

The deep structure and seismic characteristic of Longmenshan fault zone

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The Longmenshan fault zone is located at the Eastern Tibet, north from the Qingchuan, go through the Nanba, Beichuan, Yingxiu, Baoxing to LuDing, total length is about 560 km, and width is 30-50 km. This belt is mainly composed of 4 faults from the west to the east, which are Maoxian-Wenchuan fault, Beichuan-Yingxiu fault, Anxian-Guanxian fault and Guangyuan-Dayi fault, respectively (Hubbard et al., 2008; Xu et al., 2008). The whole fault zone shows the characteristics of the earth's physical field change abruptly, such as landform, crustal thickness, tectonic stress field, density and velocity. Through research and analysis seismic reflection profiles and aftershock sequence space distribution of large earthquake, deep structures and the characteristics of earthquakes of Longmenshan tectonic belt are studied here. It reveals the fine crustal structure and construction of 3 sections of Longmenshan fault zone: north, middle and south, discusses the relationship between deep structural features and seismic, formed as below:

1. The north segment of the Anxian-Guanxian fault with NW dipping angle of 45° at ≥ 14 km depth, and begin to slow in the depth of 8 km. The all middle segment of this fault show the characteristic: North East steep south west slow, and develop various structural types. From the aftershock distribution map, we can see that the earthquakes are less in Anxian-Guanxian fault northern part. There are a large number of earthquakes in the middle section of the fault, which may be related to the development of the hidden faults. Most of southern part aftershocks are distributed on both sides of the fault, located below the Anxian-Guanxian fault.

2. The study found that the north segment of the Yingxiu-Beichuan fault dip 55° to NW in ≥ 19 km depth, and begin to slow in the depth of 6 km, extend to decollement surface at low angle. From the aftershock distribution map, we can see that the earthquakes in northern fault are distributed along both sides of Yingxiu-Beichuan fault. It reveals that Yingxiu-Beichuan two measuring lines are located in middle of the aftershock concentration areas.

3. It reveals that the middle segment of the Wenchuan-Maoxian fault dip 55° to NW in ≥ 10 km depth, and begin to slow in the depth of 5 km, the angle change to 35° . From the aftershock distribution map, we can see that the earthquake near this area is sporadic, only developing a NW-SE trending seismic zone in the South West of the middle segment, which covered in Wenchuan-Maoxian fault and near to the main quake of Wenchuan earthquake. This NW-SE trending seismic zone may be the activated product of Wenchuan earthquake.

References

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