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The plan imaging the lava dome structure with cosmic-ray muon at Unzen

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It is significant for the growth model of volcano which has viscous magma to investigate the density structure in a lava dome. The project imaging the new lava dome density structure in Unzen, Japan, is going on. The first observation of the imaging a inner density structure in lana dome with cosmic-ray muon was performed by Tanaka et al. (2007) in Showa-shinzan, Japan. The results indicates the growth model advanced by I. Yokoyama in 2002 is most compatible. The lastest lava dome in Mt. Unzen was formed in the eruption from January 1991 to early 1995 and the activity was calmed down in 1995. The formation of the lava dome in Unzen can be divided into two characteristic growth period, exogenous and endogenous. The exogenous dominant period is from January in 1991 to late 1993, the endogenous dominant period is from the end of 1993 to early 1995. Nakada et al (1995) observed that the surface of the lava dome was moving from the in endogenous period in Unzen. They also observed there are several faults, cracks, and th thrusts around the base of lava dome.They proposed a growth model in the endogenous period in Unzen, which is based on their observation and the model includes "peel" structure . According to the dome growth model by Nakada et al, the current density structure in the lava dome should be the following : 1. The ellipsoidal massive part is in the center of lava dome. 2. The talus spread around the massive ellipsoidal. In the talus region, there are a lot of air gaps, which makes the clear contrast in the image of density with muon-radiography. The simulation of the imaging the lava dome with cosmic-ray muon is performed. The parameters are based on the assuption from the peel growth model. As a result, the observation with the muon detector which has 1.0 m^2 as a effective area and with 6 months exposure, the detection of the boundary between ellipsoidal massive part and talus part is possible with 25m spacial resolution. The nuclear emulsion as a muon detector, which has 1.0m^2 effective area, was installed in Unzen in early December 2010. After 6 months exposure and the development of nuclear emulsion, the analysis with automated readout system will start for about two months. We will get the first image in next early autumn.