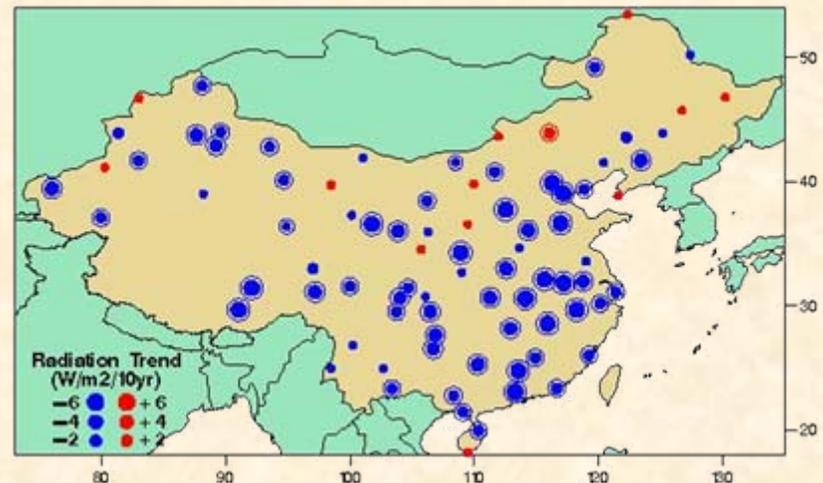
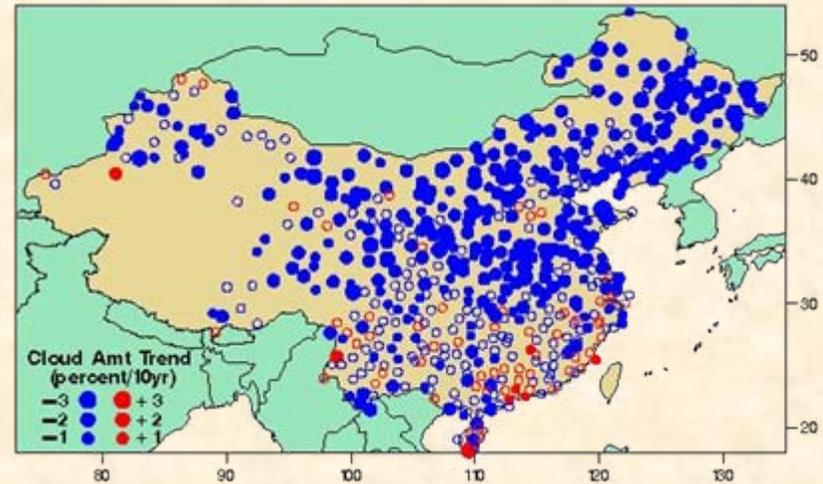


# Cloud amount and surface solar radiation in China have changed significantly over the last half century

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DOE/Office of Science/Biological & Environmental Research

- ↪ Chinese climate records from the last half century have been analyzed via a bilateral research agreement between the US DOE and the China Meteorological Administration.
- ↪ Records of cloud amount are especially important in understanding climate change. Most surface observing stations over China show significant decreases in cloud amount over 1955–2000; this decreasing trend over such a large land area is unique to China.
- ↪ While decreasing cloud amount would be expected to *increase* surface radiation, the opposite is found over most of China; many stations show *decreasing* trends in solar radiation of 2–6 W/m<sup>2</sup> per decade.
- ↪ We postulate that increasing human-made aerosol burden (mainly SO<sub>2</sub>) over much of China has produced a fog-like haze that has decreased solar radiation at the surface via reflection/absorption, despite concurrent decreases in cloud amount.



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Chinese climate records obtained via a bilateral research agreement between the US DOE and the China Meteorological Administration reveal that much of China has experienced significant decreases in cloud cover over the last half of the Twentieth century. This conclusion is supported by analysis of the observed frequency of cloud-free sky and overcast sky. Total cloud cover and low cloud cover have decreased 0.88% and 0.33% per decade, respectively, while cloud-free days have increased 0.60% per decade, and overcast days have decreased 0.78% per decade over China from 1954-2001. Meanwhile, both solar radiation and pan evaporation have decreased in most parts of China, with solar radiation decreasing 3.1 W/m<sup>2</sup> per decade and pan evaporation decreasing 39mm per decade. Combining these results with findings of previous studies, we postulate that increasing human-made aerosol burden (mainly SO<sub>2</sub>) has produced a fog-like haze over much of China that has increasingly reflected and absorbed solar radiation and resulted in less solar radiation reaching the surface, despite concurrent decreasing trends in cloud amount and increasing trends in cloud-free sky.

Qian, Y., D.P. Kaiser, L.R. Leung, and M. Xu. 2006. More frequent cloud-free sky and less surface solar radiation in China from 1955–2000. *Geophysical Research Letters*, Vol. 33, L01812, doi:10.1029/2005GL024586.