

Variation of activity of felt aftershocks: An application of the modified Omori formula to aftershocks of the 2019 off Yamagata earthquake

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Dependence of activity of felt aftershocks (K value) with epicentral distance has been studied by fitting the modified Omori formula (Utsu, 1961) to the aftershock sequences of the off Southern Yamagata Prefecture earthquake of June 18, 2019 observed at eight seismological stations in Yamagata and Niigata prefectures. The aftershocks used in the analysis are limited to those whose epicenters are located off the coast of Yamagata prefecture or Kaetsu area of Niigata prefecture. The fitting of the modified Omori formula is made to the time sequences of aftershocks with seismic intensities greater than one at each of the eight stations. The aftershocks with seismic intensities greater than one are called felt aftershocks in the present study. Because the data set of aftershocks located by JMA is used, the fitting of the formula is also made to all the located felt aftershocks. The interval of two hours is adopted after several trial fitting of the formula to the data. Three intervals are obtained from the origin time of the main shock 22:22 of June 18 to 4:22 of the next day. The values of $p=1.3$ and $K=20$ are derived from fitting the formula to the data set of all the located felt aftershocks. The value of $c=0.1$ is assumed. The values of $p=1.3$ and $c=0.1$ are fixed and K value is determined from the aftershocks felt at each of eight stations. The results are summarized in Figures 1 and 2. Figure 1 shows the numbers of felt aftershocks at three time intervals for each of eight stations, the best fitting formula and the K value for each station. Result from the all the located felt aftershocks are also shown in Figure 1. In Figure 2, the values of K obtained for eight stations are plotted as a function of epicentral distance. The K value plotted at epicenter (0 km) is obtained from the data set of all the located felt aftershocks. Figure 2 may show the decrease of the value of K with increasing epicentral distance.

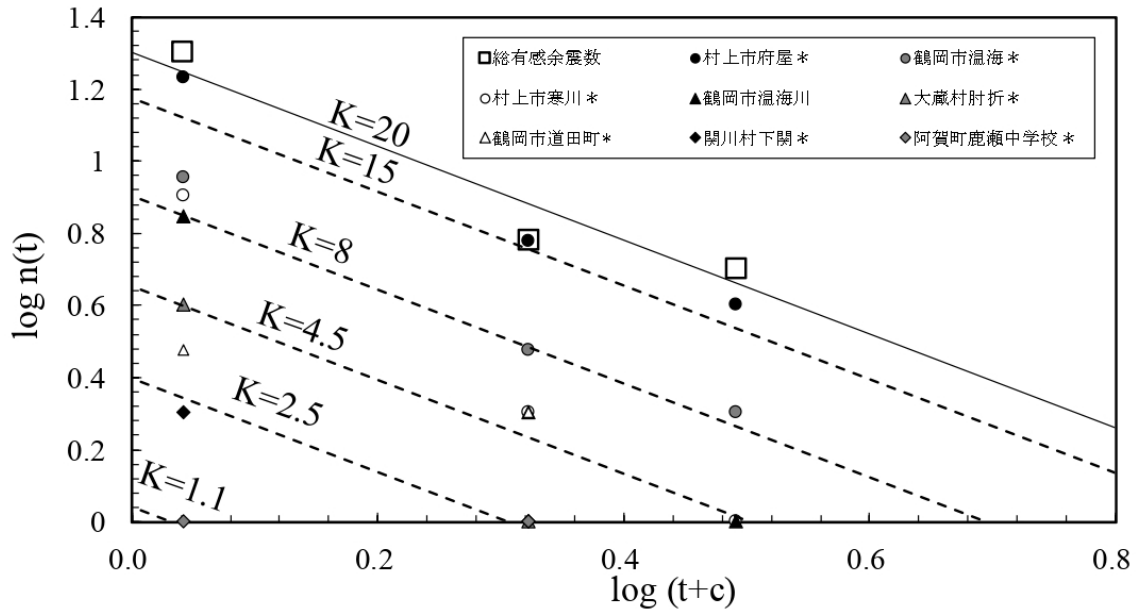


Fig.1 Frequency of the felt aftershocks for interval of 2 hours of the 2019 off Southern Yamagata Prefecture earthquake and lines with $p=1.3$, $c=0.1$, and the best values of K estimated for modified Omori formula (Utsu, 1961).

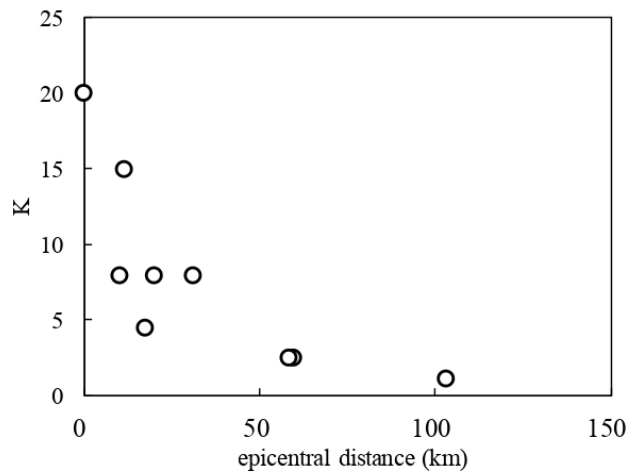


Fig.2 Relation between the value of K of the modified Omori formula and epicentral distances. The K value at 0 km is determined from all the located felt aftershocks.