



# Briefing Sheet: **Satellite Team**

## Satellite Tracking Instructions

### The information and tools you will need:

- Satellite Tracking Sheet
- Satellite Tracking Map
- Calculator, Clear Ruler, Compass, Pencil

### Steps:

#### 1. Download and read the real-time data.

On the day of the mission, the satellite tracking network will inform you of the next satellite that is due to pass over Montserrat. This data may be downloaded using the URL given to you by mission control. Today you may prepare for the mission using the practice data.

Example: Real-Time Data 09/04/1996

Time (GMT)	Latitude (deg)	Longitude (deg)	Heading (N/S)	Wavelength (m)
01:00	1.5° N	61.1° W	N	0.001796

In this example, the date is Sept. 4<sup>th</sup>, at 1 am Greenwich Mean Time (GMT). The first data report reads, "Satellite availability data for September 4<sup>th</sup> at one hundred hours: Satellite current position is Latitude 1.5° North, Longitude 61.1° West and heading approximately North. Satellite receives on a wavelength of 0.001796 m,"

#### 2. Write down the data.

Record the hourly data in the Satellite Tracking Sheet.

#### 3. Plot the current position of the satellite on the Satellite Tracking Map.

On the Satellite Tracking Map locate the Latitude and Longitude of the satellite and mark it with a small vertical cross. Record the time of the observation next to it.

#### 4. Determine when the satellite needs to take the next image.

- A. Place a clear plastic ruler over the cross on the Satellite Tracking Map. Make sure that the ruler is level (the times the ruler reads off on the left and right side of the map will be the same). Record this time on the table in the column marked "Time to Target". **Be careful, the scale runs in different directions north and south of Montserrat.**

- B. Add the time that you received the instruction (this will always be on the hour) and record this in the column marked "Observation Time". This is the time that you will be instructing the satellite to make its observation of Montserrat.

#### 5. Calculate the frequency that the satellite needs to transmit on.

The frequency of a wave and its wavelength multiplied together give the speed of the wave, in this case the speed of light (300,000,000 m/s). To calculate the frequency in Hertz (Hz) satellite needs to transmit on, divide the speed of light by the wavelength. This will give a very large number. To get this number into Gigahertz (GHz) you need to divide it by 1,000,000,000 (one billion). **Fortunately there is a short cut, just divide 0.3 by the wavelength (in metres).** This will give the frequency in GHz. Record the frequency in the column marked "Frequency".

#### 6. Send a command to the polar orbiting satellite.

Enter the calculated observation time and the contact frequency on the web page in the spaces provided and press the submit button (for the practice, where you do not have access to the website, pass a copy of your data to your instructor).

#### 7. Check that the satellite has recorded an image that includes the island of Montserrat.

- A. Read the latitude and longitude that the website returns. This is the central location of the observation made by the satellite.
- B. Plot the location on the Observations Tracking Map and draw a circle round it of radius 80 km. This is the area that volcanic observations can be made in and that ground-based data can be received from.
- C. Report to the Communications Officer whether the satellite pass has been successful or not.
- D. Fill in the last column of the Satellite Tracking sheet. Put a Y or N indicating whether the scan was successful or not.