Possible interaction between mega-earthquake and long term volcanic activity

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The 2011 March 11 Off-Tohoku M9 earthquake caused dramatic change in crustal stress field in North Honshu Arc. Source mechanism of crustal earthquakes changed from reverse fault type to strike slip type in most part (Hasegawa et al., 2011). Even normal fault type earthquake has started after the great earthquake. These lines of evidences indicate that regional stress field changed from horizontal compression to neutral or horizontal extension as a result of the M9 earthquake. It is expected that magma flux from the mantle to volcano system in the crust increased in long term after this big earthquake. To understand the response of volcanoes in subduction zones to the crustal stress drop caused by M9 earthquake is very important.
I proposed that synchronous start of modern volcanic activity of three volcanoes in Hokkido, Komagatake (started 1640AD after dormant period of ~3000 years), Usu (started 1663AD after dormant period of ~5000 years) and Tarumae (started 1667AD after dormant period of ~3000 years) may be explained by a triggered of the M9 earthquake took place in AD1611 (Takahashi, 2012). Change in crustal stress field caused by large earthquake may be plausible to explain the synchronous start of the volcanic activity. If modern activity of Komagatake, Usu, and Tarumae were triggered by the 1611 earthquake in Kuril, then interaction time between the earthquake and the volcanic eruption is 30 to 50 years. This interval between the earthquake and the start of volcanic activity may correspond with the time interval at which half solidified magma reservoir and conduits were heated and increased the degree of partial melting by the injection of hot basalt magma from the upper mantle or lower crust. Petrologic study of 1640AD products of the Hokkaido Komagatake volcano supports this interpretation (Takahashi & Nakagawa, 2005).
In the case of Jogan great earthquake (869 AD, >M8.4), only 871AD eruption of Chokai volcano (basalt lava) was recorded. However, if we allow volcanic eruption 30 to 50 years after the earthquake, the last eruption of Towada volcano (Towada-A) that took place in 915 AD may be counted as a possible eruption triggered by Jogan earthquake. Towada volcano erupted episodically in the last 150000 years. Interval time between Towada-A and Towada-B is about 1700 years. It is plausible that silica-rich magma chamber beneath Towada volcano was activated by injection of large amount of basalt magma from mantle source due to stress drop caused by the Jogan great earthquake.
Only a few volcanoes in Tohoku Japan have erupted lava flow or pyroclastic flow in the last 1000 years. Many volcanoes in Tohoku Japan, however, may start magmatic eruptions within next 10~30 years due to the injection of hot basaltic magma from the upper mantle to the lower crust. If basalt magma penetrate the half solidified conduit system and erupt separately from the silicic magma, basaltic eruption may take place much earlier than 30 years. Basalt eruption in Chokai volcano in 871AD may be an example of this type eruption. In order to make prediction of their future activities, it is most important to clarify the deep structure of active volcanoes in Japan. Methods to monitor the deep magma injection, heating process of the magma reservoir and conduits should be developed.

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