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Comment

Interactive comment on “Dynamic magma mixing revealed by the 2010 Eyjafjallajökull eruption” by O. Sigmarsson et al.

O. Sigmarsson et al.

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We are grateful for the insightful review by D. Perugini and the extended reference list, which he finds relevant for our study.

The reviewer suggests that we change the title of our manuscript. We agree with his arguments and our new title will be “Remobilization of silicic intrusion by mafic magmas revealed by the 2010 Eyjafjallajökull eruption”.

As reviewer 1, Perugini criticizes our use of the words “mingling” and “mixing”. However, the two reviewers disagree about the definitions of these two words when discussing amalgamation of two magmas. We will eliminate the word “mingling” and use instead “mechanical mixing” or simply mixing (s.l.) regardless if partial or complete

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chemical exchange occurred. The reason for this misconception is perhaps simply that neither the authors nor the reviewers are native English speakers.

In his point 3, Perugini proposes an interesting alternative to our proposed rapid magma mingling and fast changing mixing end-member compositions. Namely, sluggish experiments show that mechanical mixing of two components can result in very different degree of mixing, or mixing efficiency, before the blend becomes hybrid magma. This mechanism has been compellingly shown to operate in the plutonic record with mafic enclaves at different stages of disintegration in more silicic magma. However, it is not clear why such diversely mechanically-mixed magma would erupt explosively. What would be the driving force behind such eruption dynamics? In the case of the Eyjafjallajökull eruption last year, the mafic magma injection triggers the eruption. Moreover, the correlation between depth of earthquakes and change in basaltic composition of the mafic mixing end-members is best explained by a very short timescale of magma mingling/mixing. Elsewhere, we will address timescale of mixing derived from elemental diffusion in the incoming mafic minerals and short-lived U-series disequilibria.

Interactive comment on Solid Earth Discuss., 3, 591, 2011.

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