

Project Summary

Rocky Mountains Cooperative Ecosystem Studies Unit

Project Title: Systematic Monitoring of Thermal Springs and Features in Yellowstone National Park for Estimating Heat Flow and Detecting Change

Discipline: Natural Resources
Type of Project: Research
Funding Agency: National Park Service
Other Partners/Cooperators: Utah State University
Effective Dates: July 31, 2009 - December 31, 2011
Funding Amount: \$250,388 [FY09: \$130,389; FY10: \$119,999]

Investigators and Agency Representative: September 30, 2011
NPS Contact: Cheryl Jaworowski, Yellowstone Center for Resources, P.O. Box 168, Yellowstone National Park, WY 82190; 307-344-2208; cheryl_jaworowski@nps.gov.

Investigator: Christopher M. Neale, Professor and Director of the Remote Sensing Services Laboratory, Department of Biological and Irrigation Engineering, Utah State University, Logan, UT 84322-4105, Telephone (435) 797-3689, cneale@cc.usu.edu

Abstract: Utah State University will conduct a thermal feature inventory and change assessment for Yellowstone National Park utilizing satellite remote sensing statistical techniques. Task will include:

1. Rectified and calibrated multispectral mosaic (UTM Zone 12 N, NAD 83) in ERDAS Imagine format (*.img) of the Upper, Middle and Lower Geyser Basins and other areas of interest at 1-meter pixel resolution
2. Rectified and calibrated thermal mosaic (UTM Zone 12 N, NAD 83) of the Upper, Middle and Lower Geyser Basin Study area and other areas of interest at approximately 3.5-meter pixel resolution in ERDAS Imagine (*.img) format.
3. Rectified and calibrated thermal mosaic (UTM Zone 12 N, NAD 83) of the Old Faithful Geyser Basin and Biscuit Basin at 1-meter pixel resolution.
4. Change detection map (UTM Zone 12 N, NAD 83) of active thermal features for the Old Faithful area and Biscuit Basin at 1-m pixel resolution.
5. Rectified and calibrated heat flux map (UTM Zone 12 N, NAD 83) of the Old Faithful area, Midway and Lower geyser basin, Biscuit Basin, and other areas of interest.
6. Change detection map of active thermal features (UTM Zone 12 N, NAD 83) for the Upper, Midway, Lower geyser basins as well as other areas of interest at 3.5 m spatial resolution.
7. A progress report discussing findings of an energy balance experiment designed to measure solar heat input, ground heat output, and effects of water vapor from thermal features on airborne thermal infrared measurements.
8. A final report describing the data and methodology used, main features of the imagery and analyses results.
9. Papers and publications describing the 5-year collaborative effort and results.

Outcomes with Completion Dates:

Utilize the Utah State University aircraft acquire day/night imagery in September 2009 and 2010. Begin assembly of images and georectification in November to December 2009 and 2010. Final maps produced in March 2011. Change detection and heat flow calculations completed by July 2011. Draft reports completed for NPS review by September 1, 2011.

Keywords: Utah State University, Yellowstone National Park, remote sensing, thermal springs

