Geological hazards and monitoring activities at the Azores archipelago

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AZORES ARCHIPELAGO
Geographic and Geodynamic setting
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Geographic and Geodynamic setting
Most destructive Historical earthquakes
Historical eruptions
Active Volcanic Systems

S. V. Lagoas
Vulcão Central da Caldeira
Vulcão de Santa Bárbara
S. V. Fissural
Vulcão do Pico Alto
Vulcão Sete Cidades
S. V. dos Picos
Vulcão do Fogo
S. V. do Congro
Vulcão das Furnas

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Geological Hazards in the Azores

- Azorean population is exposed to more than one natural hazard
- Earthquakes, volcanic eruptions, landslides and tsunamis can occur as coupled events
- The combined action of these events should always be considered when defining scenarios for emergency planning
CIVISA - Centre for Information and Seismovolcanic Surveillance of the Azores

• Objectives
  – Prevent and forecast Geological Hazards
  – Provide scientific advisory to the Civil Protection
  – Contribute to Public awareness
Monitoring networks

• Types of networks
  – Seismic
  – Geodesic
  – Geochemical
  – Air quality
  – Meteorological

• Data Acquisition
  – Real time data acquisition and transmission from remote stations to CIVISA – Ponta Delgada (S. Miguel Island)
Geophysical Monitoring
Seismic Monitoring

37 short period stations - 1Hz

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Geophysical Monitoring
Seismic Monitoring
Geodesic Monitoring
GPS observation Network

Starting date - 2002

- Temporary stations
- Permanent stations
Geodesic Monitoring

Ground deformation
Geochemical / Environmental Monitoring

Soil CO\textsubscript{2} flux stations

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Geochemical / Environmental Monitoring
Landslide monitoring network
Landslide monitoring network
DATA TRANSMITION SYSTEMS
(Data and Voice)

Multiplex Network – SRPCBA Regional Network

Radio Transmission
- UHF
- Freewave 2.4 GHz
- Wifi – 5 GHz

Mobile Network - GSM

LAN Network – Azores Government Network

Satellite communications
Aplication of EO Spatial Technologies

Volcano Monitoring
Ground deformation InSAR

Differential PALSAR L-band interferograms

Cong, X. et al (2008) - Ground deformation measurement with radar interferometry in Exupéry - Projecto Exupery
Surface thermal anomalies

Lava Flow on Bezymianny Volcano
Dec. 28, 2000
This image is a composite of an Advanced Spaceborne Thermal Emission and Reflection Radiometer (ASTER) image showing the volcano's topography (blue) and a thermal infrared image showing the "hot spot" (red) in great detail. ASTER is the "zoom lens" aboard NASA's Terra satellite.

Credit
Image courtesy NASA/GSFC/MITI/ERSDAC/JAROS, and U.S./Japan ASTER Science Team, University of Pittsburg
Volcanic Ash Clouds

On January 19, 2009, the Advanced Spaceborne Thermal Emission and Reflection Radiometer (ASTER) on NASA’s Terra satellite captured an image

http://earthobservatory.nasa.gov/OTD/view.php?id=36725

NASA’s Terra Satellite captured this image on April 15, 2010 of the volcano and resulting ash plume. NASA image by Jeff Schmaltz, MODIS Rapid Response Team at NASA GSF

http://earthobservatory.nasa.gov/NaturalHazards/view.php?id=19887
PROJECTS INVOLVING SPATIAL TECHNOLOGIES
The project aimed to demonstrate the contribution of EO integrated services in support to Volcanological Observatories and other authorized users, such as civil protection, giving particular emphasis to prevention and early warning.
Ground deformation using images for DINSAR and ALOS PALSAR
MED-SUV
MEDiterranean SUpersite Volcanoes
2013-2016

THEME [ENV.2012.6.4-2] [Long-term monitoring experiment in geologically active regions of Europe prone to natural hazards: the Supersite concept]

Partners: ESA, TERRADUE

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