



## Independent Confirmation of Global Land Warming without the Use of Station Temperatures

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Confidence in estimates of 20th century land warming is limited by known issues with near-surface air temperature observations from land stations. Station siting, site moves, instrument changes, changing observing practices, urban effects, land cover, land use variations, and statistical processing have all been hypothesized as affecting the trends presented by the Intergovernmental Panel on Climate Change and others. Confidence in the observed rise of global land temperatures since the 1950s is important in assessments of anthropogenic effects on climate, so any artifacts in the observed decadal and centennial variations associated with these issues could have important consequences for scientific understanding and climate policy. Here we test the station temperature observations using a completely different approach to investigate global 20th century land warming. Specifically, we ignore all land temperature observations and instead infer the temperatures from global observations of subdaily barometric pressure, monthly HadISST1.1 sea surface temperature and sea-ice concentration, and of CO<sub>2</sub>, solar and volcanic radiative forcing agents using a physically-based data assimilation system called the 20th Century Reanalysis. This independent dataset reproduces both annual variations and centennial trends found in the observational near-surface air temperature datasets, thus demonstrating the robustness of previous conclusions based on them regarding global warming.