

Harvard University, Solid Earth Physics Seminar
Tuesday 25 May 2010, 1:30 pm
4th Floor Faculty Lounge, Hoffman Laboratory, 20 Oxford St.

***It Takes Three to Tango:
Bubble Dynamics in Basaltic Volcanoes
and a Critical Look at Current Models
of Normal Strombolian Activity***

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Abstract: Normal Strombolian activity, named after the famously episodic eruptions at Stromboli volcano, is characterized by temporally discrete fountains of incandescent clasts. The mildly explosive nature of normal Strombolian activity, as compared to more effusive variants of basaltic volcanism, is related to the presence of dissolved gas in the magma, yielding a complex two-phase-flow problem. In the first part of this study, we demonstrate that a combination of three numerical tools, an extended ghost-fluid-type approach, the level-set method, and the extension-velocity technique accurately simulate the dynamics of gas bubbles in basaltic flow. In the second part, we apply this new numerical tool to Stromboli and find that large gas pockets are prone to rapid breakup. This finding sheds doubts on the widely held view that normal Strombolian activity is caused by the bursting of large gas bubbles at the free surface.