

# 1999年台湾集集地震余震区——嘉义地区地震的剪切波分裂参数随时间变化的研究

郑秀芬<sup>1,2</sup>, 陈朝辉<sup>2</sup>, 张春贺<sup>3</sup>

1 中国地震局地球物理研究所, 北京 100081; 2 台湾中正大学地震研究所, 嘉义 62102;

3 国土资源部油气资源战略研究中心, 北京 100034

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**摘要** 本文利用台湾中央气象局布设的嘉义台CHY、民雄台CHN2和义竹台CHN8记录的地震波形资料, 使用波形互相关的SAM分析方法(剪切波分裂系统分析方法), 对发生在1999年9月20日台湾集集大地震( $M_W$ 7.6)余震区的嘉义 $M_L$ 6.4和 $M_L$ 6.0级地震的震前序列, 开展了长达22个月的大震前近场源剪切波分裂参数随时间变化的应力预测研究. 研究表明, 在正常情况下, 快剪切波的偏振方向大致近东西向, 与嘉义地区最大主压应力场的方向一致, 表明该区的各向异性受区域构造应力场控制; 根据剪切波分裂参数——快剪切波偏振方向和慢剪切波时间延迟随时间的变化, 我们认为, 临震期慢剪切波时间延迟的快速下降和快剪切波偏振方向 $90^\circ$ 跳跃事件的频繁发生, 可以作为临震期大震应力预测的前兆指标. 近场源剪切波分裂参数随时间的变化在揭示震源区应力变化方面将发挥重大作用.

**关键词** [台湾集集地震](#), [余震区](#), [嘉义地震](#), [地震各向异性](#), [剪切波分裂](#), [应力预测前兆](#), [快剪切波偏振方向](#), [慢剪切波时间延迟](#)

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Study on temporal variations of shear-wave splitting in the Chiayi area, aftershock zone of 1999 Chichi earthquake, Taiwan

ZHENG Xiu-Fen<sup>1,2</sup>, CHEN Chao-Hui<sup>2</sup>, ZHANG Chun-He<sup>3</sup>

1 Institute of Geophysics, China Earthquake Administration, Beijing 100081, China; 2 Institute of Seismology, National Chung Cheng University, Chiayi 62102, Taiwan, China; 3 Strategic Research Centre for Oil and Gas Resources, Ministry of Land and Resources, Beijing 100034, China

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**Abstract** Based on the data from three seismic stations CHY, CHN2 and CHN8 of Taiwan Central Weather Bureau Seismic Network (CWBSN), the systematic analysis method (SAM) of shear-wave splitting has been used to do the near-source stress-forecast research of temporal preseismic variations of polarization directions and time delays in nearly 22 months before 1999  $M_L$  6.4 and  $M_L$  6.0 earthquakes in the Chiayi area, the aftershock zone of  $M_W$  7.6 Chichi, Taiwan earthquake of September 20, 1999. The result shows that the normal polarization directions of station CHY, CHN2 and CHN8 are approximately EW, in good agreement with the direction of maximum compressional stress, suggesting that the anisotropy in this area is controlled by local tectonic stress field. The results strongly indicate that in the stress critical stage, the polarization  $90^\circ$ -flips occurred frequently, and that there were abrupt decreases in time delays shortly before the Chichi mainshock and two Chiayi earthquakes. These can be considered as two precursors of stress-forecast. We think that the temporal variations of shear-wave splitting are of great importance, since they provide information about source stress processes and critical warning information before large earthquakes.

**Key words** [1999 Chichi earthquake](#) [Aftershock zone](#) [Chiayi area](#) [Anisotropy](#) [Shear-wave splitting](#) [Stress-forecast precursor](#) [Polarization of fast shear-wave](#) [Time delay of slow shear-wave](#)

通讯作者:

张春贺 [chunhezh@yahoo.com.cn](mailto:chunhezh@yahoo.com.cn)

作者个人主页: 郑秀芬<sup>1,2</sup>; 陈朝辉<sup>2</sup>; 张春贺<sup>3</sup>

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