

ASTER Observations of Water Surface Temperature for Elephant Butte Reservoir in New Mexico

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ABSTRACT

Measurement of the surface temperature of water (referred to as skin temperature for water bodies) such as rivers, reservoirs and oceans has been a challenge. In the past, regular thermometers or thermocouples were used to measure the skin temperature of the water. Thermocouples are mostly used in the field due to their ability to withstand harsh environments. In practice, thermocouples are tied to a buoyant object which holds it suspended up on the water surface. However, the accuracy of measuring skin temperature of the water is hindered by the conditions above the water such as wave motion and the tendency of the thermocouple to sink a few millimeters and thus not reflecting the actual skin temperature of the water surface.

In this study, an infrared thermocouple which is commonly used for measuring the temperature of leaves, was tested for its ability to measure skin temperature of water bodies. An infrared thermocouple was selected due to its simplicity of use and that it does not need to be floated on the water surface to measure temperature. In practicality, the thermocouple could be mounted on buoys in water bodies with a micro-data logger to record skin temperatures for longer periods of time and even telemetry data for further processing and use in estimating evaporation. In 2005, the measured skin temperature was compared to satellite estimated surface temperature. The ASTER sensor on board NASA's Terra satellite was used in the analysis which is presented here. The results indicate that the satellite measurements are in good agreement with the surface measurements.