increase the likelihood for student success within the course.

6. Develop assessment methods to measure the impact of these changes on student success, engagement, and experience in the course, as compared to the textbook currently in use.

Statement of Transformation:

The barrier to the adoption of OER most often cited by faculty is the lack of resources for their subject area (~49% of faculty cite this reason) (Allen and Seaman, 2016). A due-diligence search for OER resources related to weather and climate courses demonstrated that there is indeed a lack of available material, such that it is likely that a much higher percentage of faculty would cite the lack of resources for weather and climate courses at a barrier to adoption than the previously cited ~49%. Rather than relying upon a single OER that would not prove suitable for an introductory weather and climate course, many different free resource materials will be identified and combined to create a comprehensive repository of material. The resources will be modular in nature, as opposed to the traditional structure of a textbook. As such, the modules, constructed by major concepts, could be used individually or in combination so as to mirror the more traditional structure of a textbook.

Introduction to Weather and Climate is a large enrollment course at Valdosta State University (VSU), fulfilling an Area D.1 or D.2.b Core Curriculum Area D – Natural Science, Math, and Technology – requirement. The primary stakeholders are the approximately 225 students who take this course each year. About 94% of students agree that the cost of textbooks, reaching $1200 on average during the 2013-2014 academic year, affect their ability to afford college
(Textbook Survey Report 2012; College Board 2013). Many VSU students come from economic backgrounds that can make the purchase of expensive textbooks difficult. Moreover, it is not uncommon for students to await financial aid disbursement weeks into the semester before being able to purchase textbooks. As such, the students can begin the semester at a disadvantage. An OER for GEOG 1112K would reduce the financial burden of students enrolled in the course, and also allow access to course material upon the first day of the course, thereby allowing students to use their funds for other school-related expenses. In addition, the modules will be available in PDF format so that it can be downloaded to mobile devices or computer, and used offline, which allows the students to review the materials at any time and place.

A secondary stakeholder would be faculty that teach introductory weather and climate courses. Because the material will be freely available, other faculty at other institutions could access the materials. Moreover, the module nature of the resources created would allow other faculty to select modules that are most suitable for their courses, rather than be forced to adopt an entire text that may include information irrelevant to their courses.

Overall, the creation of the OER for an introductory weather and climate course has the immediate financial benefits to students (at $191.75 per textbook, the transformation would collectively save students $43,144 annually), and creates a resource that is more accessible to students. It also creates a resource that is available to faculty at other institutions. The availability of the course material at the beginning of the semester would likely aid in student success in the course by creating educational material to all students in the most timely available manner, thereby aiding in the success of the students in the course. The modular nature of the education resources will also allow for the continued expansion and update of information in a timelier manner than the updates of new textbook editions (which typically carry higher price tags). The new OER will be adopted by all faculty in the department that teach GEOG 1112K, providing consistency across multiple sections of the course here at VSU. A well-designed and free educational resource should also aid in drawing more students into the course, potentially increasing the number of majors in the department that discover an interest in the discipline by taking the course.

**Transformation Action Plan:**

The process will involve identifying online, open access resources that cover the major themes of the course. Given that there is no single online resource currently available for an introductory weather and climate course, this will involve a comprehensive search of available online resources that can be combined into the aforementioned learning modules. As such, the themes of each module will be used to guide the adoption of resources. To ensure students’ engagement with the modules, the material collected will include material incorporating a variety of active learning strategies. The identification and collection of resources to create the modules will not consist of just text or image-based material, but rather include relevant movies, animations, websites, interactives, or other educational resources to aid in student engagement.
As is true with the adoption of any new textbook, or equivalent educational material, the syllabus and PowerPoint lectures will need to be revised to align with the content and delivery format. Because the modules created will align with major themes for an introductory weather and climate course, changes to the syllabus are anticipated to be minimal. The instructional material, such as PowerPoint lectures, will have to be significantly modified to include the new content and learning material incorporated into the modules.

The investigators on this proposal will work together on all project goals, sharing the duties of developing the educational modules. Both investigators will be modifying the syllabus, lecture notes, quizzes, and exams so that the course content aligns with the educational modules. While both investigators will share in the responsibilities, one investigator will take the lead in certain aspects of the development. Dr. Allard will provide the lead guidance on the selection of the themes for the educational modules and for authoring any new material that may not be available as a free resource online. Dr. Allard will also provide the lead guidance in modifying the syllabus, lecture notes, quizzes, and exams. Dr. Feng will provide the lead guidance in editing, formatting, and publishing the educational modules. Dr. Feng will also ensure compliance with copyright and accessibility requirements.

All students will have access to the educational modules through BlazeView D2L, and public access will be available through the VSU Institutional Repository (Vtext). This ensures that students will have access to the course material anywhere there is access to the internet. The educational material will be adopted across the department to ensure uniformity in the instruction of the course. All content will be open access and licensed CC-BY (Creative Commons – by attribution). Neither investigator has experience with posting material to OpenStax or LibGuide, but it is hoped that eLearning or Resource Instructors at the Odum Library will be able to assist in providing access to the learning modules through those resources. Funding to hire somebody should be available for this purpose through the home department.
Quantitative & Qualitative Measures: After the implementation of the project, quantitative and qualitative measures will be used to determine the impact of this transformation on student success. A number of quantitative measures will be utilized. First, we will compare course grades and DFW rates pre- (traditional textbook) and post-transformation (educational modules) between sections taught by the same professor to determine if the new material aids student success in the course. Particular attention will be paid to the attrition rate with the new material. Second, we will assess before and after performance on exams (aligned with learning objectives). This will be done by identifying highly similar exam questions that tested the same concepts to compare student success using the commercial textbook versus the educational modules. GEOG 1112K is undergoing a core curriculum assessment in fall 2016, so the questions selected for this assessment can be incorporated into the assessment of the textbook transformation to link student success from the textbook transformation to core curriculum assessment (including university and departmental learning objectives), increasing the usefulness of the transformation assessment. Third, statistics on online usage of the educational module will be collected from BlazeView D2L, and compared to student performance on class quizzes and exams. Qualitative measures will also be used. First, student experience and satisfaction will be evaluated through the use of Student Opinion of Instruction (SOIs), controlled for variation among instructors. Second, a survey will be used that contains proving questions will be created to solicit students’ perspectives on the use of the alternative educational resource and the modular nature of the educational material. Questions will focus on the difference type of educational resources available (e.g., text, graphics, animations, pictures) and their effectiveness. These survey results will not be shared with the instructor of record until after the course grades are submitted. Responses to this survey will be used to improve the educational material in future
Timeline:

October 2016: Principle investigators meet to review goals, identify online resources, and establish module-specific content and objectives, as related to learning objectives.

November – December 2016: Review and collection of online content to be used in the creating of educational modules.

January – February 2017: Begin the process of designing modules in BlazeView D2L, and identify educational material required for the modules that are not available online as free access material.

March 2017: Develop and include content into D2L that were not available online as free access material.

April – June 2017: Finalize the content of educational modules.

June 2017: Finalize the design of educational modules in D2L and Vtext.

June 2017 – July 2017: Adapt and finalize course material, including the course syllabus, PowerPoint lectures, quizzes and exams, and other educational resources for use with the educational modules.

August 2017: Pre-semester meeting to confirm the completion of transformation for the fall semester.

Fall 2017: Implement new course materials.

December 2017: Complete assessment of transformation and submit required ALG report.

Spring 2018: Co-investigators modify course material based on student feedback.

Budget:

Dr. Jason Allard - $5000 for overload and/or release time.

Dr. Weimin Feng - $5000 for overload and/or release time.

Travel for two team members to the ALG kickoff meeting ($800)

Sustainability Plan:

The overall goal of this project is to create a compilation of modules, which cover the themes required to teach an introductory weather and climate course. All material will be made
available to every instructor prior to the beginning of the semester through BlazeView D2L. The modules will also be made available to faculty at other USG institutions through the VSU Institutional Repository (Vtext).

GEOG 1112K is offered every fall, spring, and summer semester. Following the development of the modules, they will be available for all future offerings of the course. The course material will be adopted throughout the department, ensuring consistency of course content. Dr. Allard will update the modules and improve the master design as any feedback is provided on improving the course from colleagues or students.
September 1, 2016

Dear Affordable Learning Georgia,

I am pleased to write this letter in enthusiastic support of the Affordable Learning Georgia Textbook Transformation Grant proposal submitted by Dr. Jason Allard (Associate Professor of Geography) and Dr. Weimin Feng (Associate Professor of Geography) in the Department of Physics, Astronomy, and Geosciences at Valdosta State University. I am encouraged that during this time of dwindling enrollments and soaring textbook costs in the State of Georgia that this proposal will enable many more students to enroll and be successful in GEOG 1112K Weather and Climate Area D Core Lab Science course. The cost of the Tarbuck and Lutgens 13th edition of The Atmosphere: An Introduction to Meteorology text used in multiple GEOG 1112K Weather and Climate lab sections at Valdosta State University is presently $191.75, which is prohibitively expensive for only a single semester course.

The first three weeks in this course are critical in determining student success because of the new terminology and ideas that are introduced and added upon. Many students at this stage have yet to purchase their textbook and thus are likely to be putting themselves at serious risk of failure, or resolved to play catch-up for the entire semester in that class. Not only does this new project eliminate the costs of textbooks, which for non-science majors can be overwhelming, but also will provide each student with instant access to all course materials from the first day of class. Most of the course drops and withdrawals in the first few weeks of class would be prevented, and the rigor of these more complex concepts can be embraced by all students equally and immediately. Therefore, the continuing challenges of retention for the university and graduation in a timely fashion for the student are resolved. Furthermore, the flexibility and efficiency of the disseminated material assures its currency far beyond that of an easily dated published text.

I am pleased with the clarity and simplicity of the project design, and am most certain that its results will yield recommendations for essential change in how core-lab science course materials are accessed by students in the USG.

Long-term sustainability of this project at Valdosta State University is particularly essential, as student enrollment (approximately 225 students each year) and retention in this multiple section course provides a crucial gateway for majors into our own Environmental Geosciences program. The transformation of this multi-section course in the department, taught by Dr. Jason Allard and Dr. Mark Groszos, will serve as a model to other departments within the College of Arts and Sciences at Valdosta State University. I see this study as vital link to success for both students and departments in the USG.

Your consideration on this matter is greatly appreciated. Thank you.

Sincerely,

Edward E Chatelain, Head
Physics, Astronomy, and Geosciences
Affordable Learning Georgia Textbook Transformation Grants

Rounds Six, Seven, and Eight

For Implementations beginning Fall Semester 2016

Running Through Fall Semester 2017

Proposal Form and Narrative

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<th>Information</th>
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<td>Jason Allard</td>
</tr>
<tr>
<td>Submitter Title</td>
<td>Associate Professor</td>
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<tr>
<td>Submitter Email</td>
<td><a href="mailto:jmallard@valdosta.edu">jmallard@valdosta.edu</a></td>
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<tr>
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<tr>
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</table>
| Team Members | Jason Allard; Department of Physics, Astronomy, and Geosciences; Valdosta State University; jmallard@valdosta.edu  
|             | Weimin Feng; Department of Physics, Astronomy, and Geosciences; Valdosta State University; wfeng@valdosta.edu |
| Sponsor, Title, Department, Institution | Dr. Edward Chatelain, Department Head and Associate Professor; Department of Physics, Astronomy, and Geosciences; Valdosta State University; echatela@valdosta.edu |
| Proposal Title | Educational Modules for GEOG 1112K: Introduction to Weather and Climate |
| Course Names, Course Numbers and Semesters Offered | GEOG 1112K: Introduction to Weather and Climate  
|             | The course is offered every semester. Enrollment is ~125 in fall, ~75 in spring, and ~25 in summer. |
| Final Semester of Instruction | Fall 2017 |
| Average Number of Students Per Course Section | ~25  
| Number of Course Sections Affected by Implementation in Academic Year | 5 in fall, 3 in spring; 1 in summer  
| Total Number of Students Affected by Implementation in Academic Year | ~225 students (see above) |
| Award Category (pick one) | ☒ No-or-Low-Cost-to-Students Learning Materials  
|             | ☐ OpenStax Textbooks  
|             | ☐ Interactive Course-Authoring Tools and Software  
<p>|             | ☒ Specific Top 100 Undergraduate Courses |
|             | The textbook used to be required, but is now listed as recommended. The instructor of the course felt that the cost of the textbook was too excessive to require its use. |</p>
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<tr>
<td>Post-Proposal Projected Per Student Cost</td>
<td>$0 for the online textbook (online: see narrative for details).</td>
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1.1 PROJECT GOALS

1. To provide no-cost, high-quality, web-based educational material to replace the current textbook for students in the introductory weather and climate course (GEOG 1112K) on a department-wide basis at Valdosta State University (VSU). With an average 9 sections per year and 25 students per section, the projected annual savings would be $43,144.

2. Develop and deliver targeted, online, open-source material (e.g., text, movies, animations, websites, interactives, or other educational resources) presented as modules (i.e., course specific materials divided into modules according to broad conceptual themes) that more closely align with the learning outcomes of VSU and the Department of Physics, Astronomy, and Geosciences.

3. Redesign the syllabus and PowerPoint lectures to match the new educational material presented in the OER modules.

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5. By offering these new and free OER modules, increase student enrollment and increase the likelihood for student success within the course.

6. Develop assessment methods to measure the impact of these changes on student success, engagement, and experience in the course, as compared to the textbook currently in use.
1.2 STATEMENT OF TRANSFORMATION

The barrier to the adoption of OER most often cited by faculty is the lack of resources for their subject area (~49% of faculty cite this reason) (Allen and Seaman, 2016). A due-diligence search for OER resources related to weather and climate courses demonstrated that there is indeed a lack of available material, such that it is likely that a much higher percentage of faculty would cite the lack of resources for weather and climate courses at a barrier to adoption than the previously cited ~49%. Rather than relying upon a single OER that would not prove suitable for an introductory weather and climate course, many different free resource materials will be identified and combined to create a comprehensive repository of material. The resources will be modular in nature, as opposed to the traditional structure of a textbook. As such, the modules, constructed by major concepts, could be used individually or in combination so as to mirror the more traditional structure of a textbook.

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Overall, the creation of the OER for an introductory weather and climate course has the immediate financial benefits to students (at $191.75 per textbook, the transformation would collectively save students $43,144 annually), and creates a resource that is more accessible to students. It also creates a resource that is available to faculty at other institutions. The availability of the course material at the beginning of the semester would likely aid in student success in the course by creating educational material to all students in the most timely available manner, thereby aiding in the success of the students in the course. The modular nature of the education resources will also allow
for the continued expansion and update of information in a timelier manner than the updates of new textbook editions (which typically carry higher price tags). The new OER will be adopted by all faculty in the department that teach GEOG 1112K, providing consistency across multiple sections of the course here at VSU. A well-designed and free educational resource should also aid in drawing more students into the course, potentially increasing the number of majors in the department that discover an interest in the discipline by taking the course.
1.3 TRANSFORMATION ACTION PLAN

The process will involve identifying online, open access resources that cover the major themes of the course. Given that there is no single online resource currently available for an introductory weather and climate course, this will involve a comprehensive search of available online resources that can be combined into the aforementioned learning modules. As such, the themes of each module will be used to guide the adoption of resources. To ensure students' engagement with the modules, the material collected will include material incorporating a variety of active learning strategies. The identification and collection of resources to create the modules will not consist of just text or image-based material, but rather include relevant movies, animations, websites, interactives, or other educational resources to aid in student learning.

As is true with the adoption of any new textbook, or equivalent educational material, the syllabus and PowerPoint lectures will need to be revised to align with the content and delivery format. Because the modules created will align with major themes for an introductory weather and climate course, changes to the syllabus are anticipated to be minimal. The instructional material, such as PowerPoint lectures, will have to be significantly modified to include the new content and learning material incorporated into the modules.

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1.4 QUANTITATIVE AND QUALITATIVE MEASURES

After the implementation of the project, quantitative and qualitative measures will be used to determine the impact of this transformation on student success.

A number of quantitative measures will be utilized. First, we will compare course grades and DFW rates pre- (traditional textbook) and post-transformation (educational modules) between sections taught by the same professor to determine if the new material aids student success in the course. Particular attention will be paid to the attrition rate with the new material. Second, we will assess before and after performance on exams (aligned with learning objectives). This will be done by identifying highly similar exam questions that tested the same concepts to compare student success using the commercial textbook versus the educational modules. GEOG 1112K is undergoing a core curriculum assessment in fall 2016, so the questions selected for this assessment can be incorporated into the assessment of the textbook transformation to link student success from the textbook transformation to core curriculum assessment (including university and departmental learning objectives), increasing the usefulness of the transformation assessment. Third, statistics on online usage of the educational module will be collected from BlazeView D2L, and compared to student performance on class quizzes and exams.

Qualitative measures will also be used. First, student experience and satisfaction will be evaluated through the use of Student Opinion of Instruction (SOIs), controlled for variation among instructors. Second, a survey will be used that contains proving questions will be created to solicit students’ perspectives on the use of the alternative educational resource and the modular nature of the educational material. Questions will focus on the difference type of educational resources available (e.g., text, graphics, animations, pictures) and their effectiveness. These survey results will not be shared with the instructor of record until after the course grades are submitted. Responses to this survey will be used to improve the educational material in future semesters.
1.5 TIMELINE

October 2016: Principle investigators meet to review goals, identify online resources, and establish module-specific content and objectives, as related to learning objectives.

November – December 2016: Review and collection of online content to be used in the creating of educational modules.

January – February 2017: Begin the process of designing modules in BlazeView D2L, and identify educational material required for the modules that are not available online as free access material.

March 2017: Develop and include content into D2L that were not available online as free access material.

April – June 2017: Finalize the content of educational modules.

June 2017: Finalize the design of educational modules in D2L and Vtext.

June 2017 – July 2017: Adapt and finalize course material, including the course syllabus, PowerPoint lectures, quizzes and exams, and other educational resources for use with the educational modules.

August 2017: Pre-semester meeting to confirm the completion of transformation for the fall semester.

Fall 2017: Implement new course materials.

December 2017: Complete assessment of transformation and submit required ALG report.

Spring 2018: Co-investigators modify course material based on student feedback.
1.6 BUDGET

Dr. Jason Allard - $5000 for overload and/or release time.

Dr. Weimin Feng - $5000 for overload and/or release time.

Travel for two team members to the ALG kickoff meeting ($800).
1.7 SUSTAINABILITY PLAN

The overall goal of this project is to create a compilation of modules, which cover the themes required to teach an introductory weather and climate course. All material will be made available to every instructor prior to the beginning of the semester through BlazeView D2L. The modules will also be made available to faculty at other USG institutions through the VSU Institutional Repository (Vtext).

GEOG 1112K is offered every fall, spring, and summer semester. Following the development of the modules, they will be available for all future offerings of the course. The course material will be adopted throughout the department, ensuring consistency of course content. Dr. Allard will update the modules and improve the master design as any feedback is provided on improving the course from colleagues or students.
1.8 REFERENCES & ATTACHMENTS


See attached letter of support from sponsoring Department Head, Dr. Edward Chatelain.
Syllabus
Introduction to Weather and Climate

Course Overview:

- Course Description (from the 2017-2018 VSU Undergraduate Catalog): Weather components, processes, and their measurements. Climatic elements and their control factors and geographic classification of climatic and vegetation types are also discussed.
- Course Objectives: To understand the basic principles of weather phenomena and climate and the physical processes underlying these phenomena.
- How Achieved? A combination of lectures and laboratory exercises that apply the principles of meteorology and climatology in the context of processes (e.g., energy, water) and landscape structure (e.g., soils, vegetation, landforms).
- Prerequisites: MATH 1101 or higher; a desire to learn more about the Earth’s weather and climate, how it varies, why it varies, how it impacts humans and how we, too, may be affecting it.

Attendance:

A student who misses more than 20% of the scheduled classes of a course (6 classes) will be subject to receiving a failing grade for the course; how often a student attends class directly affects the comprehension of the course material and grades. You are strongly encouraged to attend class; your course grade will be significantly higher if you attend the lectures (and pay attention). The class meets from 12:30 – 1:45 pm on Tuesday and Thursday. All labs are held in Nevins Hall, Room 2032. Lab attendance is mandatory; missing more than three (3) labs will result in a failing lab grade. Having an individual pass in your lab during your lab period does not count as attending lab.

Textbook:

Online through BlazeView

Optional Textbook:

The Atmosphere, 13th Edition
by Lutgens, Tarbuck, and Tasa
ISBN-10: 0-321-98714-4

Required Lab Manual:

Laboratory Exercises: Introduction to Weather and Climate
Only available through the VSU bookstore
Laboratory:

There is a lab component that every student must take. Lab attendance is mandatory; missing more than three (3) labs will result in a failing lab grade. You should attend each week’s lab and must complete the required lab. Each lab will be due the next lab after it is assigned. The lab syllabus will discuss late labs. At the end of the semester, the lowest lab grade will be dropped, and the other labs will be equally weighted to be 20% of the final course grade. This is a lab science course; you cannot pass the course without passing the lab. Bring a calculator, lab manual, lecture notes, and textbook to lab.

Assessment:

This course grade will consist of three tests (the last being the final exam), and a lab grade. There will be no additional course credit offered (i.e., no extra credit). Remember that you most likely will not attain a high grade if you do not regularly attend classes. Here’s the weighting of points and the tentative dates of the three tests:

<table>
<thead>
<tr>
<th>Test</th>
<th>Date</th>
<th>Weeks Covered</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st Test</td>
<td>September 19</td>
<td>1-5</td>
<td>20%</td>
</tr>
<tr>
<td>2nd Test</td>
<td>October 24</td>
<td>6-10</td>
<td>25%</td>
</tr>
<tr>
<td>Final Exam</td>
<td>December 5</td>
<td>all, esp. wks. 11-16</td>
<td>30%</td>
</tr>
<tr>
<td>Lab Grade</td>
<td></td>
<td></td>
<td>20%</td>
</tr>
<tr>
<td>Attendance/Participation</td>
<td></td>
<td></td>
<td>5%</td>
</tr>
</tbody>
</table>

Total course points: 100%

Grades:

The following grading scale will be used to compute final grades:

- A = 90% - 100%
- B = 80% - 89.9%
- C = 70% - 79.9%
- D = 60% - 69.9%
- F = < 59.9%

Course Outcomes:

The Objectives and Outcomes of this course address VSU General Education Outcomes for Area D, posted at: http://www.valdosta.edu/academics/academic-affairs/vp-office/general-education-council/ge-outcomes.php

- Students will demonstrate understanding of the physical universe and the nature of science, and they will use scientific methods and/or mathematical reasoning and concepts to solve problems.

The Objectives and Outcomes of this course address Environmental Geosciences Major Outcomes 1, 2, and 3 as shown in the 2017-2018 Undergraduate Catalog.

- To provide a working knowledge of the basic research tools in physical and cultural geography, environmental research, and in digital cartography.
- To provide the knowledge required to evaluate and interpret environmental data, address and analyze regional environmental questions and synthesize and recommend solutions to a range of environmental problems.
- To provide the analytical and technical skills necessary for geographical research including: spatial and temporal analysis; digital and conventional mapping; and analysis and interpretation of data.
Policies:

University and Department Policies

Please read the following carefully:

- The Physics, Astronomy and Geosciences Department at Valdosta State University adheres to Section 504 of the Rehabilitation Act of 1973 and the Americans with Disabilities Act of 1990 (ADA) in prohibiting discrimination against any qualified person with a disability. Students with disabilities who are experiencing barriers in this course may contact the Access Office for assistance in determining and implementing reasonable accommodations. The Access Office is located in Farbar Hall. The phone numbers are 229-245-2498 (V), 229-375-5871 (VP) and 229-219-1348 (TTY). For more information, please visit VSU’s Access Office or email: access@valdosta.edu.

- The Department of Physics, Astronomy, and Geosciences adheres to the academic honesty policies and procedures of VSU and requires all students enrolled in departmental courses to honor the same (see this policy at: http://www.valdosta.edu/academics/academic-affairs/vp-office/academic-honesty-at-vsu.php). Cheating and/or plagiarism may result in a failing grade for an assignment/quiz/test or for the course. Students who violate these procedures will be reported to the Academic Dean as outlined in the academic honesty policies and procedures.

- The Department of Physics, Astronomy and Geosciences does not tolerate sexual harassment. Please refer to Valdosta State University’s official policy on sexual harassment found at the following web location: http://www.valdosta.edu/administration/finance-admin/human-resources/policy/sexual-harrassment.php.

- The Department of Physics, Astronomy and Geosciences adheres to the Title IX Statement: Valdosta State University (VSU) is committed to creating a diverse and inclusive work and learning environment free from discrimination and harassment. VSU is dedicated to creating an environment where all campus community members feel valued, respected, and included. Valdosta State University prohibits discrimination on the basis of race, color, ethnicity, national origin, sex (including pregnancy status, sexual harassment and sexual violence), sexual orientation, gender identity, religion, age, national origin, disability, genetic information, or veteran status, in the University's programs and activities as required by applicable laws and regulations such as Title IX. The individual designated with responsibility for coordination of compliance efforts and receipt of inquiries concerning nondiscrimination policies is the University's Title IX Coordinator: Maggie Viverette, Director of the Office of Social Equity, titleix@valosta.edu, 1208 N. Patterson St., Valdosta State University, Valdosta, Georgia 31608, 229-333-5463.

- **HB 280 (“Campus Carry”):** It is now legal to bring concealed guns to our campus IF you have a permit. “Concealed guns” refer to firearms that are “carried in such a fashion that does not actively solicit the attention of others and are not prominently, openly, and intentionally displayed.” However, even license-holders may NOT carry a handgun into the following locations:
  - Buildings and property used for athletic sporting events
  - Student housing facilities including residence halls
  - Classrooms in which high school students are enrolled, whether through dual enrollment or programs such as Move On When Ready (MOWR)
  - Faculty, staff, and administrative offices

Note: It will be the responsibility of those who choose to carry handguns on campus to know the law. Thus, among other things, license-holders need to visit the Registrar’s Office to determine if there are high school students enrolled in their classes. It is a misdemeanor to violate any of the regulations put forth in HB 280. Moreover, those found in violation of HB 280 will be reported to the Student Conduct Office and the VSU Police. If you have any questions concerning HB 280, contact the VSU Police (229-333-7861), the University Attorney (229-333-5351), visit the VSU website at www.valdosta.edu/campuscarry or visit the website of the University System of Georgia at [http://www.usg.edu/hb280/additional_information](http://www.usg.edu/hb280/additional_information).
Class Policies

Please read the following carefully:

• Make-up exams are given only if there is a valid excuse for missing the regularly scheduled exam. If you miss one of the exams because of illness or injury, you must give me a valid written excuse from a local physician (note that an appointment with a doctor is not a valid excuse for missing an exam) or from the Office of Student Affairs to be eligible to take a make-up exam. If you do not give me a valid written excuse, you will be assigned a score of “0” for that exam. The make-up test may be an essay-type test. A student that misses two or more exams will receive an “F” for the course. Final exam: no make-up for any reason.

• Cell phones are a problem. Cell phones should be turned off during the class period. Any misuse of the cell phone may result in it being confiscated for the class period. The instructor will hold no responsibility for the confiscated cell phone. Emergency phone calls are an exception.

• Please respect your classmates! Please refrain from any disruptive behavior during class. Disruptive behavior includes but is not limited to: text messaging, talking on a cell phone, cheating on quizzes/tests, talking in class, arriving after class starts or leaving before class ends, disruptive comments during lectures, and any non-class related activity such as studying for an exam or surfing the web. Note: when the instructor is lecturing, do not attempt to hold a non-course related conversation with the instructor. Disruptive behavior may result in your expulsion from class for that day. Six (6) such expulsions will trigger the absence regulations outlined above and result in an “F” for the course.

• The Student Success Center provides free peer tutoring. It also offers test preparation, time management, and study skills workshops as well as provides free professional academic advising. It is located in Langdale Residence Hall, and the phone number is 333-7570.
### Tentative Lecture Schedule:

<table>
<thead>
<tr>
<th>Date</th>
<th>Topic</th>
<th>Lab Exercise</th>
</tr>
</thead>
<tbody>
<tr>
<td>T Aug 15</td>
<td>Introduction</td>
<td>No Lab</td>
</tr>
<tr>
<td>R Aug 17</td>
<td>Composition of the Atmosphere</td>
<td></td>
</tr>
<tr>
<td>T Aug 22</td>
<td>Earth-Sun Relationships</td>
<td>Lab 1: The Earth’s Atmosphere</td>
</tr>
<tr>
<td>R Aug 24</td>
<td>The Nature of Radiation</td>
<td></td>
</tr>
<tr>
<td>T Aug 29</td>
<td>Radiation Budget</td>
<td>Lab 2: Earth-Sun Relationships</td>
</tr>
<tr>
<td>R Aug 31</td>
<td>Energy Budget</td>
<td></td>
</tr>
<tr>
<td>T Sep 5</td>
<td>Temperature</td>
<td>Lab 3: The Surface Energy Budget</td>
</tr>
<tr>
<td>R Sep 7</td>
<td>The Global Water Cycle and Humidity</td>
<td></td>
</tr>
<tr>
<td>T Sep 12</td>
<td>Condensation I</td>
<td>Lab 4: Atmospheric Humidity</td>
</tr>
<tr>
<td>R Sep 14</td>
<td>Condensation II</td>
<td></td>
</tr>
<tr>
<td>T Sep 19</td>
<td><strong>Exam I: In Class</strong></td>
<td>No Lab</td>
</tr>
<tr>
<td>R Sep 21</td>
<td>Precipitation</td>
<td></td>
</tr>
<tr>
<td>T Sep 26</td>
<td>Clouds</td>
<td>Lab 5: Adiabatic Processes</td>
</tr>
<tr>
<td>R Sep 28</td>
<td>Air Pressure</td>
<td></td>
</tr>
<tr>
<td>T Oct 3</td>
<td>Atmospheric Pressure and Wind</td>
<td>Lab 6: Atmospheric Motion and Wind</td>
</tr>
<tr>
<td>R Oct 5</td>
<td>General Circulation of the Atmosphere</td>
<td></td>
</tr>
<tr>
<td>T Oct 10</td>
<td><strong>No Class: Fall Break</strong></td>
<td>No Lab</td>
</tr>
<tr>
<td>R Oct 12</td>
<td>Jet Streams and the Westerlies</td>
<td></td>
</tr>
<tr>
<td>T Oct 17</td>
<td>Air Masses and Fronts</td>
<td>Lab 7: Surface Weather Maps</td>
</tr>
<tr>
<td>R Oct 19</td>
<td>Mid-Latitude Cyclones</td>
<td></td>
</tr>
<tr>
<td>T Oct 24</td>
<td><strong>Exam II: In Class</strong></td>
<td>No Lab</td>
</tr>
<tr>
<td>R Oct 26</td>
<td>Monsoons</td>
<td></td>
</tr>
<tr>
<td>T Oct 31</td>
<td>Thunderstorms</td>
<td>Lab 8: Mid-Latitude Cyclones</td>
</tr>
<tr>
<td>R Nov 2</td>
<td>Tornadoes</td>
<td></td>
</tr>
<tr>
<td>T Nov 7</td>
<td>Hurricanes</td>
<td>Lab 9: Thunderstorms and Tornadoes</td>
</tr>
<tr>
<td>R Nov 9</td>
<td>Teleconnections</td>
<td></td>
</tr>
<tr>
<td>T Nov 14</td>
<td>Climate Classifications</td>
<td>Lab 10: Hurricanes</td>
</tr>
<tr>
<td>R Nov 16</td>
<td>Köppen Climate Classification</td>
<td></td>
</tr>
<tr>
<td>T Nov 21</td>
<td>Paleoclimatology</td>
<td><strong>No Lab</strong></td>
</tr>
<tr>
<td>R Nov 23</td>
<td><strong>No Class: Thanksgiving</strong></td>
<td></td>
</tr>
<tr>
<td>T Nov 28</td>
<td>Climate Change I</td>
<td>Lab 11: Controls of Climate</td>
</tr>
<tr>
<td>R Nov 30</td>
<td>Climate Change II</td>
<td></td>
</tr>
<tr>
<td>T Dec 5</td>
<td><strong>Exam III: 12:30 –2:30 pm in JH 1111</strong></td>
<td></td>
</tr>
</tbody>
</table>
Chapter 1: Introduction to the Atmosphere (Week 1) - Attributions

1. https://www.ucar.edu/learn/1_2_1.htm
2. https://eo.ucar.edu/educators/ClimateDiscovery/LJA_lesson1_9.28.05.pdf
8. https://www2.ucar.edu/atmosnews/perspective/9574/five-things-know-about-carbon-dioxide
Chapter 2: Earth-Sun Relationships (Week 2) - Attributions


Chapter 3: Heating of the Earth’s Surface (Weeks 2 and 3) - Attributions

6. http://climate.ncsu.edu/edu/k12/EnergyTransfer
7. https://science.nasa.gov/ems/01_intro
8. http://learningweather.psu.edu/node/18
11. http://learningweather.psu.edu/node/19
17. http://climate.ncsu.edu/edu/k12/.lsheat
Chapter 4: Temperature (Week 4) - Attributions

2. http://climate.ncsu.edu/edu/k12/IsobarIsotherm
15. https://scied.ucar.edu/longcontent/urban-heat-islands
16. https://laulima.hawaii.edu/access/content/group/2c084cc1-8f08-442b-80e8-ed89faa22c33/book/chapter_3/temperature.htm
17. http://www.meted.ucar.edu/fire/s290/unit4/print.htm#z5_0
Chapter 5: Atmospheric Humidity (Weeks 4 and 5) - Attributions

7. https://www.meted.ucar.edu/fire/s290/unit5/print.htm#z3_0
14. http://hyperphysics.phy-astr.gsu.edu/hbase/Kinetic/vappre.html
17. http://www.ux1.eiu.edu/~cfjps/1400/moisture.html
18. http://climate.ncsu.edu/edu/k12/.humidity
Chapter 6: Saturation and Atmospheric Stability (Week 5) - Attributions

3. http://hyperphysics.phy-astr.gsu.edu/hbase/Kinetic/vappre.html
12. https://www.e-education.psu.edu/earth111/node/751
17. http://www.meted.ucar.edu/fire/s290/unit6/print_2.htm#page_2.3.0
Chapter 7: Fogs and Clouds (Week 6) - Attributions

3. http://hyperphysics.phy-astr.gsu.edu/hbase/Kinetic/vappre.html
10. https://www.meted.ucar.edu/mesoprim/dynfog/print.htm#2.1
13. https://www.slideshare.net/niki2110/ppt-31654952
14. https://www.meted.ucar.edu/fog_int_cases/guyana/navmenu.php?tab=1&page=2.3.0&type=flash
28. https://cloudatlas.wmo.int/home.html
29. https://www.weather.gov/abq/features_acsl
30. https://scijinks.gov/clouds/
Chapter 8: Precipitation (Week 6) - Attributions

5. http://www.meted.ucar.edu/norlat/snow/micro_ice/1.1.crystal_growth.htm
Chapter 9: Atmospheric Pressure and Winds (Weeks 7 and 8) - Attributions

1. https://www.meted.ucar.edu/emgmt/hazwx/navmenu.php?tab=2&page=2.4.0&type=text
3. http://climate.ncsu.edu/edu/k12/WhatDrivesWx
15. http://climate.ncsu.edu/edu/k12/.Pressure
17. http://www.earthonlinemedia.com/ebooks/tpe_3e/circulation/air_pressure_p_2.html
24. http://www.meted.ucar.edu/afwa/climo/intro/print.htm#z2.1
Chapter 11: Air Masses, Fronts, and Midlatitude Cyclones (Weeks 10 and 11) - Attributions

2. http://www.meted.ucar.edu/dot/print.htm#z2_1_1
3. http://www.physicalgeography.net/fundamentals/7r.html
4. http://www.physicalgeography.net/fundamentals/7s.html
5. http://climate.ncsu.edu/edu/k12/.airmasses
7. http://www.meted.ucar.edu/afwa/climo/intro/print.htm#z4.1
14. https://www.meted.ucar.edu/emgmt/hazwx/print_2.htm#page_3.1.0
17. http://climate.ncsu.edu/edu/k12/.fronts
23. http://www.meted.ucar.edu/mesoprim/bandedprecip/print.htm#3
Chapter 12: Thunderstorms and Tornadoes (Week 12) - Attributions

5.  https://www.meted.ucar.edu/emgmt/hazwx/print_4.htm#page_3.1.0
11.  https://www.meted.ucar.edu/intromet/basic_wx/navmenu.php?tab=1&page=7-1-0&type=flash
17.  http://climate.ncsu.edu/edu/k12/SevereWeather
20.  https://www.meted.ucar.edu/intromet/basic_wx/navmenu.php?tab=1&page=7-3-0&type=flash
22.  http://hyperphysics.phy-astr.gsu.edu/hbase/electric/lightning2.html
25.  https://www.meted.ucar.edu/emgmt/hazwx/print_4.htm#page_3.2.0
34. http://www.spc.noaa.gov/misc/about.html
Chapter 13: Hurricanes (Week 13) - Attributions

1. https://earthobservatory.nasa.gov/Features/Hurricanes/
17. http://www.unidata.ucar.edu/data/NGCS/objects/chp/structure/
Chapter 14: World Climates (Week 14) - Attributions

30. https://sites.google.com/site/climatetypes/highland
Chapter 15: Climate Change (Week 15) - Attributions

2. https://www.ncdc.noaa.gov/data-access/paleoclimatology-data
7. https://earthobservatory.nasa.gov/Features/Milankovitch/
19. Climate Change Impacts in the United States: Chapter 2: Our Changing Climate
20. https://history.aip.org/climate/co2.htm
21. https://www.nature.com/articles/srep21691
23. Global Climate Change Impacts in the United States (2009)
Final Report
Affordable Learning Georgia Textbook Transformation Grants

Final Report

Date: 12/12/17

Grant Number: 272

Institution Name(s): Valdosta State University

Team Members (Name, Title, Department, Institutions if different, and email address for each):

Jason Allard; Department of Physics, Astronomy, and Geosciences; Valdosta State University; jmallard@valdosta.edu

Weimin Feng; Department of Physics, Astronomy, and Geosciences; Valdosta State University; wfeng@valdosta.edu

Project Lead: Jason Allard

Course Name(s) and Course Numbers: GEOG 1112K: Introduction to Weather and Climate

Semester Project Began: Fall 2016

Semester(s) of Implementation: Fall 1017

Average Number of Students Per Course Section: 25

Number of Course Sections Affected by Implementation: The course is offered every semester. Enrollment is ~125 in fall (5 sections), ~75 in spring (3 sections), and ~25 in summer (1 section).

Total Number of Students Affected by Implementation: 125 students in fall 2017 (225 students a year)
1. Narrative

A. Describe the key outcomes, whether positive, negative, or interesting, of your project. Include:

Over the course of the project, the OER “modules” transformed into a textbook. While the intention was to use collect online content and synthesize it into learning modules, the availability of online information was far too lacking. Each chapter serves the same purpose as the learning modules, but the chapters are far more comprehensive than originally planned. The textbook, while able to be modified for future use, is 398 pages and consists of 15 chapters. It involved more original authorship by the principle investigators than originally intended. However, this did allow for a resource that is more aligned with how the lecture material is presented. As one student in the course stated in fall 2017: “… the textbook reads like you talk.” The contents of the textbook fully match those in PowerPoint lectures and the lab manual. There is now a full integration of concepts and learning material throughout the course.

The OER will continue to be used in the course in future semesters, providing a free textbook for students in the course. The popularity of the course ensures that many students will benefit from not having to purchase a textbook when they take this course for interest, or to fulfill a science with lab core curriculum requirement (Area D II). The use of this OER may have even more of an impact on the number of students than originally stated. In spring 2018, 6 sections of GEOG 1112K will be offered instead of the projected 3 sections. This will financially benefit more students than originally intended.

Unfortunately, there does not appear to be a significant impact on student performance. Exam, lab, and overall course grades for the implemented semesters were approximately equivalent to previous semesters. It was anticipated that access to a free resource would increase adoption and use of the OER in place of an expensive textbook, which in turn would result in higher course grades. Instead, the impact on the grades appear neutral. While it is good that there was no negative impacts arising from the resources provided, it is unfortunate that the course grades did not appear to show a positive impact.

B. Describe lessons learned, including any things you would do differently next time.

While the project developed into a much larger project than originally anticipated, the final project is a far better learning resource, and as such I would not want to produce anything less in the future. However, if something similar was done in the future for another course, it would have to involve more faculty participants. The creation of a textbook from hundreds of independent internet resources weaved together by the writing of the PIs is a far more time consuming project than the adoption of an OpenStax textbook.
2. Quotes

- “When I couldn’t remember something about a slide [in reference to a lecture PowerPoint slide], I could find everything about it clearly covered in the textbook.”
- “The textbook really helped me. I used it before the exam to study what I didn’t understand from class.”
- “The textbook covers everything discussed in lecture, and the textbook reads like you talk. It makes it easier to understand the material.”

3. Quantitative and Qualitative Measures

3a. Overall Measurements

Student Opinion of Materials

Was the overall student opinion about the materials used in the course positive, neutral, or negative?

Total number of students affected in this project: 125 (fall 2017)

- Positive: 18 % of 23 number of respondents
- Neutral: 5 % of 23 number of respondents
- Negative: 0 % of 23 number of respondents
Student Learning Outcomes and Grades

Was the overall comparative impact on student performance in terms of learning outcomes and grades in the semester(s) of implementation over previous semesters positive, neutral, or negative?

The overall impact on student performance in the course was not discernible. The distribution of grades, as well as the number of withdrawals and failures, remained similar to previous semesters. As such, in terms of student performance, the implementation could be considered neutral. However, when it is considered how much students potentially saved from not having to purchase a textbook, it would be considered positive in terms of student finances.

Choose One:
- ___ Positive: Higher performance outcomes measured over previous semester(s)
- ___ Neutral: Same performance outcomes over previous semester(s)
- ___ Negative: Lower performance outcomes over previous semester(s)

Student Drop/Fail/Withdraw (DFW) Rates

Was the overall comparative impact on Drop/Fail/Withdraw (DFW) rates in the semester(s) of implementation over previous semesters positive, neutral, or negative?

The overall comparative impact on the DWF rates in the semester of implementation were neutral.

Drop/Fail/Withdraw Rate:

7.9% of students, out of a total 127 students affected, dropped/failed/withdrew from the course in the final semester of implementation.

Choose One:
- ___ Positive: This is a lower percentage of students with D/F/W than previous semester(s)
- ___ Neutral: This is the same percentage of students with D/F/W than previous semester(s)
- ___ Negative: This is a higher percentage of students with D/F/W than previous semester(s)
3b. Narrative

No significant impact upon the academic performance of the students in the course during the term of implementation could be discerned. The DFW rate of the term of implementation did not substantially differ from previous semesters: 7.9% DWF (fall 2017; 12.8% (spring 2017); 13.1% (fall 2016); and 6.6% (spring 2016). Course grade averages also were not significantly different and likely just represent normal variability: 75.5% class average (fall 2017); 76.9% (spring 2017); 75.8% (fall 2016); and 76.9% (spring 2016). Exam and lab grades during the term of implementation were variable between lab sections, and were within the variability of previous terms.

The lack of a change in student performance from before to after implementation is slightly disheartening given the amount of effort that was put into the creation of the OER. However, performance of the students was more likely related to the student use of the resource, rather than an issues with the resource. While some students were accessing the resource, other students were clearly not utilizing it, even if it was recorded that they viewed the resource. Some students admitted to not reading the textbook, while others clearly did not use the resource to its full potential even when they stated that they used the resource (questioning the student about the resource made it clear that they did not actually spend the time looking at it to answer the most basic of questions).

In subsequent semesters, the instructor of record, Jason Allard, intends to incorporate online quizzes that force students to access and read the textbook. The quizzes will be created and worded such that reading the textbook will be required to do well on the quizzes. Hopefully, by reading the textbook, they will be able to better understand the advantages of using the textbook when it comes to the labs and exams.

While quantitative proof of the OER having an impact on student performance was not evident, it was obvious that students appreciated the availability of a free online resource. This was easily qualitatively assessed by the appreciative feedback of the students in the course. While not immediately provable, the availability of the OER may have increased the popularity of the course. In fall 2017, Valdosta State University added the functionality to registration for students to be waitlisted for courses that had reached capacity. This is the first semester that this functionality was incorporated, so there is no previous semesters with which to compare. However, there were four sections, each with 25 students, scheduled for spring 2018. Once the waitlist reached 39 students, another two sections were added. There is still a wait list of more than a dozen students, but no faculty to teach additional sections. There are factors that result in individuals gravitating towards certain courses, and one of them could be related to cost.

Moreover, the creation of this OER did meet the goal of creating a freely available online resource to support the course. At a time when textbook prices are increasing, students now have one less financial burden if they are enrolled in the course.
4. Sustainability Plan

The OER developed for GEOG 1112K is fully implemented for the course. It will be the textbook used in the course. One of the primary PIs, Jason Allard, decides upon the textbook used in the course. While the impact appeared neutral in the semester of implementation, no negative feedback on the OER was received.

All the material created for the course has been save and backed-up. Unless new knowledge that makes something within the OER inaccurate, the textbook will undergo an update every two years. This should allow for current material to be incorporated, while not putting unnecessary work on the creators of the resource. The textbook developed for the course was completed by the PIs, so the PIs are not reliant upon any outside entities to make modifications to the OER.

5. Future Plans

The students in the course that provided feedback were very appreciative of a freely available textbook for the course. It was very satisfying as the instructor of the course to see their appreciation. I do think that it would be beneficial to create freely available education resources for other courses, but the magnitude of work that it took to put together the textbook was far too time consuming. Two PIs working on the project of creating a new online resource was not enough. If involved in a similar project in the future, it would have to involve more individuals so that the work for any single PI could be reduce.

No definitive plans have been decided upon yet. Jason Allard will be attending the annual meeting of the American Association of Geographers in April 2018. The textbook will be presented to fellow climate scientists for feedback and suggestions.

6. Description of Photograph

Dr. Jason Allard, co PI and instructor of record; Dr. Weimin Feng, co PI

The image is only of Dr. Allard. There was an oversight on the part of the PIs to take a combined photo before the submission of this report. The PIs are traveling separating now that the fall 2017 term is over, so it is not possible to take a combined photo. This requirement can be fulfilled when both faculty return in spring 2018.