# Briefing Sheet: Volcano Team
## Instructions

**The information and tools you will need:**

- 2 Seismic Work Sheets: Both RF and VT
- Graph paper, Practice data, Calculator

**Steps:**

### 1. Download and Read the Real-Time Data

On Mission day, the satellite will send live data from ground-based sensors on the island. This data may be downloaded by using the URL given to you by Mission Control. Using the practice data you can prepare for Mission Day.

EXAMPLE: Real-Time Data 04/09/1996

| GMT | RF | VT |
|---|---|---|
| 00:00 | 16 | 12 |

In this example, the data is from Sept. 4, at midnight, Greenwich Mean Time (GMT). The first data report reads, "Seismic Activity data for September 4th at zero hundred hours: **Hourly Rock Fall (RF)** is 16, and **Hourly Volcanic Tremors (VT)** is 12."

The following method is the same for Rock Fall (RF) and Volcanic Tremors (VT) data.

### 2. Write down the data

Record the Hourly data in the first empty column (Column B) on each of the Seismic Work Sheets.

### 3. Calculate the Cumulative Totals for 24 hours

Cumulative Total is the total of the RF or VT so far, added together. Add the current Hourly VT or RF (Column B) to the last total in Column C. Write the new total in Column C.

*The first Hourly number will be the same as the first Cumulative number, as it will be the only one at that point.*

### 4. Predict the number of RF or VT events for the whole day.

To predict the Daily RF Total, multiply the Cumulative Hourly RF Totals (Column C) by the number in the "Multiply By" column (Column D). Round your results to the nearest whole number and write the answer in Column E

### 5. Find the predicted Total Seismic Activity

To find the Total Seismic Activity, add together the **Predicted Daily RF** (Rock Fall in Column E) and **Predicted Daily VT** (Volcanic Tremors in Column E, on the other sheet). The data tells us if and when the seismic activity shows a sharp increase.

### 6. Draw graphs for Rock Fall, Volcanic Tremors and Total Seismic Activity.

Your team will need to make three graphs using the templates provided. Connect the points you draw with lines.

a) Graph of **Hourly Rock Fall** (RF) for each hour.
b) Graph of **Hourly Volcanic Tremors** (VT) for each hour.

The RF and VT graphs are the same. The Y-axis should be numbered from 0 to 60. The X-axis should be numbered from 00:00 hours to 24:00 hours.

c) Graph of **Total Seismic Activity** for each hour.

The Y-axis should be numbered from 0 to 2000. The X-axis should be numbered from 00:00 hours to 23:00 hours.

**A large increase in the number of Volcanic Tremors (VT) between one reading and the next could mean that pyroclastic or lava flows may occur soon.**

**A large increase in the Total Seismic Activity between one reading and the next could mean that the volcano could erupt soon.**

# Briefing Sheet: Volcano Team

## Predicting an Eruption

**As the Volcano Team part of your job is to try to predict the eruption of the Volcano.**

**This information can help you to understand the volcano that you are studying on Montserrat.**

### Predicting Eruptions

Volcanologists use different tools and techniques to analyse volcanoes. Volcanic Tremors (VT) and Rock Fall (RF) numbers represent the amount of seismic activity.

A visual observation can be just as important as the numbers for predicting volcanic eruptions. For instance, if lava flows are observed as especially "bubbly", then scientists would say that the lava contains a high level of dissolved gases and can be explosive.

To be able to predict volcanic activity during the mission, you will need to use all the data and the graphs. Members of your volcano team may make different predictions. Make sure you discuss your predictions before you inform the other teams and Mission Control.

No one can predict exactly when a volcano might explode. There are, however, common clues to look for to let people know that the danger is increasing:

- **Land deformation**. At the top of a volcano there may be a volcanic vent. Near a volcanic vent, as magma pushes up from below, the land on top of and surrounding the vent may start to swell upwards, and grow larger. In many cases this deformation creates a dome of volcanic debris. As the dome grows in size, it becomes unstable, and ultimately it will collapse and produce pyroclastic flows or lava flows. Increasing dome size indicates a growing danger.

- **Ash Clouds**. Large ash clouds are evidence of increasing volcanic activity. On the island of Montserrat scientists have found that during dangerous times, ash clouds occur in a cycle of 4 to 30 hours apart. What causes an ash cloud? In an active volcano, rocky materials may block the vent. This blockage causes the pressure from the rising magma to build until eventually the blockage is blasted apart in a flurry of explosive activity. The released pressure shoots volcanic debris high into the air creating an ash cloud. Once an ash cloud is produced, the vent may become blocked again and the cycle may repeat. If a blocked volcano does not release its pressure, scientists become concerned that a massive explosion may happen. As long as the ash clouds keep appearing regularly, then there is less chance of a very large explosion.

- **Tremors**. Magma flowing beneath the surface tries to make room for itself. This causes tremors on the surface. Tremors are measured both for their magnitude of vibrations and the length of time between vibrations, or rate. On the island of Montserrat, scientists study two kinds of seismic data: Volcanic Tremor (VT) and Rock Fall (RF). The number of tremors or falling rocks are counted by the seismometer. The rate of volcanic tremors or rock fall is determined by the number per hour. An increase in the number per hour (rate) can be an indication of a possible eruption.