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THE RELATION BETWEEN THE LINEARITY OF AFTERSHOCK ZONES AND THE STRONG AFTERSHOCK PRODUCTIVITY

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We examined the distribution of aftershock zones for large earthquakes($M_S \geqslant 7$), and found that, if the distribution of aftershock zone is very regularity , dominated length, or the ratio of length(L) to width(W)(defined as the linearity of aftershock zone) large(highly linearity), thus the frequency of the strong aftershocks and the magnitude of the largest aftershock low; if linearity of aftershock zone low, thus the frequency of the strong aftershocks and the magnitude of the largest aftershock high(Figure 1).

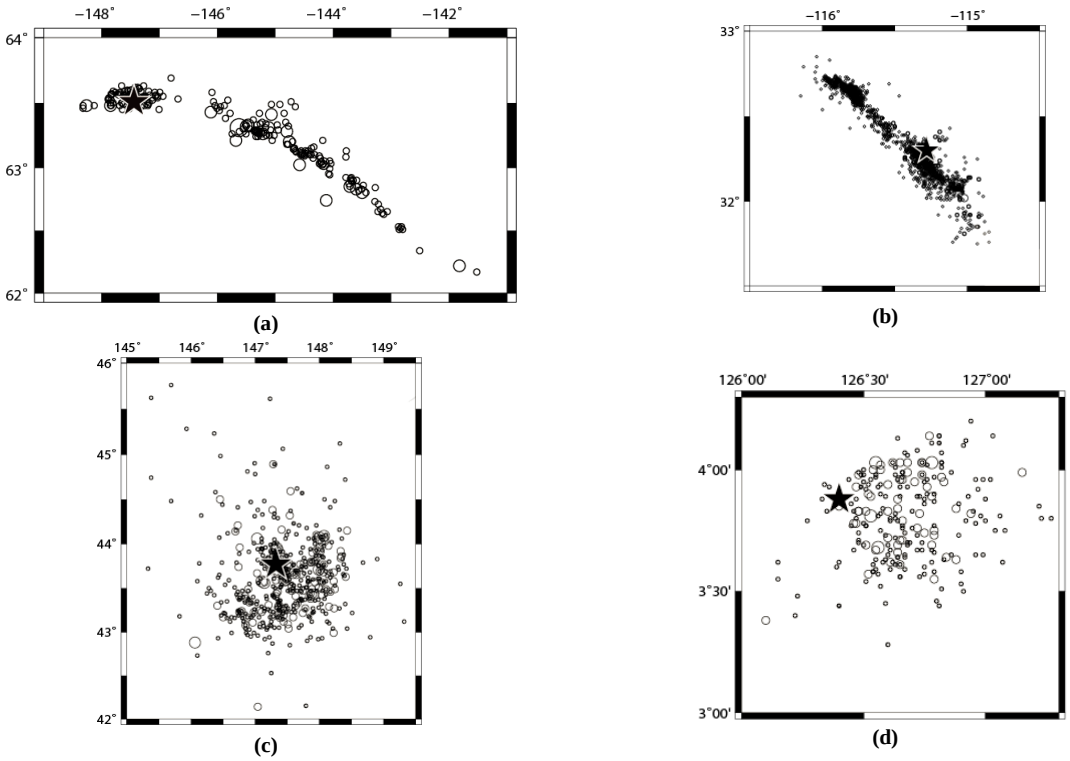

Figure 1. Some examples for the distribution of aftershock zone: (a),(b)-highly linearity; (c),(d)- lowly linearity. (a) The 2002 Alaska M7.9 earthquake(L/W=8.0， N5=19， N6=1， D1=1.9); (b) The 2010 Mexico M7.2 earthquake (L/W=5.0，N5=9，N6=0，D1=1.4); (c)The 1994 Japan M8.3 earthquake(L/W=1.7，N5=202，N6=18，D1=1.0); (d) The Indonesia M7.2 earthquake(L/W=1.7，N5=87，N6=7，D1=0.9).
L/W, the ratio of length(L) to width(W); N5, the frequency of M⩾5.0 aftershocks; N6, the frequency of M⩾6.0 aftershocks; D1, the magnitude difference D1 between the main shock and the largest aftershock.

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We investigated the distribution of aftershock zones for 84 shallow(h⩽60km), mainshock-aftershock type earthquake sequences, the mainshock with $M_S \geqslant 7$, in the period 1977–2010 in the world, there are sufficient early aftershocks to permit the determination of the length and width of aftershock zones. For every sequence, the aftershocks with $m_b \geqslant 4$ are collected from the Preliminary Determination of Epicenters (PDE) NEIC worldwide catalog. We determined the length (L) and width (W), to use 3 days distribution of aftershocks; the aftershock frequency (N5, N6) (N5, the frequency of M≥5.0 aftershocks; N6, the frequency of M≥6.0 aftershocks) and D1 (the magnitude difference between the main shock and the largest aftershock) were computed for the 1-year time period sequence following the mainshock.

There existed some extent relation between the linearity(L/W) of aftershock zone and the strong aftershock productivity. The frequency of the strong aftershocks and the magnitude of the largest aftershock decrease systematically with the linearity(L/W) of aftershock zone(Figure 2 and Figure 3). It is useful to judge the tendency after mainshock by this relation.

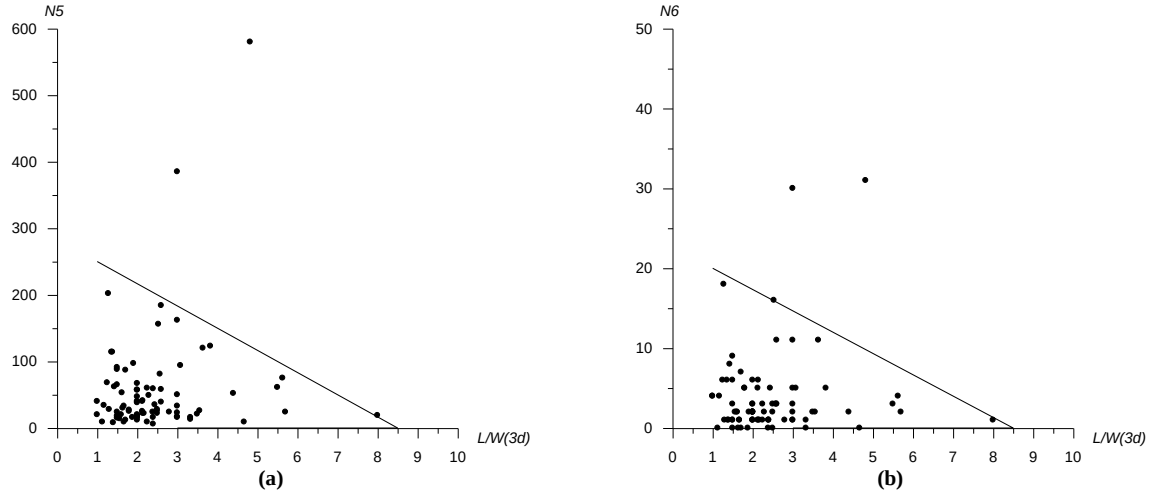

Figure 2. The relation between the aftershock zonelinearity(L/W) and the aftershock frequency(N5,N6).

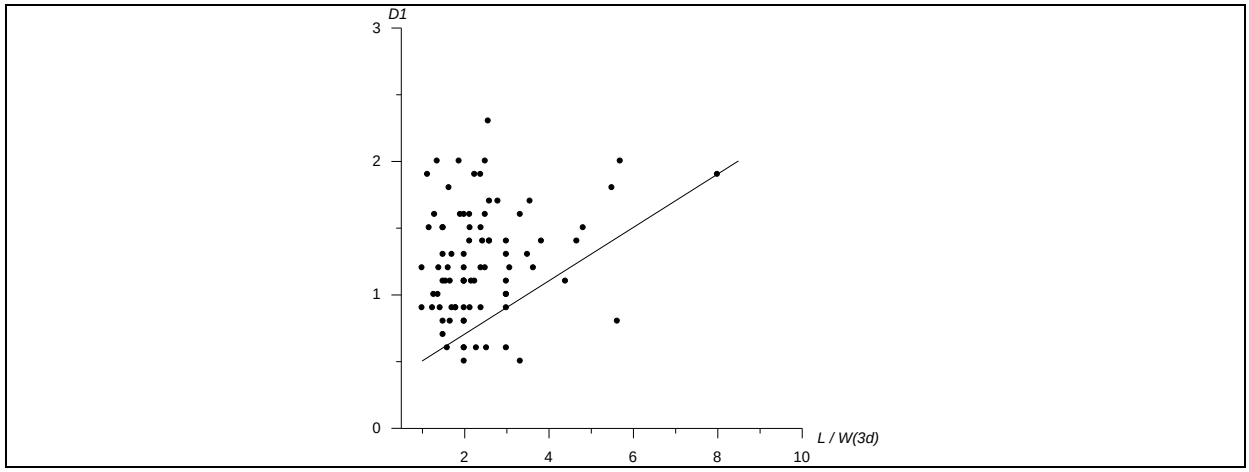

Figure 3. The relation between the aftershock zone linearity(L/W) and D1.

REFERENCES

Henry C and Das S (2001) "Aftershock zones of large shallow earthquakes: fault dimensions, aftershock area expansion and scaling relations," *Geophys. J. Int.*, 147: 272-293

Kagan Y Y (2002) "Aftershock zone scaling," *Bull. Seism. Soc. Am.*,, 92(2): 641-655

SU Youjin and Zhao Xiaoyan (2008) "Character istics of Globa l Earthquake Sequences with *M*w⩾8.0," *Journal of Seismological Research*, 31(4): 308-316