

## Changes in Asian summer monsoon induced by cultivation during 1700-1850

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Pre-industrial changes in the Asian summer monsoon climate from the 1700s to the 1850s were estimated with an Atmospheric General Circulation Model (AGCM) using historical global land cover/use change data reconstructed for the last 300 years. Extended cultivation resulted in a decrease in monsoon rainfall over the Indian subcontinent and southeastern China, and an associated weakening of the Asian summer monsoon circulation. The precipitation decrease in India was marked, and was consistent with the observational changes derived from examining the Himalayan ice-cores for the concurrent period. Between the 1700s and the 1850s, the anthropogenic increases in greenhouse gases and aerosols were still minor; also, no long-term trends in natural climate variations, such as those caused by the ocean, solar activity, or volcanoes, were reported. Thus, we propose that the land cover/use change was the major source of disturbances to the climate during that period. This report will set forward quantitative examination of the actual impacts of land cover/use changes on Asian monsoons, relative to the impact of greenhouse gases and aerosols, viewed in the context of global warming on the inter-annual, decadal, and centennial time scales.