MONITORING AND PREDICTION

- **PLATE SETTING** Destructive plate boundaries cause explosive, infrequent eruptions, at 5+ on the Volcano Explosivity Index; due to the acidity of the magma, and the high gas and silica content. Constructive plate boundaries and Oceanic hot spots have frequent, quiet or effusive eruptions with low VEI numbers due to the basic, non viscous lava that they produce. A continental hot spot such as Yellowstone produces very infrequent supervolcano events
- **GEOLOGICAL HISTORY AND PAST DEPOSITS** give a good indication of how the volcano erupts and deposits can be dated to show the frequency of eruptions and where lava, pyroclastics and lahars usually go
- **SEISMICITY** Earthquake activity can be measured using seismometers. Rising magma produces the earthquakes and the location, magnitude (size) and frequency of the activity can be used to predict the event. Research shows that harmonic seismic events may indicate an imminent eruption. Tomography using seismic events may allow the measurement of the 'footprint' of the magma chamber and therefore the probably size of the event
- **GAS EMISSIONS** The volume of SO2 emissions can be measured using a helicopter. Rising magma will increase the SO2 volumes. A sudden fall in SO2 emissions may indicate that the volcano is not 'de-gassing' and may erupt soon
- **SAMPLES OF ASH OR LAVA** can be taken to determine the chemistry of the lava. The silica content or acidity can determine the type of eruption. Viscous acid lava, with a high silica content, means an explosive eruption; and runny basic lava, with a low silica content, means an effusive/quiet eruption
- **OTHER METHOD** Heat flow measurements by aircraft or satellite
  Tilt meters
  Water level changes
  Electrical resistivity and magnetic field changes

RESPONSE

- **HAZARD ZONING** Studying past eruptions can determine the location and extent of previous lava flows, pyroclastic flows, ash deposits and lahars. The risk analysis can lead to the drawing of a Hazard Map showing the usual routes taken by each type of hazard. This may impact on LAND –Use planning and the creation of 'No Go' or No Build' zones
- **WEATHERFORECASTING** A study of weather patterns and upper winds may allow meteorologists to predict the extent and movement of ash clouds to allow Aviation Authorities to cancel flights where appropriate
- **EMERGENCY / EVACUATION PROCEDURES** Evacuation needs careful planning and the population needs education. Temporary housing, shelter, food, water and communications must be ready to put in place immediately. Trained emergency response teams may also save lives
- **MODIFYING THE EVENT** Volcanic eruptions are very powerful and very difficult to affect. But there has been limited success. Blasting of barriers and channels has been used at Mt Etna (Sicily, Italy). In 1973 at Haeimaey in Iceland water was pumped onto the lava to limits its speed of flow and spread. Roofs may be strengthened to prevent collapse due the weight of ash fall, and moveable houses are built on Hawaii.

Monitoring and prediction may allow scientists to use the Alert Level Warnings 1-4 as the USGS did at Pinatubo

3 – EVACUATION BEGINS 4- ERUPTION PROBABLE IN 24-48 Hrs

VOLCANO MITIGATION

LESSENING THE IMPACTS