

Geothermal Remote Sensing, Aquiculture, Alligators and Tourism

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Infrared Camera Technology

- High-Resolution digital infrared cameras produce an image that has 480 by 640 pixels.
- Each pixel records 13 bits of data (unlike a photo camera that has 8)
- There are 307,200 pixels, each one represents a surface temperature reading
- The sensitivity of the camera covers a 300 degree range, to the thousandth of a degree.

Temperature Measurement and Remote Sensing

- NASA's ASTER commercial geothermal service can record similar data, but because of the distance can only provide a 36 foot by 36 foot pixel. Since a high confidence level is achieved by a three-pixel by three pixel averaging, the effective temperature spot is over 100 ft square.
- Tests with ASTER in California have shown over 90% correlation between remote data and shallow-probe data.

Ground Testing

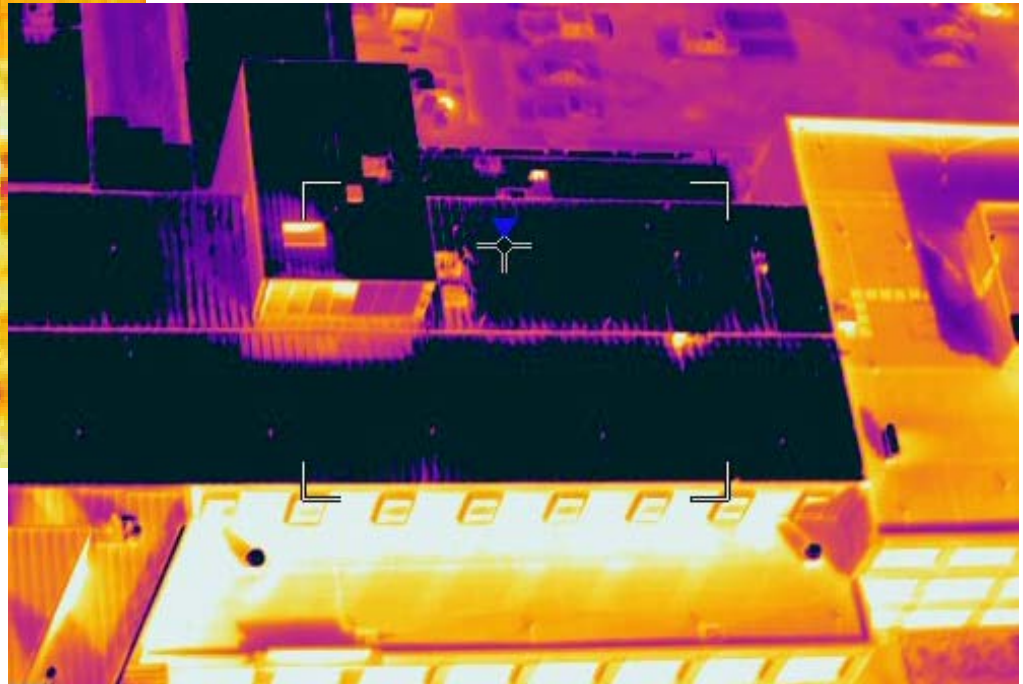
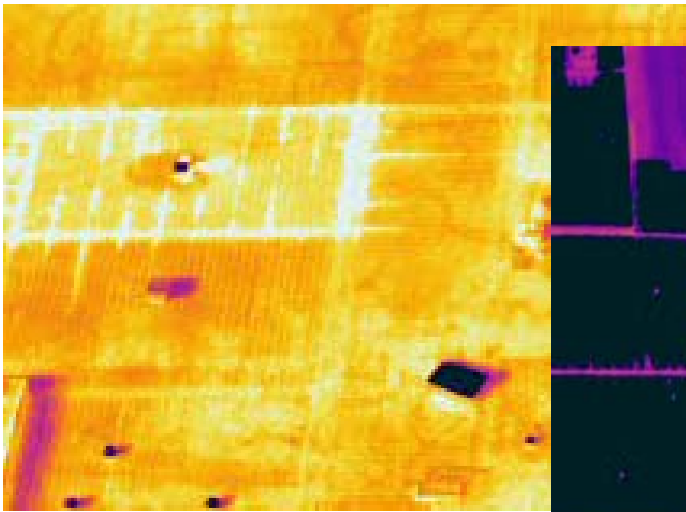
- The common protocol today for testing is to use temperature probes sunk 2 meters deep in a grid pattern. McGee Mountain in Nevada sunk 108 probes at a cost of \$980K.
- Students at CSM sunk over 300 probes over a period of three years at Mt. Princeton to measure a 2 sq. mile area.

The Aerial Thermography Solution

- Higher sensitivity and smaller pixel size should provide higher confidence level than ASTER
- Using aerial thermography, validated periodically by shallow probes, can collect data cheaper. (We can do 4,000 square miles for the cost of the 17 square miles of McGee mountain)
- Using aerial thermography we can collect data faster - months not years.

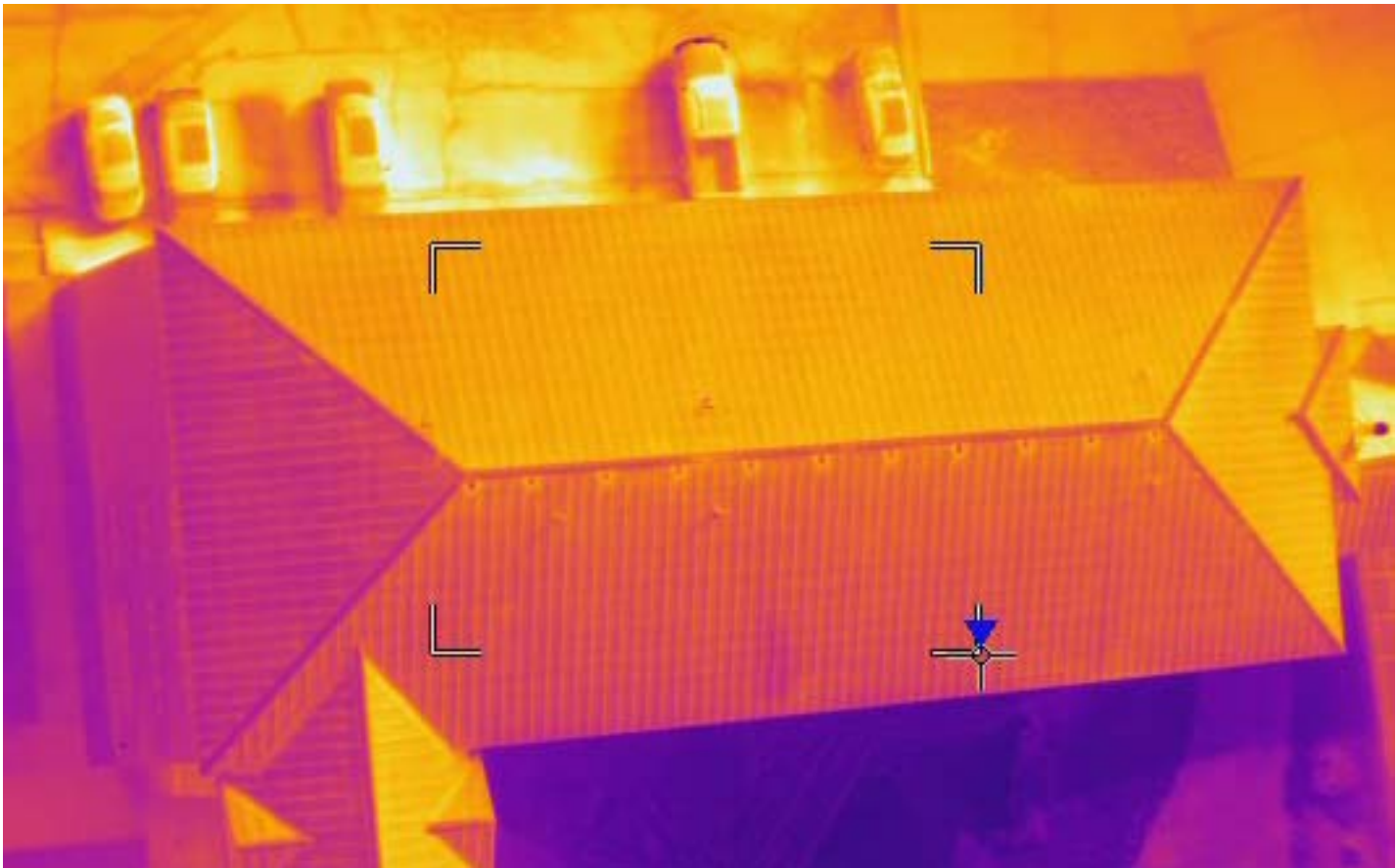
Examples of Use

- Predictive/Preventative maintenance on flat roofs – resolution at 3 inches square



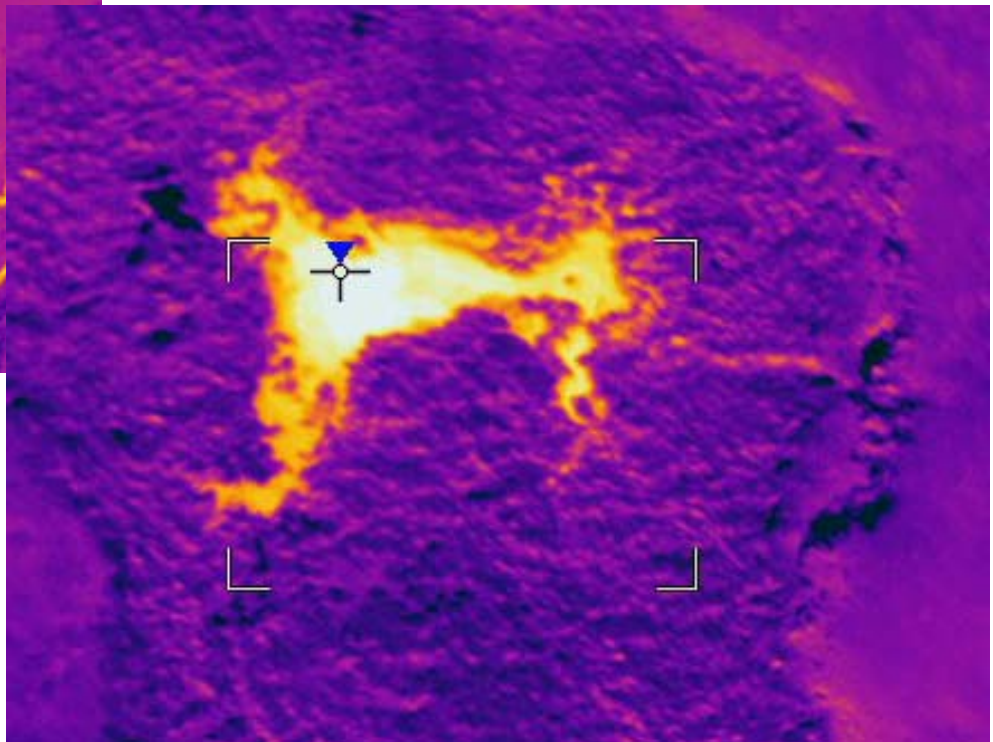
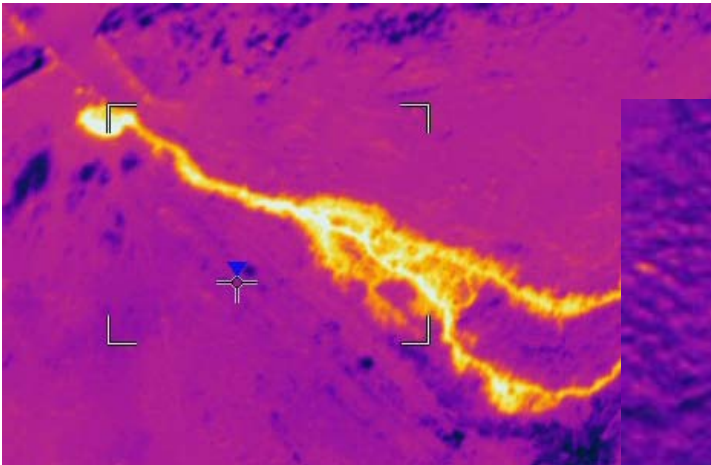
Examples of Use

- Energy Audits - Limitations



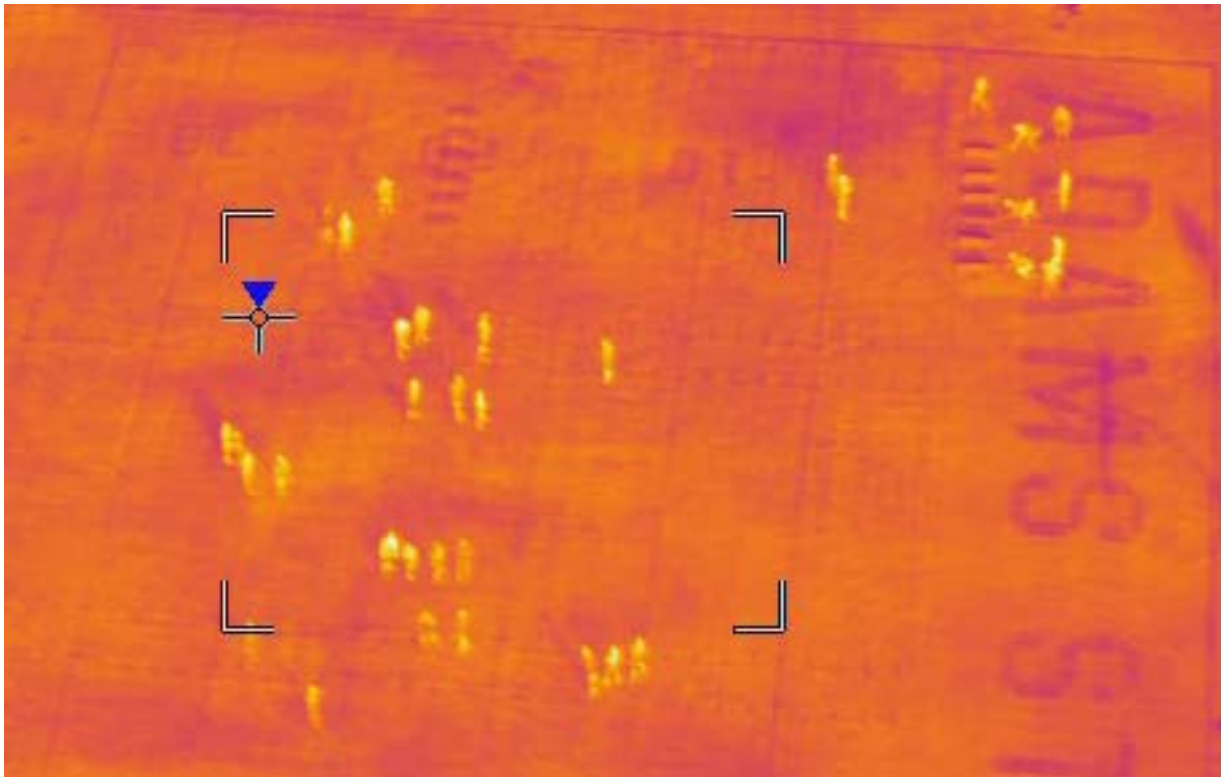
Examples of Use

- Geothermal Mapping



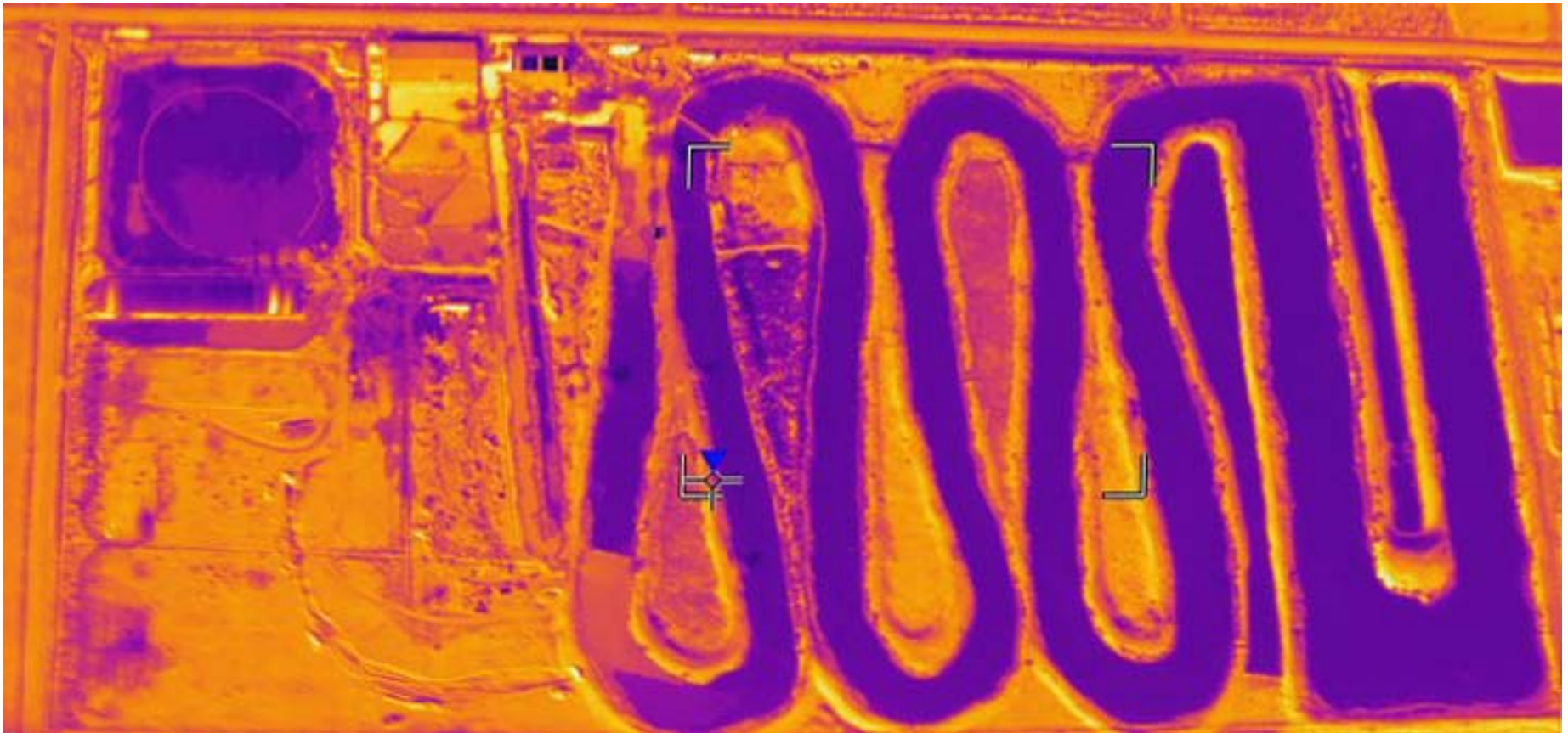
Examples of Use

- Wildlife Surveys/Counts



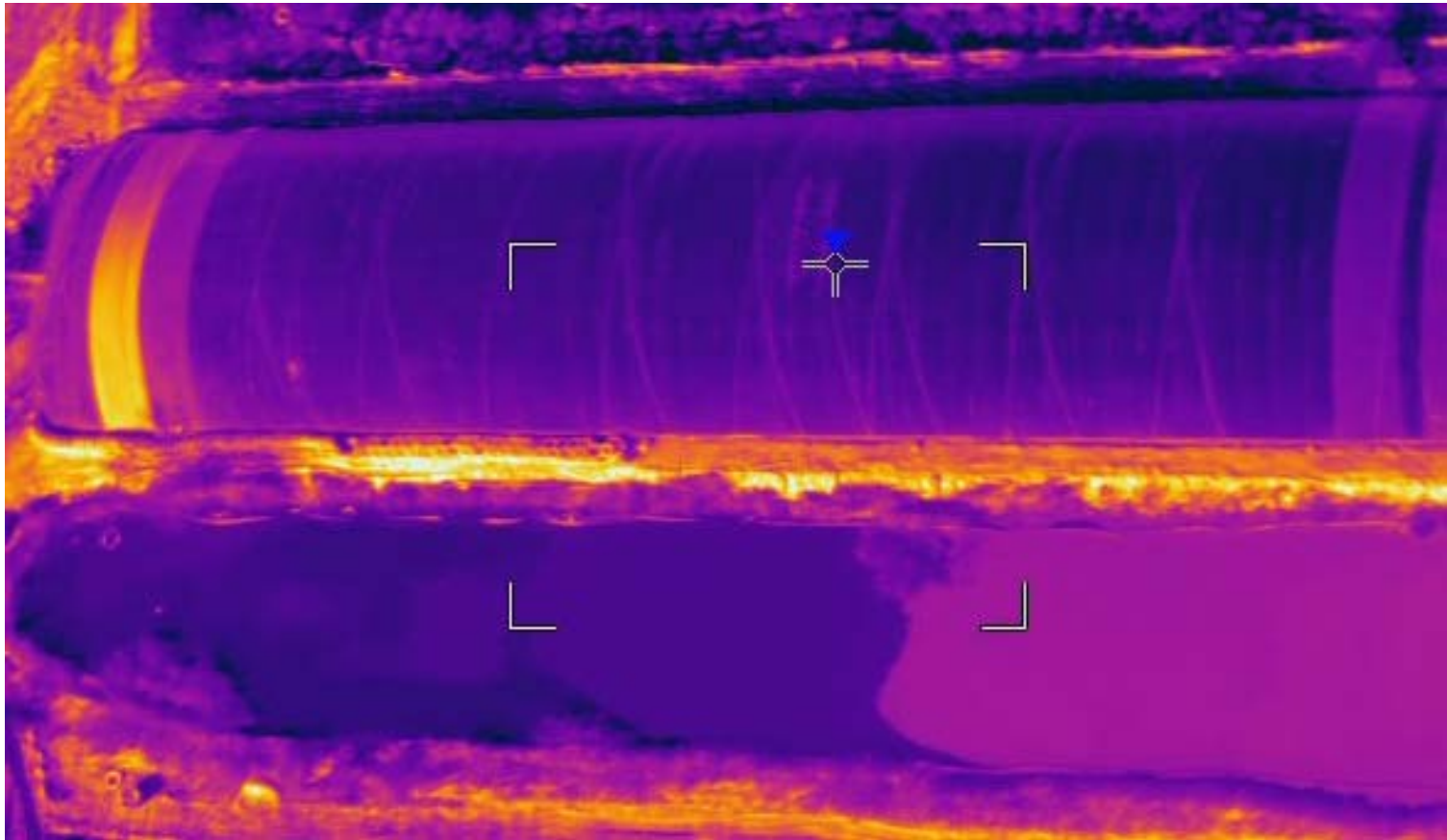
Examples of Use

- Energy Audits – Colorado Gators



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