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Spatiotemporal stability of seismic quiescence 2

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In the last meeting of the seismological society of Japan we have reported spatiotemporal stability of the seismic quiescence before the 2011 Tohoku Earthquake. As a result, it became clear that the seismic quiescence had continued to appear stably in the northern part of the source region which became clear around 2001. And also that in some cases the appearance of quiescence area is not directly connected to a large earthquake. This phenomenon is likely to be artificial ones caused by way of parameter setting. We report the results to verify if the behavior of the apparent quiescence is captured by the method of parameter setting.

The method for analysis is the eMAP (Aketagawa and Ito, 2008; Hayashimoto and Aketagawa, 2010), a detection tool of activation and quiescence of seismicity, as it has been used before. It is possible to adjust various kinds of parameters to earthquake detection capability and characteristics of the seismic activity in every area for grasp of spatial pattern of seismicity with this tool.

Seismic quiescence is thought to be caused by a reduction in stress due to localized slip at the contact surface between the fault plane with relatively weak strength. That seismic activity did activated in the southern half, while the quiescence was observed only in the northern half of the focal region in Tohoku Earthquake, seems to reflect that the stress decreased in the northern half, while it increased in the southern half. Although there are cases where apparent quiescence occurs from temporary fluctuation of seismic activity, a most probable seismic quiescence area can be extracted by proper selection of parameters. A possible method for judgment of true seismic quiescence is a so-called doughnut pattern (Mogi, 1969). This phenomenon is thought to be universal to reflect the physical property of the focal region, because the activation area of the seismic activity appears in the asperity where strength is comparatively high in the surrounding of seismic quiescence area.

Keywords: Seismic activity, Quiescence