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SIT041-03 会場: 101 時間: 5月24日 14:15-14:30

海嶺玄武岩の粘性係数測定：斜長石形状の相対粘性係数に対する効果

Viscosity measurements of MORBs from Hole 1256D, ODP Leg 206: Effect of thin platy plagioclase on the relative viscosity

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The viscosity measurements and samplings were performed at temperatures from 1240C to 1165C under 1atm QFM buffered conditions on the Mid-Ocean Ridge Basalts from East Pacific obtained during the Ocean Drilling Program Leg 206. Three samples examined are No.1 [core 39R1], No.2[core 27R19] and No.3 [core 3R4]. They are typical MORBs but have different Mg/[Mg+Fe] ratios of 0.60, 0.48, and 0.42 for No.1, No.2 and No.3, respectively. Bulk viscosity of sample No.1 increased from 46 to 74 Pa s at hyperliquidus temperatures of 1240 to 1210C, whereas it increased up to 2908 Pa s in subliquidus temperatures of 1185C. In the sample No.2, bulk viscosity also increased slowly from 42 Pa s at 1232C to 79 Pa s at 1172C, then increased much rapidly to 3422 Pa s at 1152C. Similarly, the sample No.3 showed slow increase of the bulk viscosity from 54 Pa s at 1183C to 84 Pa s at 1153C, whereas it increased up to 1197 Pa s at 1133C. The increase of bulk viscosity at lower temperature is mostly caused by the interaction of the crystals, because the calculated melt viscosity by the equations of either Shaw[1972] or Giordano et al. [2008] are consistent with the observed viscosity at hyperliquidus temperatures, but do not account for the large increase of the viscosity under subliquidus temperatures. The relative viscosities [ur = [bulk viscosity]/[melt viscosity]] are 28 at crystal content of 29 vol % for the sample No.1, 34 at crystal content of 25 vol% for No.2, and 15 at crystal content of 25 % for sample No.3, which are 4-9 times larger than the estimation by Einstein-Roscoe equation with the Marsh's constant (=(1-p/0.6)-2.5). We analyzed crystal size distribution and crystal morphology according to Higgins(2000). From the apparent 2D aspect ratio of rectangles of plagioclase in the experimental run products, plagioclase crystals are extremely thin with the average axial ratio of 14:12:1. The interaction of thin plagioclase in the subliquidus MORBs may be the main cause of the departure of the relative viscosities from the values obtained by Einstein-Roscoe-Marsh equation.