Supporting Information for "Investigating the velocity of magmatic intrusions and its relation with rock fracture toughness: insights from laboratory experiments and numerical models"

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Introduction

This supporting information provides extra material with the table of 3D volume estimates for the simulated cracks, the plots -separated by volumes- of the velocity profiles tracked from the experiments and used for simulations, and the linear regression results that demonstrate the relationship between the width (W) and length (L) of the crack.

Table 1. 3D volume estimates for the simulations, obtained by multiply A_0 times the average width for each volume experiment.

Injected volumes (mL)	A_0 **(cm^2)**	**Mean width (cm)**	$\sim$ **3D volume estimate (mL)**
10	2.4	3.4	8
30	4.9	5.6	27
50	6.7	6.6	44

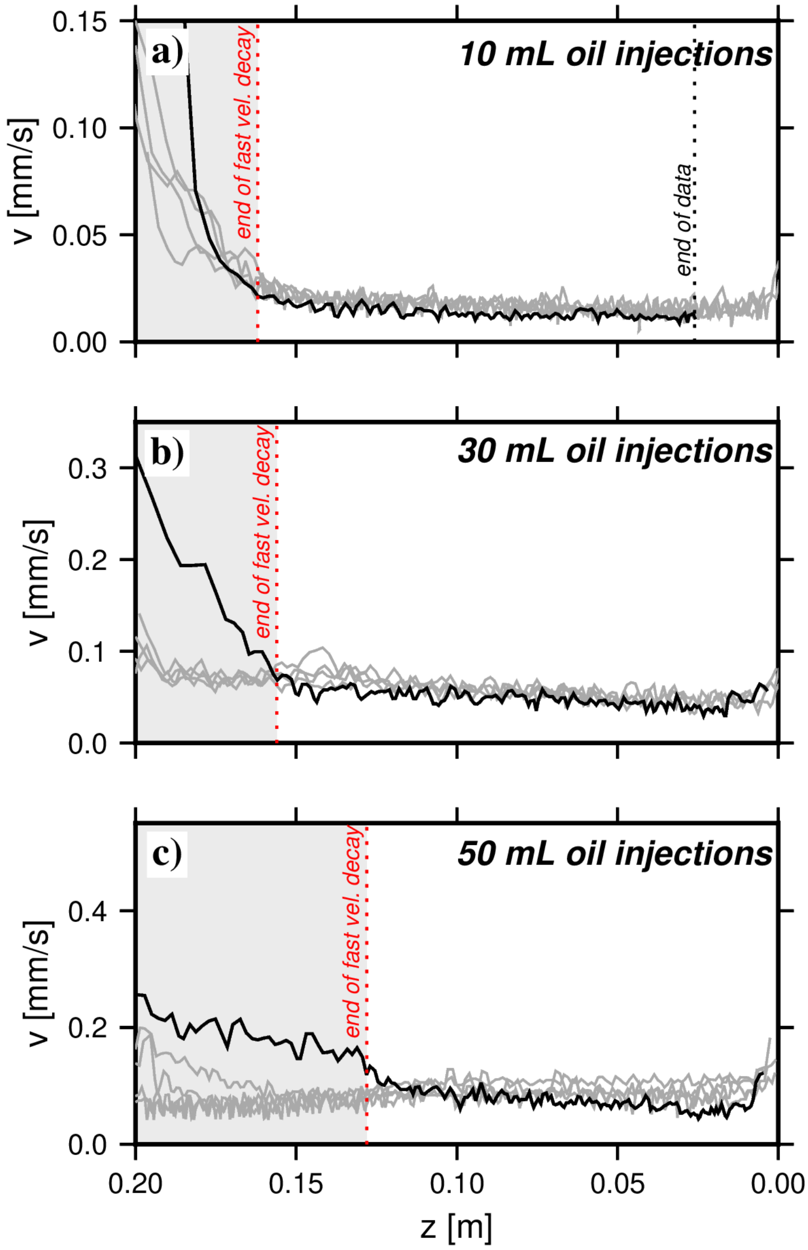

Figure 1. Experimental velocity profiles. Velocity measured along the propagation of oil-filled cracks for a) 10 mL, b) 30 mL and c) 50 mL injections. The black curves represent experiments performed with a thicker needle: 14-O1, 14-O2 and 14-O3 for 10 mL, 30 mL and 50 mL, respectively (Table 1).

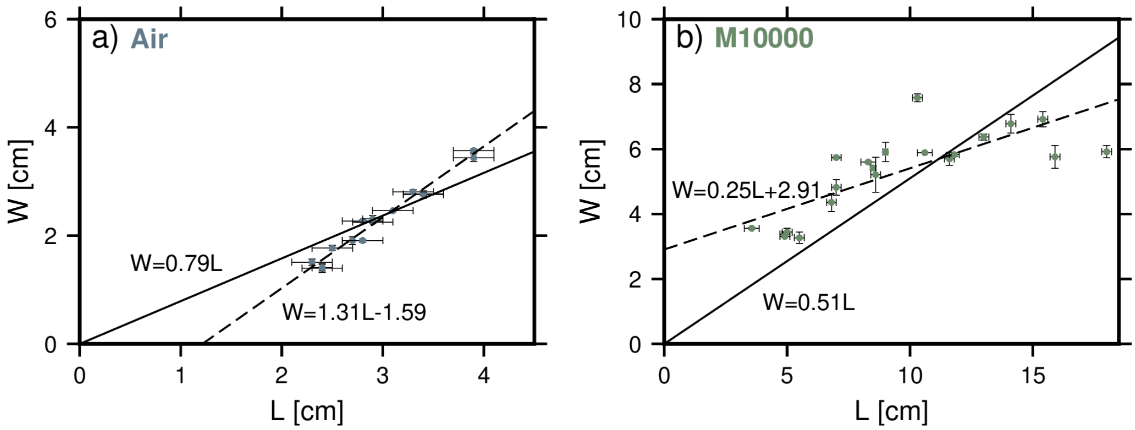

Figure 2. Experimental W/L ratio for a) air- and b) oil-filled cracks. The graphs depict the crack width (W) in proportion to its length (L) for a comprehensive range of injections (as detailed in Table 2 and 1 respectively). The dashed line represents the optimal linear regression, with a formula of $f(x) = 1.31x + 1.59$ for air-filled cracks. Meanwhile, the solid line demonstrates a linear regression with a constraint on the origin of the coordinates. This suggests that as the volume decreases towards zero, both W and L must approach zero, as observed in Dahm (2000a). Although the dashed line offers the best fit for the experimental data, it is not physically plausible because it does not intersect the (W,L) plane at the origin (0,0). Note the difference in scale between the two subfigures.