

Project Summary

Rocky Mountains Cooperative Ecosystem Studies Unit

Project Title: Mapping Thermal Springs and Features in the Upper, Middle and Lower Geyser Basin, Yellowstone National Park

Type of Project: Research
Discipline: Natural Resources
Funding Agency: National Park Service
Other Partners/Cooperators: Utah State University
Effective Dates: 8/1/2005-3/31/2009
Funding Amount: \$54,848 (FY08); \$246,802 (total)

Investigators and Agency Representative:

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Project Abstract:

This four year project is to conduct a thermal feature inventory and change assessment for Yellowstone National Park utilizing satellite remote sensing statistical techniques.

First year tasks include:

1. Rectified and calibrated multispectral mosaic in ERDAS Imagine format of the Upper, Middle, and Lower Geyser Basins at 1_meter pixel resolution.
2. Rectified and calibrated thermal mosaic of the Upper, Middle and Lower Geyser Basin Study area at approximately 3.5-meter pixel resolution in ERDAS Imagine format.
3. Rectified and calibrated thermal mosaic of the Old Faithful Geyser Basin at 1_meter pixel resolution.

Second year tasks include:

1. Acquire airborne high resolution thermal and shortwave imagery over the Upper, Middle and Lower Geyser Basin in order to map change in the temperature of the thermal springs and features.
2. Produce calibrated thermal maps of the study areas representing calibrated at-surface temperatures corrected for emissivity.
3. Study Thermal inertia properties of the surface layers around the springs and thermal features using thermal imagery acquired at two different times of the day.

Third year tasks include:

1. Acquire airborne high resolution thermal and shortwave imagery over the Upper, Middle and Lower Geyser Basin and other areas of interest.
2. Produce calibrated thermal maps of the study areas representing calibrated at-surface temperatures corrected for emissivity and atmosphere.
3. Calculate heat flux and temporal change in heat flux for the Upper, Middle and Lower Geyser Basin.

Fourth year tasks include:

1. Rectified and calibrated multispectral mosaic in ERDAS Imagine format of the Upper, Middle and Lower Geyser Basins and other areas of interest at 1-meter pixel resolution
2. Rectified and calibrated thermal mosaic 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 format.
3. Rectified and calibrated thermal mosaic of the Old Faithful Geyser Basin and Biscuit Basin at 1-meter pixel resolution.
4. Change detection map of active thermal features for the Old Faithful area and Biscuit Basin at 1-m pixel resolution.
5. Rectified and calibrated heat flux map 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 for the Upper, Midway, Lower geyser basins as well as other areas of interest at 3.5 m spatial resolution.
7. A final report describing the data and methodology used, main features of the imagery and analysis results.
8. Papers and publications describing the 4-year collaborative effort and results.

Outcomes with Completion Dates: Final report and all remotes sensing imagery are due by December 31, 2009

Keywords: remote sensing, thermal springs, Geyser Basins, Yellowstone NP, Utah State University, ERDAS