and also exhibit a negative correlation between Sr concentration and $^{87}Sr/^{86}Sr$ ratio. These data are consistent with the previous interpretation that the syenite nodules represent completely solidified trachyte liquid (Widom et al., 1997). The minimum $^{87}Sr/^{86}Sr$ of both the trachytes and syenites is similar to the $^{87}Sr/^{86}Sr$ (0.70491) of Holocene alkali basalts (Widom et al., 1997) exposed on the flanks of Agua de Pao volcano. These basalts may therefore be representative of the uncontaminated magma parental to the trachytic/syenitic liquids. Crystal fractionation combined with shallow-level contamination were therefore active processes in the evolution of the Fogo A magmatic system.

V52A-09 1330h POSTER

Melt Inclusions in Breccia Xenoliths Pyroxene Phenocrysts from Campi Flegrei (Italy): Relationship with Mt. Somma-Vesuvius Volcanism

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The volcanic activity of Campanian Plain, southern Italy, receives continuing attention of Earth scientists motivated by the proximity of active volcanoes to densely populated areas. Campi Flegrei, active since >40 ka, is one of the volcanic centers located in the Campanian Plain, immediately west of Naples, and about 30 km from Mt. Somma-Vesuvius volcano. We studied compositions of reheated melt inclusions in clinopyroxene phenocrysts from three breccia xenoliths, sampled in the outskirts of Campi Flegrei caldera rim: two from Breccia Museo Unit (MT3 and MT25) and one from Punta Marmolite (MT10). Melt inclusion compositions are remarkably different from the compositions of known contemporary Campi Flegrei volcanics, being significantly enriched in K2O and depleted in Na2O. Some differences are also evident in FeO (total) ad TiO2 contents. We argue that clinopyroxene phenocrysts could not have crystallised from Campi Flegrei magmas but they originated from a volcanic system genetically very similar and possibly linked with the >14 ka volcanic system of Mt. Somma from which Vesuvius grew up later on (i.e., after 472 AD eruption). The Mt. Somma-Vesuvius volcanic system has always been considered as separate to the Campi Flegrei volcanic system, active in the western side of Napoli. We hypothesise on the contrary a close linkage between volcanism of Mt. Somma and volcanism in the Campi Flegrei area prior to the Neapolitan Yellow Tuff (NYT) eruption (about 12 ka). We also discuss some problems with identifying the parental magma compositions for post-472 AD Vesuvius eruptions. In particular, we demonstrate that published compositions of melt inclusions in olivine and clinopyroxene phenocrysts from these volcanics do not reflect the compositions of parental magmas, which remain virtually unconstrained.The very tight trends formed by the basaltic recent Vesuvius volcanics indicate that the composition of the erupting evolved melts has changed little since 472 AD, and that the magma chamber supplying these inter-plinian eruptions is essentially under a steady-state condition.

V52B CC: Hall D Friday 1330h

Volcanic Processes Posters *(joint with M)*

Presiding: **D Adams,** SUNY-Buffalo

V52B-01 1330h POSTER

The Movement of Block and Ash Flows in Channels

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Block and ash flows (BAFs) generated from andesitic or dacitic domes on stratovolcanoes (e.g., Colima, Montserrat, Unzen, Bezymianny and Redoubt) often propagate within steep chutes or channels in the first part of their runout. The rheology of BAFs has been approximated as fluidlike, and the flows have been described by hydraulic theory. As with a fluid, there is evidence that pyroclastic flows, including BAFs, go through a hydraulic jump at the change in slope at the base of the steep chute.

In small-scale laboratory experiments, we studied the behaviour of dry mixtures of sand (88 percent) and dust (12 percent) as they flowed from a chute (1.8 cm wide by 30 cm long) onto an open slope, as an approximation to the flow of a BAF from a channel onto a volcanic apron. We varied the angles of the chute and slope over which the poorly sorted sand-dust mixtures flowed. The transition region between the chute and slope provided a major control on flow behaviour. For example, at a chute angle of 45 deg, and slope angle of 25 deg, the velocity of the mixture slowed rapidly from 0.18 m/sec to 0.05 m/sec at the chute-slope transition. This slowing is consistent with the presence of a 'hydraulic jump'.

Within the chute itself, the velocity of the mixtures changed over time. For example, at a chute angle of 45 deg and slope angle 25 deg, the velocity of the mixture in the middle of the chute decreased from 0.11 m/sec to 0.08 m/sec with time, because of deposition within the chute and on the slope. The deposit constrained the movement of the mixture. At a chute angle of 40 deg and slope angle 35 deg, the velocity of the mixture in the middle of the chute increased from 0.09 m/sec to 0.14 m/sec. At these slope angles, a separation of the mixture into sand and dust components at the start of the chute resulted in the formation of a dust hillock, which increased the downslope component of gravitational acceleration on the flow (now more sand rich). These results suggest that during an eruption, the causes for changes in flow speed include channel modification by deposition and erosion, and that the hydraulics of flows can evolve as channel shape changes.

The chute and slope angles exert a major influence on the formation of the stratiform deposits in the experiments. For example, at a chute angle of 45 deg and a slope angle 25 deg, layers begin to form at the break in slope - at the end of the chute (type 1 deposits). At an angle of the chute of 40 deg and of the slope of 30-35 deg, the stratiform mass begins to form at the beginning of the chute (type 2 deposits). The layers of types 1 and 2 deposits display different angles with the chutebottom; the layers of the type 1 deposits retrograde; as where the layers of type 2 deposits prograde. The stratiform mass represents the alternation of subparallel sand and dust layers. In a real block and ash flow deposit, it may be that the slope angle exerts an analogous subtle control on deposit architecture.

URL: http://www.geology.buffalo.edu/mib/res/

V52B-02 1330h POSTER

The Formation of the Chute and the Channel at the Foot of the Andesitic Dome of Bezymianny Volcano

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Block and ash flows (BAFs) commonly form chutes and channels at the foot of lava domes atop stratovolcanoes that conduct pyroclastic debris to lower elevation. The evolution of such channels over a period of 20 years has been observed at Bezymianny volcano.

Bezymianny volcano (Kluchevskaya group) is the most active volcano of the Kamchatka peninsula. In the first two decades after the catastrophic eruption in 1956, the activity of the volcano consisted of the evolution of the andesitic dome Noviy in the explosive crater. After 1977, volcanic eruptions began to evolve in the following succession: slow extrusion of block in the summit crater; ash explosions of various magnitude; lateral-directed blast; pyroclastic flows; viscous lava flows. As a consequence of erosion by rolling dome blocks, chutes formed on the eastern side of the dome and adjacent apron. A chute in the NE direction formed most often and persisted the longest time. Possibly it was associated with the volcano's structure - before the 1955 eruption, the edifice of the volcano was cut by a steep valley in the ENE direction.

After the volcanic eruption of 2.11.79, as a continuation of an explosive funnel from the dome, a deep chute in the ENE direction was formed (40-20 m depth and 200-60 m wide at the opening and 6 m depth at the ending). The chute turned into a channel in the SE direction at the foot of the dome. The channel opened out into the Valley of Flows, a broad depositional fan. After the eruption of 9.18.79, the channel attained a length of 1500 m and a depth of 15-40 m.

From 1980 to 1984, the size of the chute varied depending on the scale of the eruption. The shape of the channel did not change in this time. The most powerful eruption after 1956 happened in 1985. The volume of the eruptive products was 0.05 cubic km the runout distance of the pyroclastic flows was 12.5 km. This eruption exploited the channel most profoundly. Before this eruption the entrance of the channel was narrow, and the chute turned into the channel over an angle of 100 deg. After this eruption, a triangular section of channel wall, which had blocked the entrance of the channel, was destroyed. The channel was widened in its upper part to 100 m.

After the eruption of 1985, lava flows began to effuse into the explosive funnel. In 1988, the huge explosive funnel (with a volume of 0.018-0.02(?) cubic km) was filled. From 1986 to 1990 the eruptions of the volcano were weak, with volumes of the pyroclastic flows of 0.007-0.09 cubic km. The small glowing avalanches and pyroclastic flows which accompanied the effusion of lava flows in the funnel and chute eventually filled the channel as well. After the eruption of 1990, the depth of the channel decreased by half and the channel opened into the valley without a sharp turn.

These results suggest that BAF channels are eroded primarily by the largest events with erosion focussed at channel transitions. Smaller single eruptions change channel morphology very little, but after numerous small events the channels are filled by pyroclastic debris.

URL: http://www.geology.buffalo.edu/mib/res

V52B-03 1330h POSTER

Record of Miocene-age Explosive Volcanism and Diatreme Formation in the Iblean Plateau, Southeastern Sicily

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The Miocene carbonate platform of the Iblean plateau in

V52B-04 1330h POSTER

How Long Can You Go? Cooling the Young Sheet Flow on the Juan de Fuca Ridge

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We examined lavas from the Young Sheet Flow (YSF)of the Juan de Fuca Ridge (JFR) to constrain the cooling history of submarine lava flows. The YSF covers an area of approximately 3.5 km^2 , lies between 44° 55.5' N and 44° 59.5' N, and was erupted sometime in the 1980's. The general emplacement history, flow boundaries and lava morphologies are well known for the YSF. Several flow morphologies are represented by the thin sections.

Thin sections were made from samples collected along the length of the YSF. Controlled computerized counts were completed using digitized images of the thin sections. The thin sections represent various lava flow morphologies such as sheet flows and lava pillars. Phenocryst composition is dominantly plagioclase feldspar with minor amounts of olivine. A sample collected from a lava pillar represents the most proximal thin section yet examined, and contains the lowest crystal (including both phenocrysts and microlytes) content of <1 vol. %. A sample from a flat sheet flow, located 0.5 km south of the vent, contains ~1.6 vol. % crystals. More distally, >1.5 km from the vent, there appears to be a relatively constant crystal content within the lava flow (~1.2 vol. %). The most distal sample is located 2.8 km from the vent, and contains only a slightly lower count of ~1.0 vol. %. These preliminary results suggest that there may be a near-vent rapid increase in the crystal content which then remains relatively constant with increasing distance from the vent.

These data suggest that there is very limited cooling along the length of this submarine lava flow, in contrast to subaerial basalts. For example, examination of the 1984 Mauna Loa basaltic lava flow [Crisp et al., 1994] revealed a ~0.8 vol.% increase per kilometer in crystallinity along the length of the 1984 Mauna Loa, Hawaii, flow while within the YSF samples a ~0.4 vol.% increase per kilometer is indicated by our results. The