

2003 Fall Meeting
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Cite abstracts as *Eos Trans. AGU*, 84(46),
 Fall Meet. Suppl., Abstract xxxxx-xx, 2003

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 HR: 0830h
 AN: **V51J-0406 INVITED**
 TI: [CALIPSO Borehole Instrumentation Project at Soufriere Hills Volcano, Montserrat, BWI: Overview and Prospects](#)
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AB: Project {\bf CALIPSO} ({\bf C}aribbean {\bf A}ndesite {\bf L}ava {\bf I}sland-volcano {\bf P}recision {\bf S}eismo-geodetic {\bf O}bservatory) was developed in order to investigate the magmatic system at the exceedingly active Soufriere Hills Volcano (SHV), Montserrat. The collaborative project involves a number of institutions acting in partnership with the Montserrat Volcano Observatory (MVO), and is funded by NSF with a contribution to drilling costs provided by UK NERC. SHV remains active and dynamic after 7 years and is expected to remain so for the foreseeable future. Many aspects of andesite magmatic system dynamics remain poorly understood despite significant monitoring and research efforts, and {\bf CALIPSO} is expected to improve our understanding of SHV and andesite systems generally. Drilling was carried out by DOSECC, Nov 02 to Mar 03. {\bf CALIPSO} uses an integrated array of four strategically located 200-m boreholes, plus a few shallower holes and surface installations. The borehole instrument package is designed to have long life (decades) at moderately high temperatures. Each site includes a single-component, very broad band, Sacks-Evertson strainmeter, a three-component seismometer (about 1 Hz to 1 kHz), a Pinnacle Technologies tiltmeter, and a surface CGPS station with choke ring antenna. At one site a new CIW hot-hole strainmeter design, involving hydraulic sensors and no downhole electronics, has been used for the first time anywhere. Data will be streamed from the remote borehole sites using FreeWave telemetry coupled with Quanterra A/D converters. The borehole observatory is being fully integrated into the surface monitoring networks of the MVO and other PSU/U Ark monitor systems, enhancing the existing CGPS and surface broadband seismic-acoustic networks. These instruments are intended to probe changes in the andesitic volcanic system and underlying mafic sources with unprecedented sensitivity. Cyclic activity at a variety of timescales has been a feature of SHV volcanism, involving seismicity, ground deformation, dome activity and gas exhalation, at the about 10 hour time scale. Evidence exists also for 7 and/or 14 week, and some longer cycles, and the SHV eruption since 1995 is the fourth repetition of a 30 year cycle. The longer time scale cycles originate from the deeper plumbing system, and can sometimes be detected in the seismic, deformation and gas data. However, the data are close to the limit of detection by the MVO's surface monitoring network, and the need for a new monitoring approach to better investigate these longer-term cycles of deep origin has now been met by {\bf CALIPSO}. Borehole instrumentation provides much reduced noise and the ability to locate effective stations farther from the volcano than possible with surface instruments, and both features aid the sampling of seismic and deformation signals from the deep transport, storage, and recharge systems. The design life of the borehole observatories is long, such that onset of the next 30 year cycle may be sampled after most PIs have passed on to their reward or otherwise, with some of us possibly obtaining personalised insights of the Mephistophelean magmatic environment.

DE: 8400 VOLCANOLOGY

DE: 8419 Eruption monitoring (7280)

DE: 8434 Magma migration

DE: 8494 Instruments and techniques
SC: Volcanology, Geochemistry, Petrology [V]
MN: 2003 Fall Meeting

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