THE MODELING COLLABORATORY FOR SUBDUCTION (MCS)

The Modeling Collaboratory for Subduction (MCS) Research Collaboration Network (RCN) is a community effort that is funded by the National Science Foundation as part of the Subduction Zone 4D (SZ4D) process.

The goal of MCS workshops and webinars is to pave the way for a Modeling Collaboratory that is focused on data-integrative modeling for physics-based, decadal-scale hazard assessment for earthquakes, volcanoes and tsunamis.

THE VOLCANIC SYSTEMS WORKSHOP AND WEBINARS

The Volcanic Eruption Plumes Webinars, as well as additional future webinars, are part of the postponed Volcanic Systems Modeling Workshop, which will be primarily focused on the subsurface aspects of volcanic systems: trans-crustal magma transport, magma storage, and magma ascent towards eruption.

A future MCS could serve as a vehicle for enabling intellectual collaborations in subduction-zone science, with the potential of integrating observations with models, and integrating smaller-scale models into broader system-scale models. The MCS could thus improve our ability to model volcanic systems and place them into a broader framework.

WEBINAR OBJECTIVES

The objective of these webinars is to contribute to:

- Identify key processes for collaborative modeling.
- Identify needs and opportunities among models of different scales and/or processes, and integration between models and observations.
- Identify priorities for a future integrative community modeling framework for subduction zones.
- Outline a community plan for an integrative modeling framework and spell out a vision for the MCS from a magmatic systems perspective.

SOME POTENTIAL POINTS FOR DISCUSSION

This list is far from complete and intended to help us get started thinking about potential points for discussion.

1. What are strengths and limitations of the different modeling approaches?
2. What are optimal collaborative strategies for integration of geophysical, field and remote sensing observations with eruption plume modeling?
3. What are the remaining challenges in modeling volcanic plumes?
   - inflow conditions
   - compressibility effects
   - unsteady effects
   - what is meant by the choked condition
   - entrainment
   - fluid-particle interaction
   - turbulence modification
   - heterogeneity in near-field plumes
   - microphysics
   - the problem of scale
   - eruption source parameters

4. Can the MCS contribute to the operational use of plume and tephra dispersion models?
   - reduce risk, to aviation and ground-based communities
   - probablistic tephra hazard assessment
   - simulations run during unrest to anticipate affected regions
   - simulations run during eruptions to forecast deposition
   - simulations during eruptions for aviation safety
   - decision making
   - integration of model results with observations (e.g. satellite retrievals) for improved accuracy
   - software development (e.g. gui's) to expedite setup
   - development of "best modeling practices" to improve uniformity and accuracy

5. What are the biggest factors limiting progress?
   - limited high-quality eruption data to validate models
   - is the community ready to exploit state-of-the-art computers in order to further investigate volcanic plume dynamics and get insights for operational models?
   - which kind of remote sensing observation and model/observation integration can be used to move forward from the limitations of the current approach?