



Goddard Institute for Space Studies

Congratulations to CCRI Educator, Nicole Dulaney!

<https://science.nasa.gov/contributors/nicole-dulaney>

Under Dr. Allegra LeGrande's mentorship, Dulaney developed two CCRI Unit Plans that have successfully passed NASA SMD Independent Product Review.



Future Temperature Projections:

https://www.giss.nasa.gov/edu/res/Dulaney_FutureTemperatureProjections.pdf

Future Temperature Projections is a unit plan designed for high school students grades 9 – 12 with access to computers and RStudio. This unit takes approximately one month to complete. The goal of this unit is for the students to learn about global future temperature projections based on output from the NASA GISS ModelE2 Global Climate Model. This unit should be completed after students learn about factors that influence climate, such as Earth's energy budget and greenhouse gas emissions, and the impacts of climate change. The NASA GISS ModelE2 and other climate models simulate present day climate based on knowledge of how heat and energy move around the earth and observations of the radiative forcing of the entire system. As the future state of Earth's climate and greenhouse gas emissions remains uncertain, students will learn how temperature on Earth is expected to change based on different scenarios regarding greenhouse gas emissions. Throughout the unit, the students will learn about Representative Concentration Pathways (RCP) scenarios and how these scenarios are used in models such as the GISS ModelE2 to estimate future temperature. Students will be engaging in data analysis through programming in RStudio to ultimately explore how the RCP scenarios project temperature differently out to the year 2100 in New York City and different cities around the world.

Earth's Energy Budget:

https://www.giss.nasa.gov/edu/res/Dulaney_EarthsEnergyBudgetUnitPlanPortfolio.pdf

Earth's Energy Budget is a unit plan designed for high school students grades 9 – 12 with access to computers, NASA GISS Panoply software, and RStudio. The goal of this unit is for the students to learn about each component of Earth's energy budget formula and how the contribution of each component changes with respect to the location on Earth and the time of the year. The students will be introduced to the following energy budget components: incoming solar radiation, outgoing longwave radiation, outgoing shortwave radiation, and net energy. Each lesson will challenge the students to connect the content to climate change, as the students will be asked to estimate how various components of the energy budget will be impacted due to the changing climate.

To learn more about CCRI, visit: <https://www.giss.nasa.gov/edu/ccri/>