Conduit drilling at Unzen volcano, Japan: descriptions and interpretations of dill cores

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A 1996-m-long hole has been drilled on a slanted trajectory that passed beneath Unzen volcano, Japan. The hole penetrated central conduit region of the volcano at 1600 m below the summit. Drill cores at 50 m intervals were recovered from the hole. The principal facies of the drill cores in the conduit regions are polymictic breccia and coherent dacite. The polymictic breccia is non-stratified, poorly sorted and made up of heterolithologic polyhedral dacite clasts 10 - 50 mm across, which are embeded in a cogenetic matrix. Latger clasts up to 50 cm across rarely occur. The clasts consist of non-vesicular, porphyritic dacite, which varies in color, alteration, phenocryst size and phenocryst proportion. They show clast-ratated texture and no jigsaw^fit texture. The edges of the clasts are commnly rounded. The matrix of the breccia is reddish grey, dense, and composed of angular dacite fragments up to 5 mm across. The coherent dacite is grey, massive and porphyritic. It contains plagioclase and hornblende phenocrysts. The matrix of the dacite is mostly crystalline but gradation from light grey, crystalline dacite to dark gre, glassy dacite occurs. These polymictic breccia and coherent dacite have been untryded by tuffisite veins up to 10 mm wide. The veins vary in color and components. Some veins show laminations along the vein wall.

The morphological pheatures of the polymictic breccia suggest that the breccia formed within the conduit region of the volcano in response to fragmentation of rocks due to explosions, but did not extrude from the vent. The coherent dacite is probably a dyke with chilled margins. The veins may have formed bu injections of high-temperature gas or liquid into fractures around dykes during dyke intrusions.

The descriptions of drill cores, together with drill cuttings and FMI data, suggest that a diatreme 300 - 350 m wide occurs at 1600 m below the summit. The diatreme consists of polymictic breccia and several parallel dykes. Each dyke is tabular-shaped, and 3-30 m thick. Thin dykes have simple, uniformed interior and are inferred to have formed by single injection of magma. On the other hand, thick dykes have several cooling units within, and probably formed by several magma injections.