

Accepted Manuscript

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PII: S1367-9120(16)30330-3

DOI: <http://dx.doi.org/10.1016/j.jseaes.2016.11.013>

Reference: JAES 2851

To appear in: *Journal of Asian Earth Sciences*

Received Date: 21 April 2016

Revised Date: 6 November 2016

Accepted Date: 8 November 2016

Please cite this article as: Yu, X., Ji, J., Wang, F., Zhong, D., Intensified Climate-Driven Exhumation along the South Himalayan Front since One Million Years ago, *Journal of Asian Earth Sciences* (2016), doi: <http://dx.doi.org/10.1016/j.jseaes.2016.11.013>

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Intensified Climate-Driven Exhumation along the South Himalayan Front since One Million Years ago

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Abstract: This paper builds a database of apatite fission track (AFT) ages and thermal-modeling results covering the whole southern Tibetan Plateau, providing detailed information on the cooling and erosion process of the modern landscape evolution and comparing with the distribution of climatic factors. Large-scale AFT age distribution and thermal-history modeling results indicate extraordinarily intense erosion along the South Himalayan Front and relatively weak erosion in the interior of the plateau. AFT samples from different regions plot into different partitions on the Elevation vs AFT Age diagram, and there is an excellent coupling between AFT ages and climatic factors. Based on AFT thermal-history modeling results, an intensified erosion event since ~1 Myr ago has been identified along the South Himalayan Front. The varied AFT ages along the South Himalayan Front are probably induced by differential intensity of erosion in the same cooling event rather than the time when the rapid cooling event began. Meanwhile, the spatiotemporal coupling of climatic factors and the intensified erosion belt suggests that climatic transition is the key factor dominating the rapid exhumation event since ~1 Myr.

Key words: South Himalayan Front, apatite fission track (AFT), climatic change, exhumation, landscape evolution

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