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不同构造带硅酸盐化学风化率的制约：气候还是构造？ 点此下载全文

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摘要：

虽然构造一风化--_气候之间的制约关系仍然存在各种争论，但无疑的是，硅酸盐矿物的化学风化是调节地质时间尺度全球大气二氧化碳分压，进而保持地球表层气候稳定的关键性因素。目前最大的挑战在于如何理解地表制约硅酸盐矿物化学风化的因素，特别是当仅仅从气候要素变化难以解释长时间尺度硅酸盐化学风化率的时候。综合不同构造区内岩石物理剥蚀率和硅酸盐化学风化率的数据表明，不同时间、空间尺度硅酸盐风化率与构造和气候之间既存在相互耦合也存在矛盾的关系，仅仅归因于单一要素是不能得到圆满解释的。构造隆升区的强剥蚀可能是造成硅酸盐风化率增加的重要因素之一，但是将晚新生代地表系统的各种变化与各构造带(如青藏高原)的阶段性隆升联系起来可能是草率的。在不同类型构造带内，气候和构造对硅酸盐风化的制约并非是相互排斥的，特别是长时间尺度，因此“构造隆升一化学风化一气候变化”假说也正面临着全新的挑战。

关键词：硅酸盐 气温 构造隆升 化学风化率 全球变化

Constraints on Sil icate W eathering Rates in Different Settings：Cl imatic or Tectonic? Download Fulltext

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Abstract:

Though there have been controversies concerning relationships among weathering rate and tectonic andclimatic change, it is commonly recognized that chemical weathering of silicate minerals plays a substantial rolein regulating the partial pressure of atmospheric carbon dioxide and thus in maintaining global surface climaticstability over the geological timescale. How to understand the constraints on chem ical weathering of silicateminerals remains a major challenge, especially when any single climatic factors have been proved hard tointerpret the long—term silicate weathering rate. Based on the compilation of chem ical weathering rates of silicateminerals and physical erosion rates in different settings, this study shows that weathering rates and tectonic andclimatic changes on different spatial and temporal scales have coupling or even conflicting relationships. Suchresults suggest that the silicate weathering rates cannot be explained in terms of merely a single process, andthat the explanation requires a consideration of mu ltiple factors. Although influence of tectonic uplift issuggested to serve as an important role on the change of silicate weathering, it may be cursory to link variouschanges on the Earth ' S surface in the Late Cenozoic to the stepwise uplift of the main orogenic belts, especiallyof the Himalayan- Tibetan orogen. In different settings, tectonic and climatic constraints on silicate weatheringare not necessarily incompatible, especially on time scales of a few m illion years. Thus, the hypothesis proposedfor “tectonic uplift -chem ical weathering- climatic changes” is faced with a new challenge.

Keywords:silicate m ineral air temperature tectonic uplift weathering rate global change

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