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在地震预测研究中使用GPS和震源机制资料的问题探讨——与王秀文等商榷

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Discussion on usage of GPS observational data and focal mechanism in earthquake prediction research—Comment on Wang Xiuwen's paper

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摘要

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摘要 针对“山西地区应力场变化与地震的关系”一文, 本文指出: (1) P波初动存在误读的可能, 出现矛盾符号是正常的; (2) 地震仪器极性也可能反向, 不校核可能会导致错误的震源机制解. 还讨论如何正确地表示震源机制随时间的变化. 分析认为GPS观测结果若不认真考虑观测误差、模型误差以及应变信息的层次, 所得结果可能会与震源机制解反演的区域构造应力场相矛盾. 比较了地震与GPS资料存在的差别和二者所提供信息的优劣后, 认为二者恰好可以互补. 利用GPS和地震两种资料联合反演、解释、相互约束, 则可增加反演结果的可靠性. 地震学和GPS观测两学科的交叉、融合必将有力地推动地学研究的深入.

关键词: 震源机制 GPS 应力场 P波初动 地震前兆 地震预测

Abstract: In view of "Research on relationship between stress field variation and earthquakes in Shanxi area", this paper shows that 1. it is normal having inconsistent signs because there is some possibility of misreading the first motion polarity of P waveform; 2. the polarity of seismometer may be reserved, it would lead to wrong focal mechanisms if the polarity of seismometer is not corrected when we use the first motion polarity to invert for focal mechanism. Moreover, we also discussed how to exactly display the temporal changes of focal mechanisms. Not consider seriously the observational error, model error and the level of strain information, the regional tectonic stress field derived from GPS data would be in contradiction with those from focal mechanisms. Through the comparison of the difference, advantage and disadvantage between seismic data and GPS data, we deem that they just can be complementary. Combined inversion, interpretation and mutual constraint of GPS data and seismic data will increase the reliability of inversion results. Cross-disciplinary integration between seismology and GPS will powerfully push the geosciences research forward.

Keywords: Focal mechanism GPS Stress field First motion of P waveform Earthquake precursor Earthquake prediction

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