

论文

岩石破裂强度的温度和应变率效应及其对岩石圈流变结构的影响

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摘要 研究了温度和应变率对岩石破裂强度的影响, 得到了岩石圈中一些典型岩石破裂强度的新的经验规律. 新的经验规律除考虑围压和标本尺度的影响外, 还考虑了温度和应变率的影响, 并增加了新岩石的结果, 所以更能反映岩石圈内岩石破裂的真实状态. 通过对鄂尔多斯平均流变结构的计算和对比研究表明: 传统的忽略脆性破裂的流变模型过高地估计了流变强度, 流变机制的分布也不尽合理. 而考虑了脆性破裂机制的流变模型的结果表明脆性区分为两部分, 浅部以摩擦滑动机制控制, 深部以脆性破裂机制控制. 由于新的经验规律考虑的代表性岩石更全面, 并考虑了应变率的影响, 得到的脆性区的范围进一步增大, 流变强度进一步降低.

关键词 [岩石圈流变结构](#) [脆性破裂](#) [温度](#) [应变率](#)

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Effects of temperature and strain rate on the fracture strength of rock and their influences on the rheological structure of the lithosphere

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Abstract The effects of temperature and strain rate on the fracture strength of rock were studied based on available experiment data, and a new empirical formula for the fracture strength of some typical rocks in the lithosphere is obtained. The effects of the confining pressure, size of the rock sample, temperature and strain rate are taken into account in this formula so that it can further reveal the actual fracture state in the lithosphere. Application of the new empirical formula in the Ordos block shows that the conventional rheological model overestimates the rheological strength and misinterpret rheological deformation mechanisms in the lithosphere; The brittle regime in the rheological structure calculated from new formula can be divided into two sub regions in which the frictional sliding or the brittle fracture is dominant respectively; The magnitude of the rheological strength is decreased and the area of the brittle regime is enlarged because more representative rocks and the effect of strain rate are taken into account.

Key words [Rheological structure of the lithosphere](#); [Brittle fracture](#); [Temperature](#); [Strain rate](#)

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