



## Applied Remote Sensing Training (ARSET) Program

### Introduction to NASA Resources for Climate Change Applications

## Homework Questions

### Question 1

Which of the following are climate forcings (the initial drivers of climate)?

Answers: (bold correct)

- a. Solar Irradiance
- b. Greenhouse Gas Emissions
- c. Aerosols, Dust, Smoke, and Soot
- d. **All of the above**

### Question 2

Since the late 19th century, the planet's average surface temperature has risen by roughly how much?

Answers: (bold correct)

- a. 0.9 degrees Celsius
- b. **1.18 degrees Celsius**
- c. 2.2 degrees Celsius
- d. 4.8 degrees Celsius

### Question 3

Since 1978, when scientists started tracking the amount of solar energy reaching the top of the atmosphere using satellite sensors, there has been no upward trend in the amount of solar energy reaching our planet.

Answers: (bold correct)

- a. **True**
- b. False

### Question 4

What is the most abundant greenhouse gas in the Earth's atmosphere?

Answers: (bold correct)

- a. Methane
- b. Carbon Dioxide
- c. **Water Vapor**
- d. Nitrous Oxide

### Question 5

Which greenhouse gas is responsible for about two-thirds of the total energy imbalance that is causing Earth's temperature to rise?

Answers: (bold correct)

- a. Methane
- b. **Carbon Dioxide**
- c. Water Vapor
- d. Nitrous Oxide

### Question 6

Global sea level rise can be explained by which of the following:

Answers: (bold correct)

- a. Ice melt in the ocean

- b. Ice melt on land
- c. Thermal expansion from ocean warming
- d. **Both b & c**

## Question 7

Which of the following is NOT evidence for current rapid changes in the climate system:

Answers: (bold correct)

- a. Sea Level Rise
- b. Declining Arctic Sea Ice
- c. Ocean Acidification
- d. **Increased Solar Activity**

## Question 8

Which NASA mission tracks Earth's water movement to monitor changes in underground water storage, the amount of water in large lakes, ice sheets and glaciers, and sea level?

Answers: (bold correct)

- a. Global Precipitation Measurement Mission (GPM)
- b. **Gravity Recovery and Climate Experiment (GRACE) Follow-On (GRACE-FO)**
- c. Global Ecosystem Dynamics Investigation (GEDI)
- d. Orbiting Carbon Observatory (OCO)-2

## Question 9

In 2013, the daily level of carbon dioxide in the atmosphere surpassed how many parts per million (ppm) for the first time in human history?

Answers: (bold correct)

- a. **400 ppm**
- b. 380 ppm
- c. 350 ppm
- d. 280 ppm

## Question 10

Reducing emissions of and stabilizing the levels of heat-trapping greenhouse gases in the atmosphere refers to which of the following:

Answers: (bold correct)

- a. **Mitigation**
- b. Adaptation

## Question 11

Which of the following are examples of key climate simulation products:

Answers: (bold correct)

- a. Modern-Era Retrospective analysis for Research and Applications (MERRA-2)
- b. NASA GISS Model-E
- c. NASA Earth Exchange Global Daily Downscaled Projections (NEX-GDDP)
- d. **All of the above**

## Question 12

Which of the following is NOT what climate models are designed for?

Answers: (bold correct)

- a. Response to combined or individual driving factors or causes
- b. Impacts of policy choices
- c. **Truly local information**
- d. Potential impact of "known unknowns"

## Question 13

What is the name of NASA's supercomputer used to enable global climate modeling simulations?

Answers: (bold correct)

- a. **Discover**
- b. Summit
- c. Trinity
- d. Explorer

## Question 14

Which of the following are human factors used in climate models to determine human influence on the climate system?

Answers: (bold correct)

- a. Land-Use Change
- b. Greenhouse Gas Emissions
- c. Volcanoes
- d. **Both a & b**

## Question 15

Climate modelers use illustrative scenarios (e.g., SSP1-1.9) to represent different pathways of development, technology, international cooperation, and greenhouse gas emissions.

Answers: (bold correct)

- a. **True**
- b. False

## Question 16

What type of carbon data products do you need to support your organization's goals (list as many as needed)?

- Land Biomass
- Land-Atmosphere Flux
- Land-Ocean Flux
- Ocean Biomass
- Ocean-Atmosphere Flux
- Global Surface Atmosphere Flux
- MRV (measuring, reporting, verification) of Emissions
- Decision Support
- Other

## Question 17

Climate is a broad topic, so please indicate which sub-topics you would like to see in future ARSET trainings (choose up to 3).

- Water Resources
- Food Security
- Resilience
- Climate Adaptation Planning
- Mitigation
- Fire Risk
- Sea Level Rise
- Sustainable Development Goals
- Cities
- Climate-Related Migration
- Health
- Impacts/Hazards/Disasters/Extreme Weather
- GHG Targets (National Contributions)
- GHG Targets (Municipal or State Contributions)
- Non-GHG Targets (Renewable Energy)
- Land Degradation
- Ice Sheet or Glacier Monitoring
- Other

## Question 18

Which climatic impact-drivers are important to the system you most care about? (Choose up to 3)

Answers: (bold correct)

- Mean Surface Temperature
- Extreme Heat
- Mean Precipitation
- Drought
- Fire Weather
- Tropical Cyclone
- Permafrost
- Coastal Flood
- Marine Heatwave

## Question 19

As it relates to Climate related extreme weather, which topic interests you the most? (Choose 1)

Answers: (bold correct)

- Drought
- Extreme Heat
- Extreme Precipitation
- Hurricanes
- Tornadoes
- Wildfires

## Question 20

How do you use climate model projections in your work?