



# STF-1: West Virginia's First Spacecraft

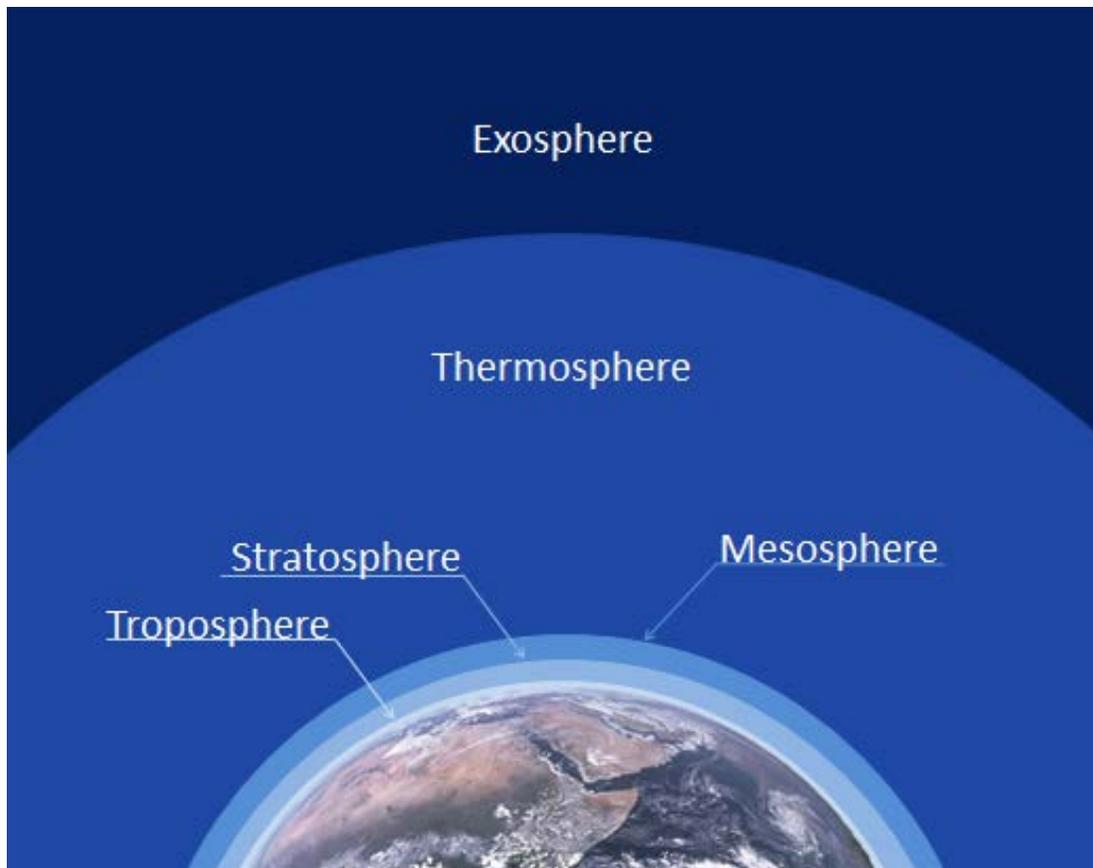
Locating Earth's Atmospheres Activity

In this activity you get to explore the atmospheric layers of earth. This includes the Troposphere, Stratosphere, Mesosphere, Thermosphere and the Exosphere. You will make a keychain and learn about West Virginia's first spacecraft, Simulation To Flight-1 (STF-1).



## The Layers of Earth

Earth has five atmospheric layers. Each layer has something and does something different. All of these layers are important to earth because this is how we can live on earth. Below describes each layer. You will make a bracelet of earth's layers with Simulation to Flight 1 (STF-1), West Virginia's first spacecraft.



## Troposphere

We live in the Troposphere! “Tropo” means change because the weather always changes. This extends from earth’s surface 5 to 9 miles depending on where you are on earth, and is also the heaviest layer.

## Stratosphere

“Strat” means layer. That’s because there are layers inside this layer. This is where the ozone layer is located. This is important to filter out UV lights that give us sunburns. If we didn’t have the ozone layer we wouldn’t exist.

## Mesosphere

“Meso” means middle. This is the layer where we see meteor showers, or some call them shooting stars. We see the meteor showers because this is where they burn up entering the atmosphere.

## Thermosphere

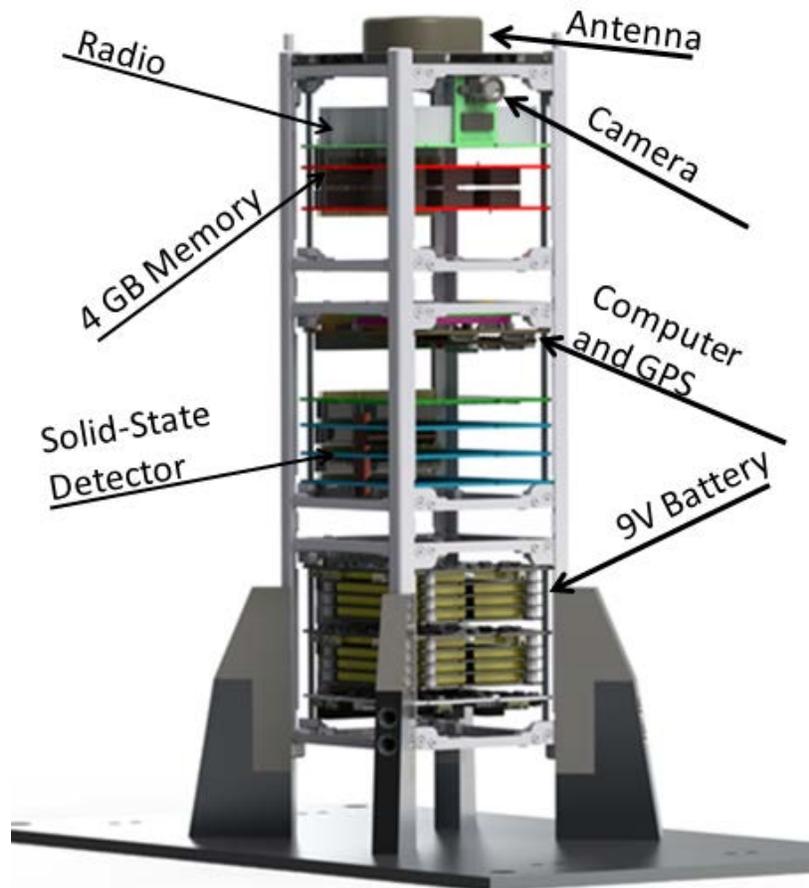
“Thermo” is short for thermodynamics which means the study of heat. This layer is super-hot, 4500°F hot. That’s two times as hot as liquid lava. This is also where STF-1 will orbit earth.

## Exosphere

The exosphere is the thickest layer of our atmosphere at 6,200 miles thick, about the same distance as earth is wide. “Exo” means outside. There is no air in this layer and it is extremely cold. It is just empty space.

## What is STF-1?

STF-1 is going to do so much but it is pretty small yet has a lot of things inside. This satellite is going to test to see if little satellites can do what big satellites can. See below for the components.



## Did You Know?

- STF-1 is West Virginia's first spacecraft
- STF-1 is about the same size of a loaf of bread and weighs 9 pounds
- STF-1 will orbit earth every 93 minutes
- STF-1 will be spinning as it orbits earth
- STF-1 will be in orbit for 6 months then burn up entering Earth's atmosphere
- It is going to go 18,000 miles per hour around earth

## Do the Activity

### Materials:

1. String (yarn or embroidery string shown)
2. Tape
3. Three beads (preferably cubes)

Note this is a scaled model of earths atmospheres

### Step 1: Cut string



Cut four colors to a length of 34 inches, cut two more colors and cut to 50 inches.

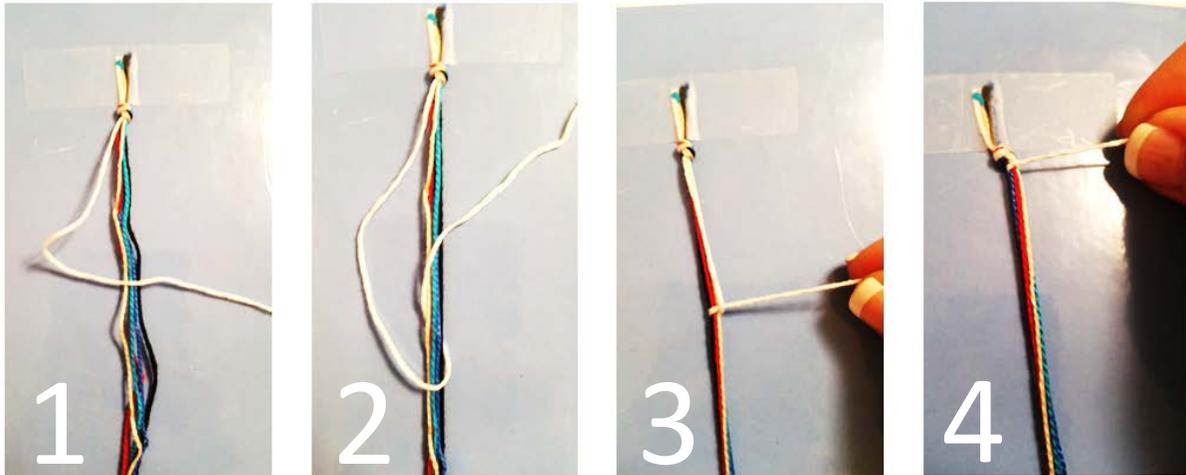
### Step 2: Tie the knot and tape it



Take all the colors and tie a knot. Tape it to a hard surface, or use a clipboard, making sure it is secured.

### Step 3: Troposphere

Take your first color and tie a knot by following the steps 1-4 below. Use one hand to hold the strings together and the other to tie the knot with the other string.



- 1 – Make a 4 with your string
- 2 – Tuck your string under and through the 4 loop
- 3 – Pull the string tight
- 4 – Pull the knot up to the top

Repeat until it is  $\frac{1}{4}$  inch long



## Step 4: Stratosphere



Place your first color in with the other strings and pull your next short string out. Do the same as in step 3. Make it **1/8 inch long**, change string to another color to make the ozone layer, make **1 knot**. Complete the Stratosphere until it is a total of  $\frac{1}{2}$  inch in length.

## Step 5: Mesosphere

Change your color and build your mesosphere until it is  $\frac{1}{2}$  inch long.

## Step 6: Thermosphere



Use a long string and knot enough times to make it  $2 \frac{1}{2}$  inches long and add a bead, make another knot to hold in place and add two more beads the same way. Finish the Thermosphere when the total length of this color is 5 inches long.

## Step 7: Exosphere

Use your last string and tie as many knots as you would to make your key chain, or make it to fit around your wrist or ankle. If you wanted to make it to scale with the rest of the layers you will need to make it 109 inches long.

