**Unit: Impact of Aerosols on Climate**

TASK: Aerosols and Clouds

Aerosols are tiny particles suspended in the air. Some are naturally occurring and many are a product of pollution that reaches the atmosphere. These tiny particles affect how clouds form and can impact how much solar energy is reflected or absorbed by clouds. They can also have and adverse effect on how many raindrops reach the ground. The process of cloud formation is far more complex than was is normally taught.

The purpose of this task is to gain familiarity and understanding of the processes that are involved in cloud formation and how clouds affect the Earth’s energy budget.

**Part I. Clouds, Aerosols and Solar Energy**

Go to the Earth’s Observatory webpage using the link provided. There is a menu on the right hand side click on the section called aerosols and clouds, and read the section.

**NASA Article: Aerosols: Tiny Particles, Big Impact** – Section Aerosols and Clouds

Link: <http://earthobservatory.nasa.gov/Features/Aerosols/>

Click on the section titled aerosols and clouds on the right hand side.

The arrows in the images bellow represent sunlight and solar thermal energy.



Observe closely these two images. Use the questions bellow to help guide your observations. You can also view these same images using the link provided above.

Guiding Questions:

1. Briefly describe these images. How are they similar and how do they differ?
2. Look closely to the image on the left. What inferences can you make from the two connected arrows in relation to one another? What do you think they represent? How do they different?
3. Analyze the image on the right. What inferences can you make from the two connected arrows in relation to one another? What do you think they represent? How do they different?
4. Look at both images again compare the cloud on the left image with the cloud on the right image. Do you notice any differences? Please describe your observations.
5. What effect do you think the cloud of each image has on the how thick or narrow is the arrow facing down to Earth and the arrow facing up to the atmosphere? What do you think yellow arrows are trying to quantify?
6. There are two circles in each of the images. What is represented inside the circles? How do they differ?

**Part II: Aerosols and Cloud Formation**

NASA Article: Aerosols: Tiny Particles, Big Impact <http://earthobservatory.nasa.gov/Features/Aerosols/page4.php>

Click on the section “Aerosols and Clouds” on the ride hand bar.

Guiding Questions:

1. What role do aerosols play in cloud formation? What are these particles called colloquially and scientifically?

2. Which are the most common aerosols in pristine environments? Please list.

3. Which type of particles are more common in polluted air? What effect does pollution have on clouds?

4. What effect does pollution have on the clouds water droplets? How do these droplets interact with light?

5. What type of aerosols do ship smokestacks produce? How are they detected?

6. How can clouds affect regional climate systems?

7. How can aerosols affect precipitation? What evidence have meteorologist found to that effect?

8. What type of effect do different aerosols have on clouds and precipitation?

9. Why do you think it’s important to understand the effect of aerosols?