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Recent Inland Water Temperature Trends

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We are using thermal infrared satellite data in conjunction with in situ measurements to produce water temperatures for all the large inland water bodies in North America and the rest of the world for potential use as climate indicator. Recent studies have revealed significant warming of inland waters throughout the world. The observed rate of warming is – in many cases – greater than that of the ambient air temperature. These rapid, unprecedented changes in inland water temperatures have profound implications for lake hydrodynamics, productivity, and biotic communities. Scientists are just beginning to understand the global extent, regional patterns, physical mechanisms, and ecological consequences of lake warming.
As part of our work we have collected thermal infrared satellite data from those satellite sensors that provide long-term and frequent spaceborne thermal infrared measurements of inland waters including ATSR, AVHRR, and MODIS and used these to examine trends in water surface temperature for approximately 169 of the largest inland water bodies in the world. We are now extending this work to generate temperature time-series of all North American inland water bodies that are sufficiently large to be studied using 1km resolution satellite data for the last 3 decades, approximately 268 lakes. These data are then being related to changes in the surface air temperature and compared with regional trends in water surface temperature derived from CMIP5/IPCC model simulations/projections to better predict future temperature changes.
We will discuss the available datasets and processing methodologies together with the patterns they reveal based on recent changes in the global warming, with a particular focus on the inland waters of the southwestern USA.