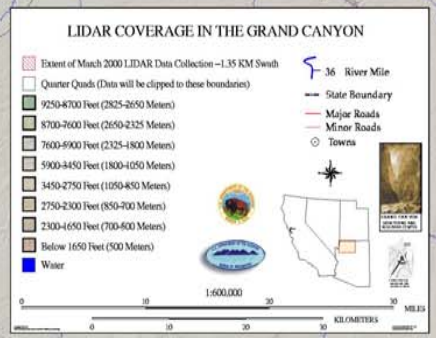
FY2002 Remote Sensing Initiative - Update



History of Remote Sensing at GCMRC

- **1997** - stakeholders request GCMRC to investigate the potential of expanded use of remote-sensing technologies for data collection

- **1998** - GCMRC convenes a PEP

- **1998 to 1999** - GCMRC opportunistically acquires remotely sensed data sets

History of Remote Sensing at GCMRC – Cont.

- **2000** - Remote sensing coordinator hired
- **2000 to 2002** - GCMRC develops remote sensing initiative and begins evaluating sensors
- **2002 to present** - Remote sensing initiative ending, reports and recommendations forthcoming

Objectives of the Remote Sensing Initiative

- Increased capability and productivity
- Less intrusive
- Expanded spatial coverage

Challenges of Remote Sensing in the CRE

- Large scale mapping
- Large variation in topography
- Disproportionate scale relative to length and width
- Data processing and storage issues

Data Standards, Georeferencing, and GIS

- Data standards developed and enforced
- Remotely sensed data set to be georeferenced
- Projections, zones, datums, and units standardized
- Data archived with temporal and spatial context

What is remote sensing?

General term that describes the action of obtaining information about an object using a sensor that is physically separated from the object

- Spaceborne
- Airborne
- Waterborne

Imagery Specifications

- Spatial resolution – 20 cm
- Positional accuracy – less than 1m (preferably 30 cm)
- Direct digital data that provide a large dynamic range to retain surface detail
- Radiometrically calibrated and orthorectified
- Acquired between 10:30 AM and 2:00PM near Summer Solstice
- Image wavelengths – green, red, and near-infrared (referred to as color-infrared imagery) at a minimum
- GPS and IMU instrumentation

Topography Specifications

- Spatial resolution – 1 m spacing acquired, translated to 25 cm DEM cells
- Vertical accuracy of topography – better than 25 cm (preferably 15 cm)
- Positional accuracy – 30 cm
- Both canopy heights and bare ground

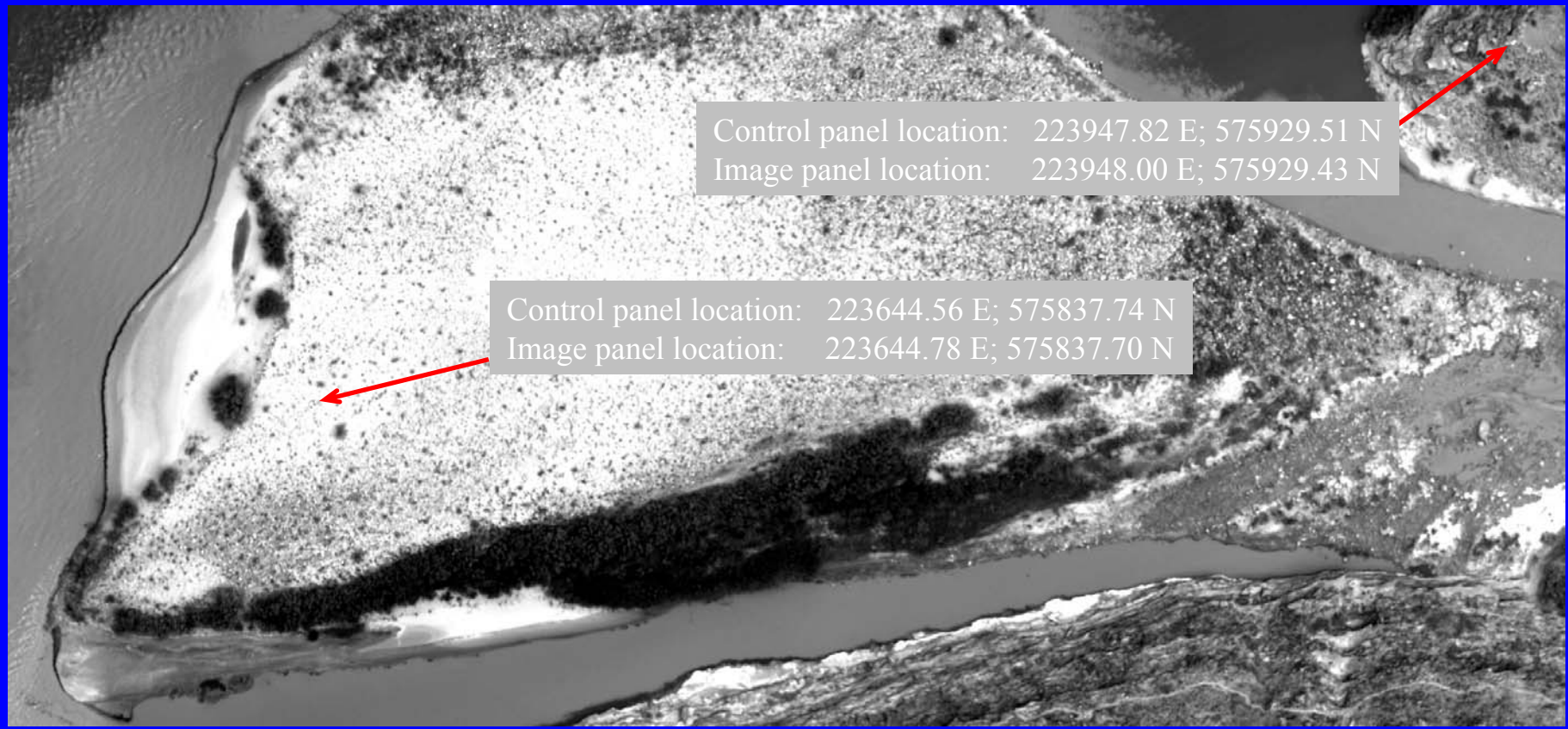
Remote Sensing Technologies Considered

- 106 satellite and airborne sensors
- Two waterborne sensors

RS Technologies Evaluated

- Black-and-white film and digital imagery
- Natural-color and color-infrared film and digital
- Digital multispectral data (12 bands including thermal)
- Digital hyperspectral data (200 bands)
- LIDAR (near-infrared) and photogrammetry
- Multibeam sonar and QTCview

Georeferenced Orthorectified Digital Imagery



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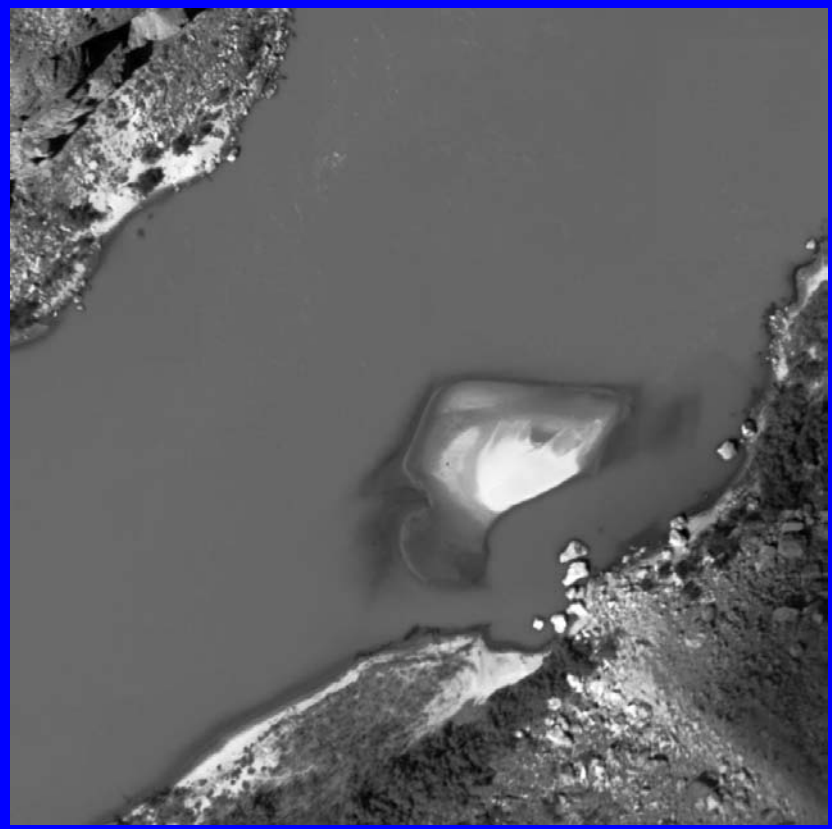
Monitoring Fine-Grained Sediment Change



Pre-Spike

Post-Spike

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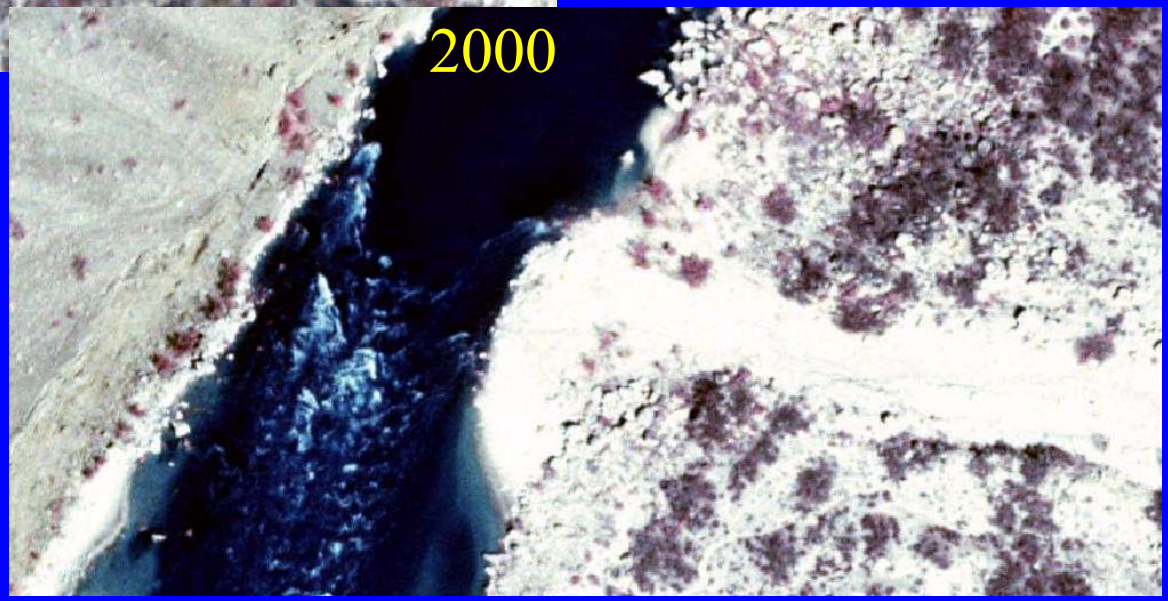

Monitoring coarse-grained sediment change

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Cultural Resources

11 cm resolution

100 cm resolution

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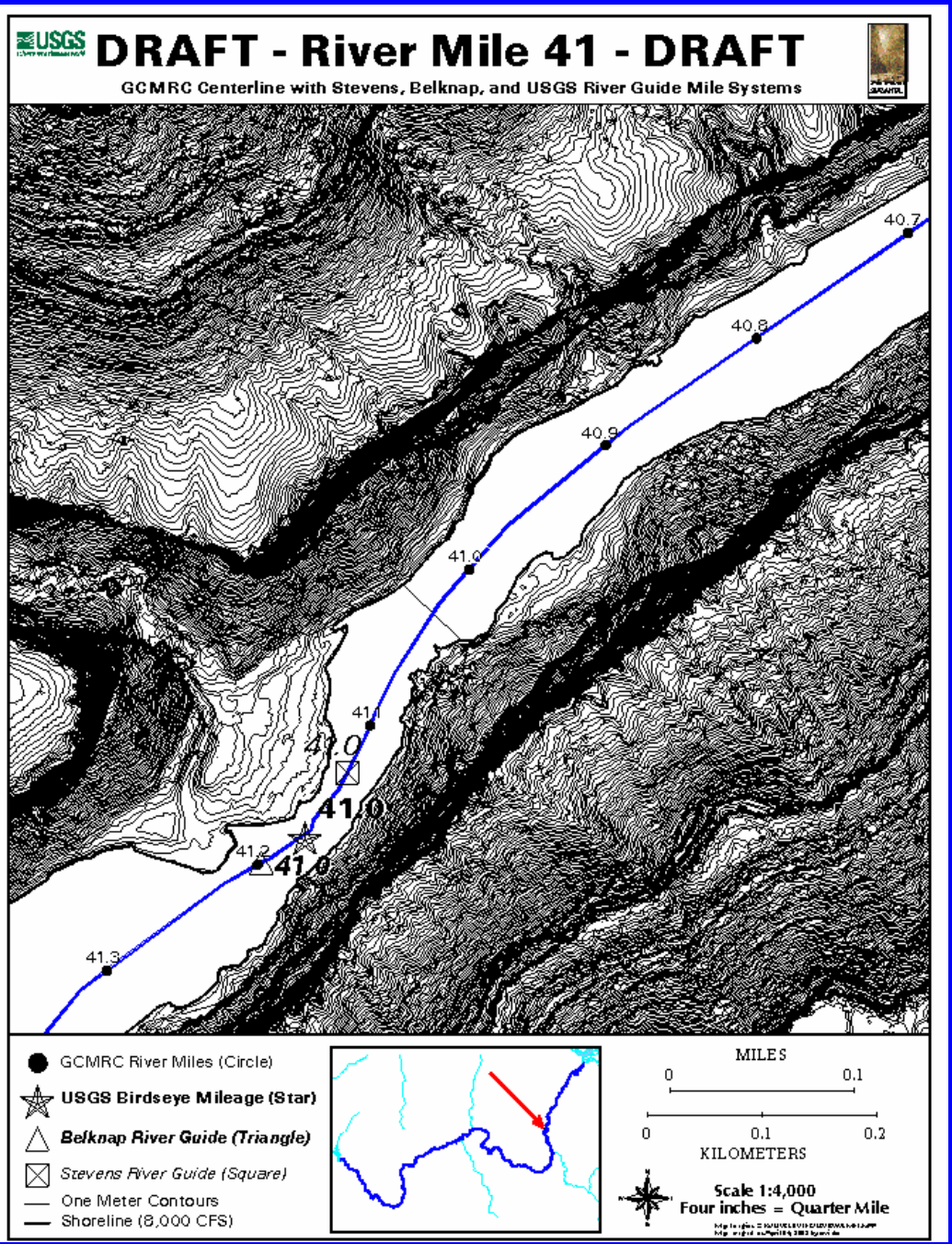

River Centerline and Field Guide

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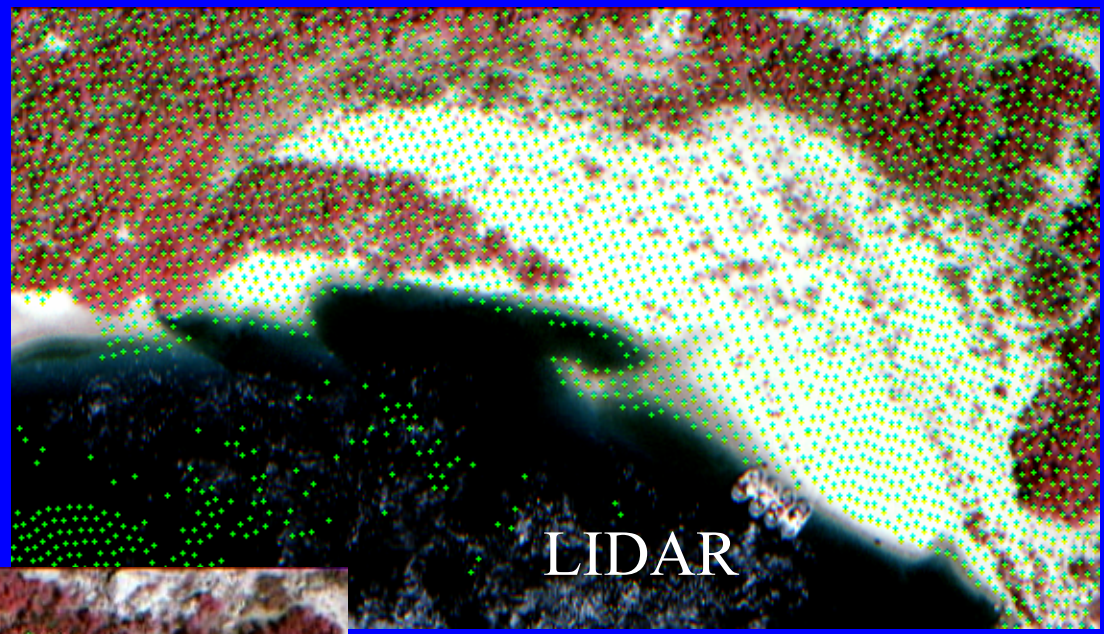
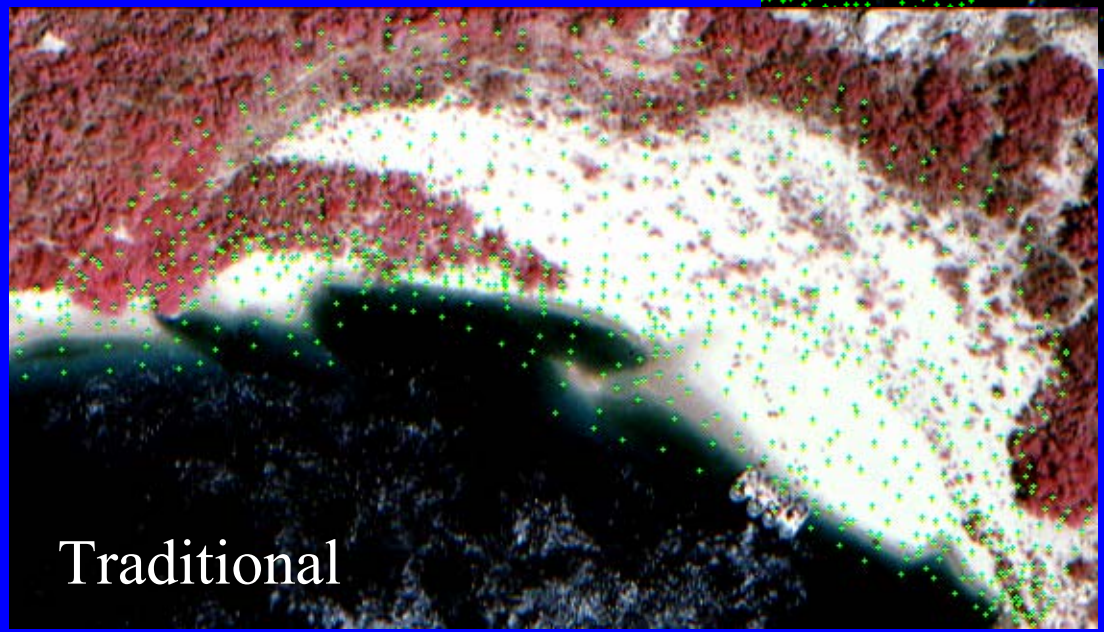
LIDAR vs. Traditional





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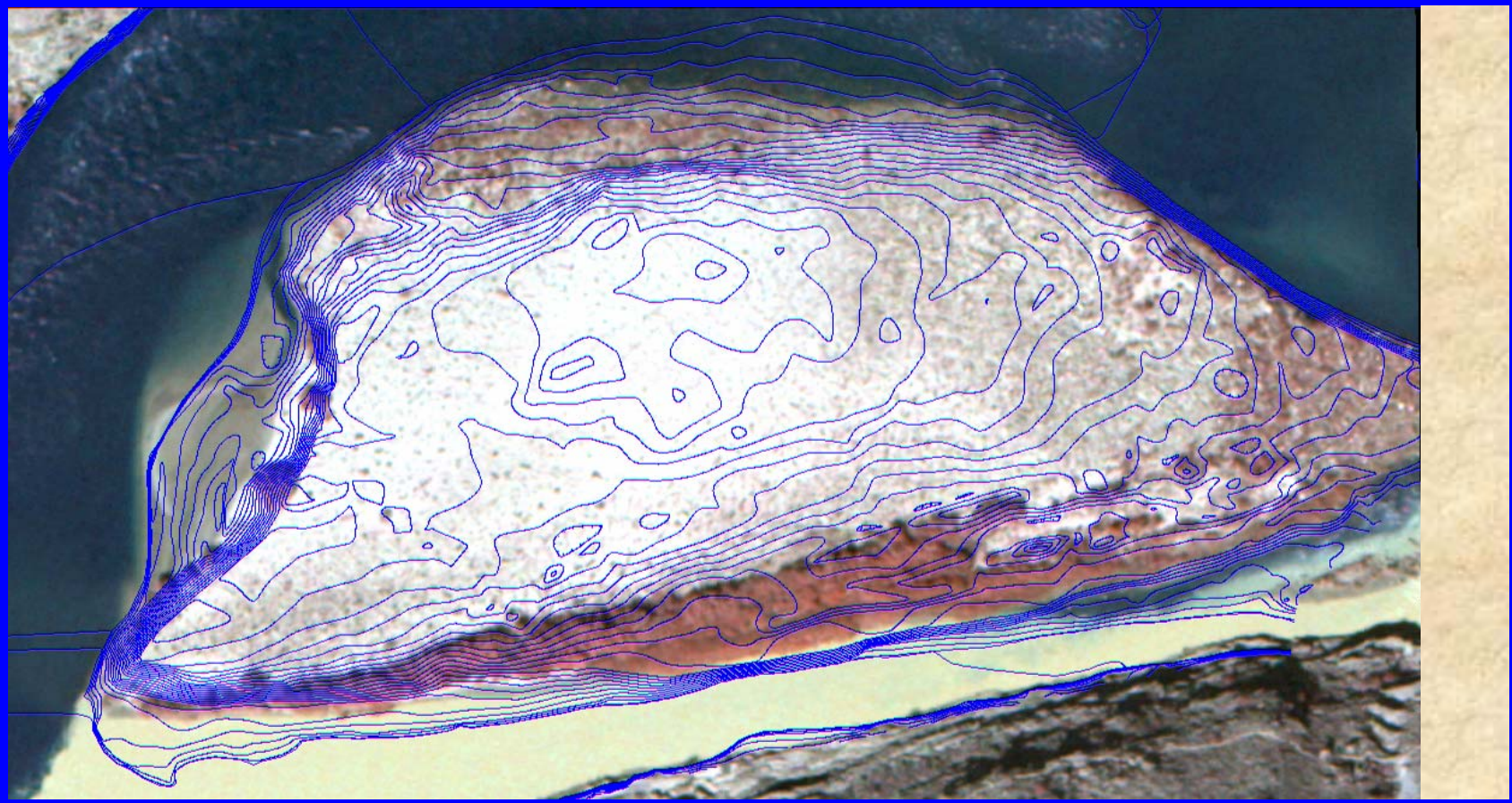
LIDAR and Photogrammetry



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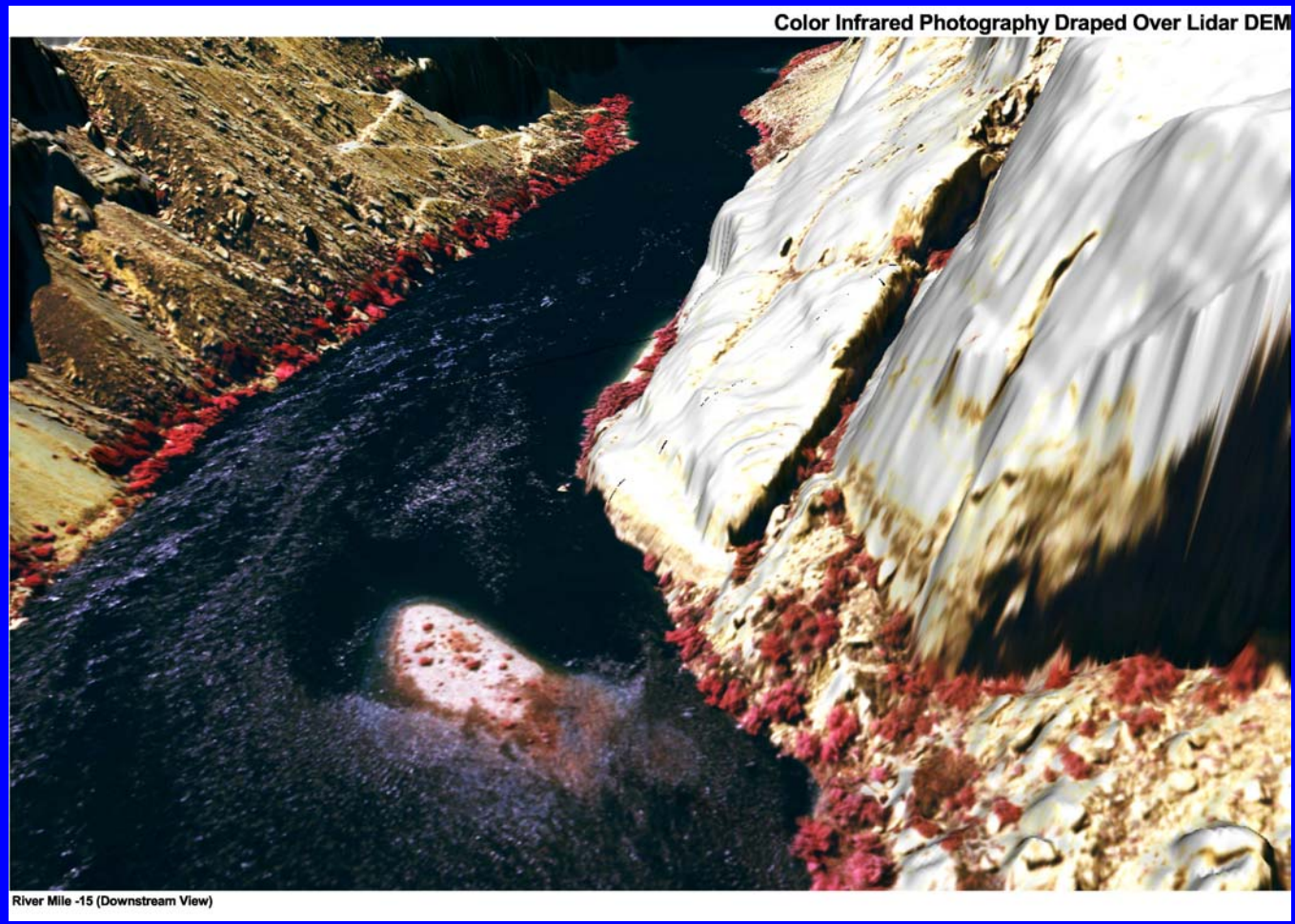
3-d Visulization



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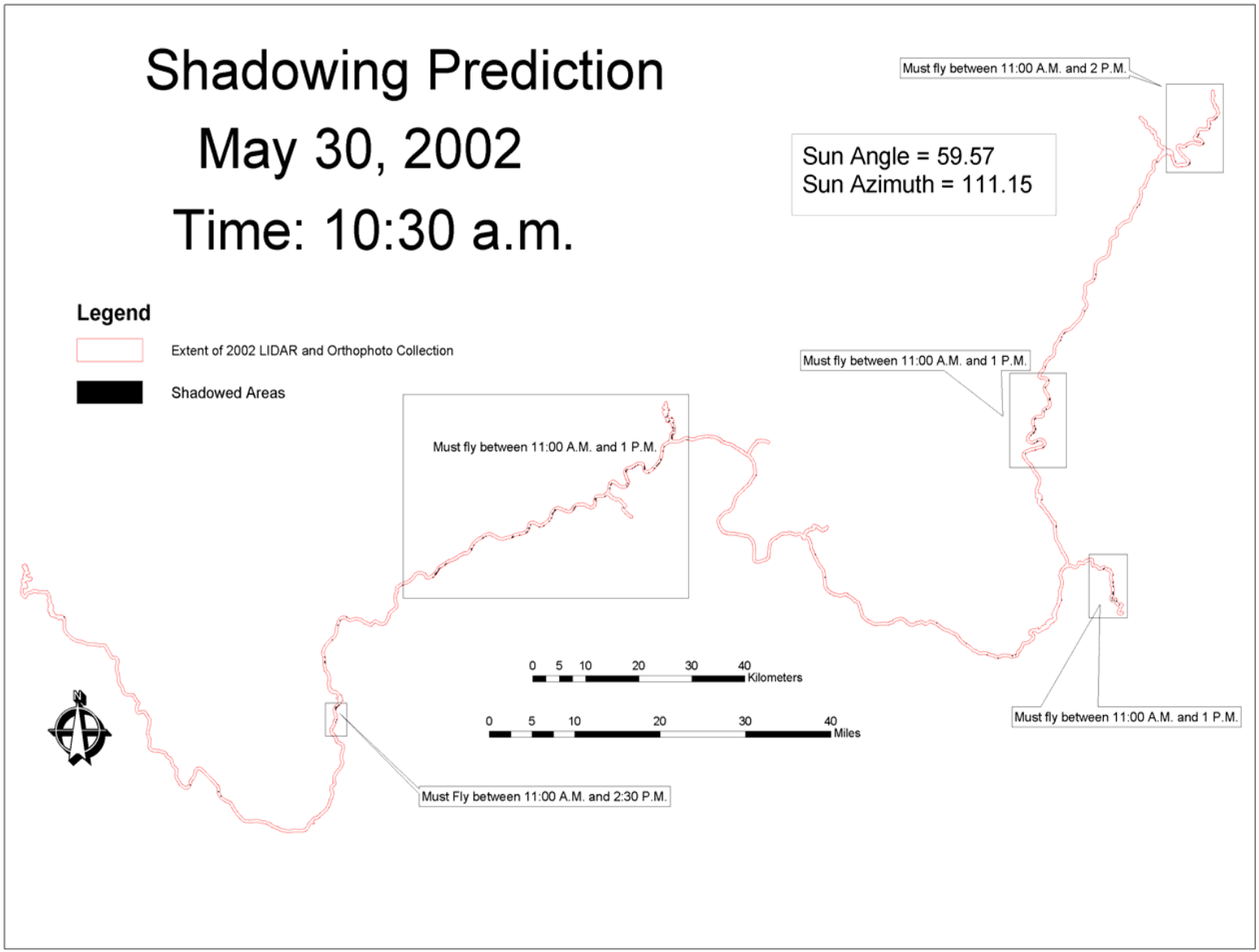

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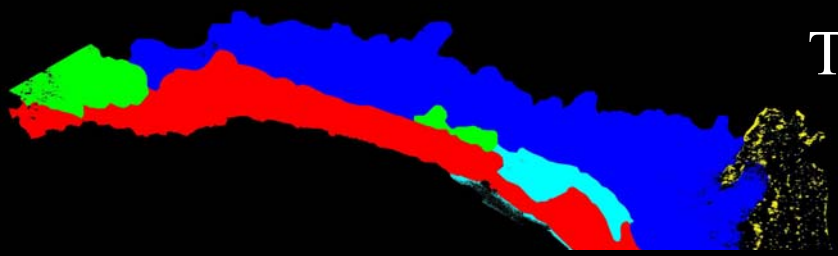

Traditional

Color Infrared

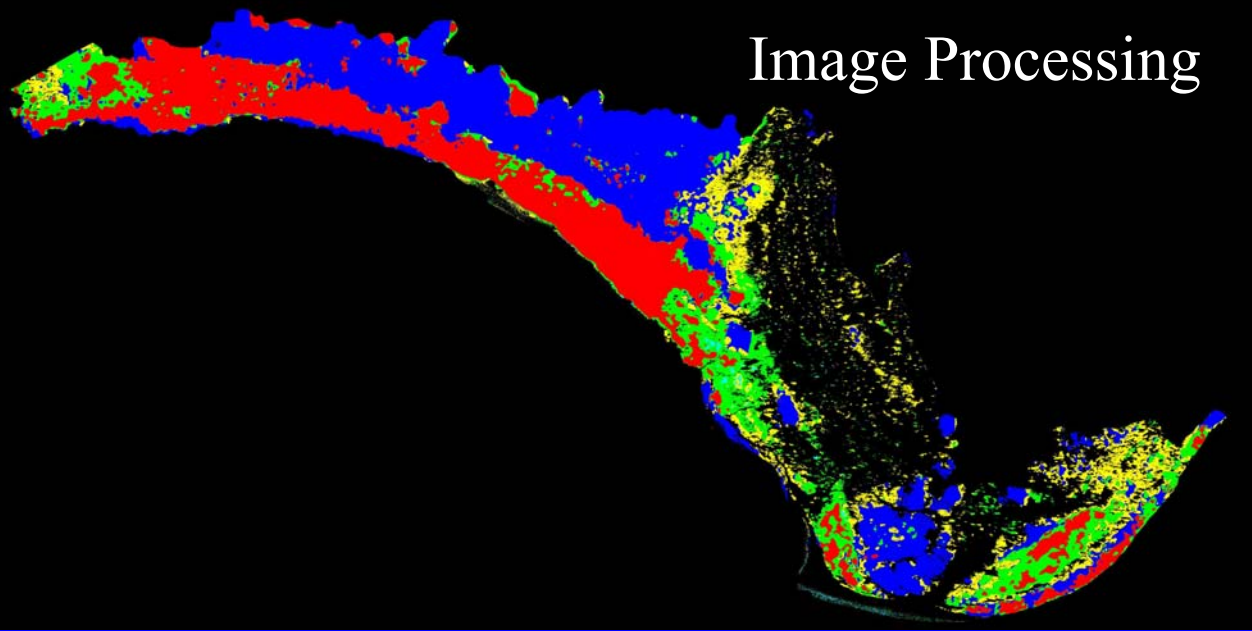

Image Processing

Mapping Terrestrial Vegetation

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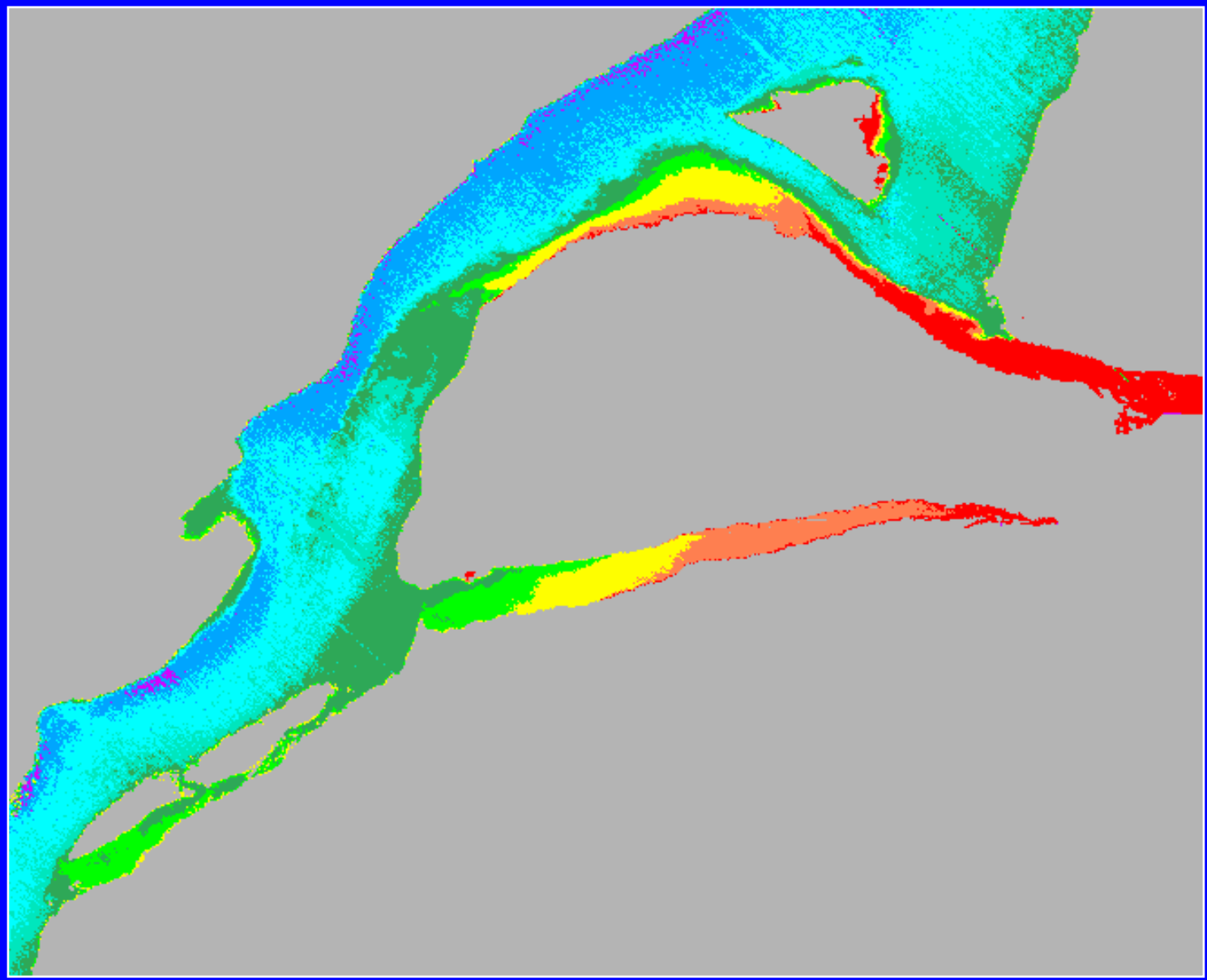
Surface Water Temperature



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Channel Morphology

Pre-Spike

Post Spike

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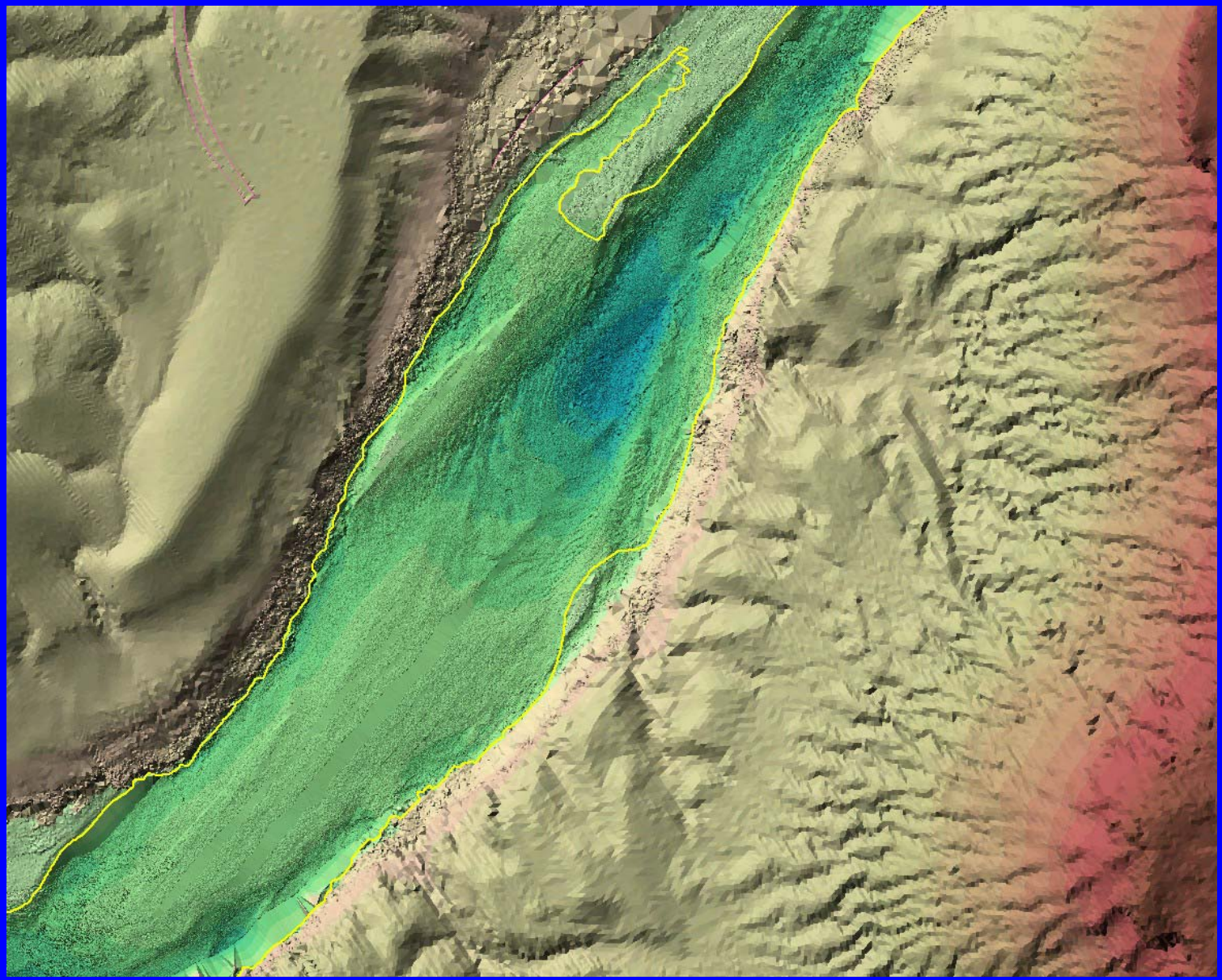
Full Channel Geometry



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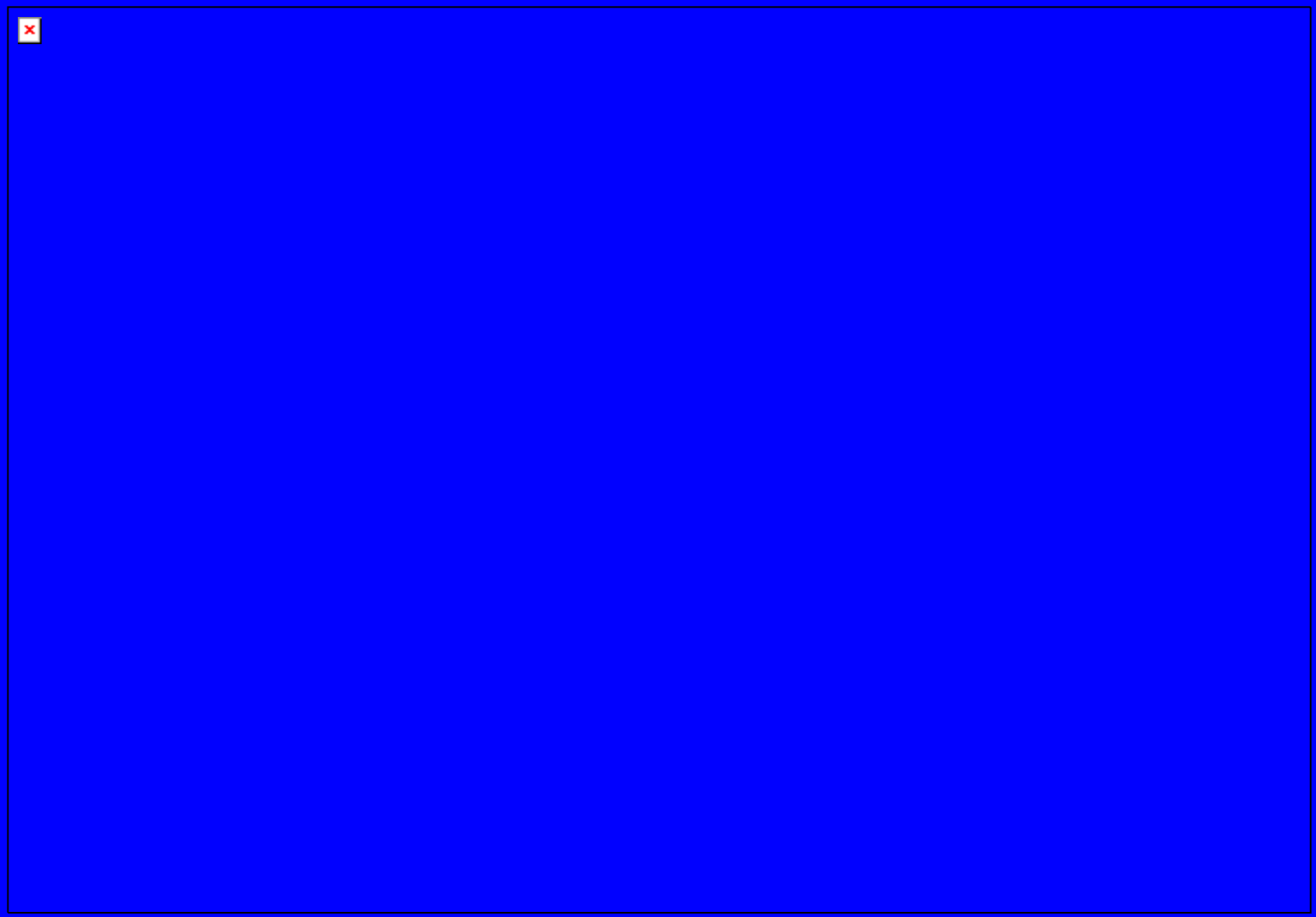
Flow Modeling of the Colorado River



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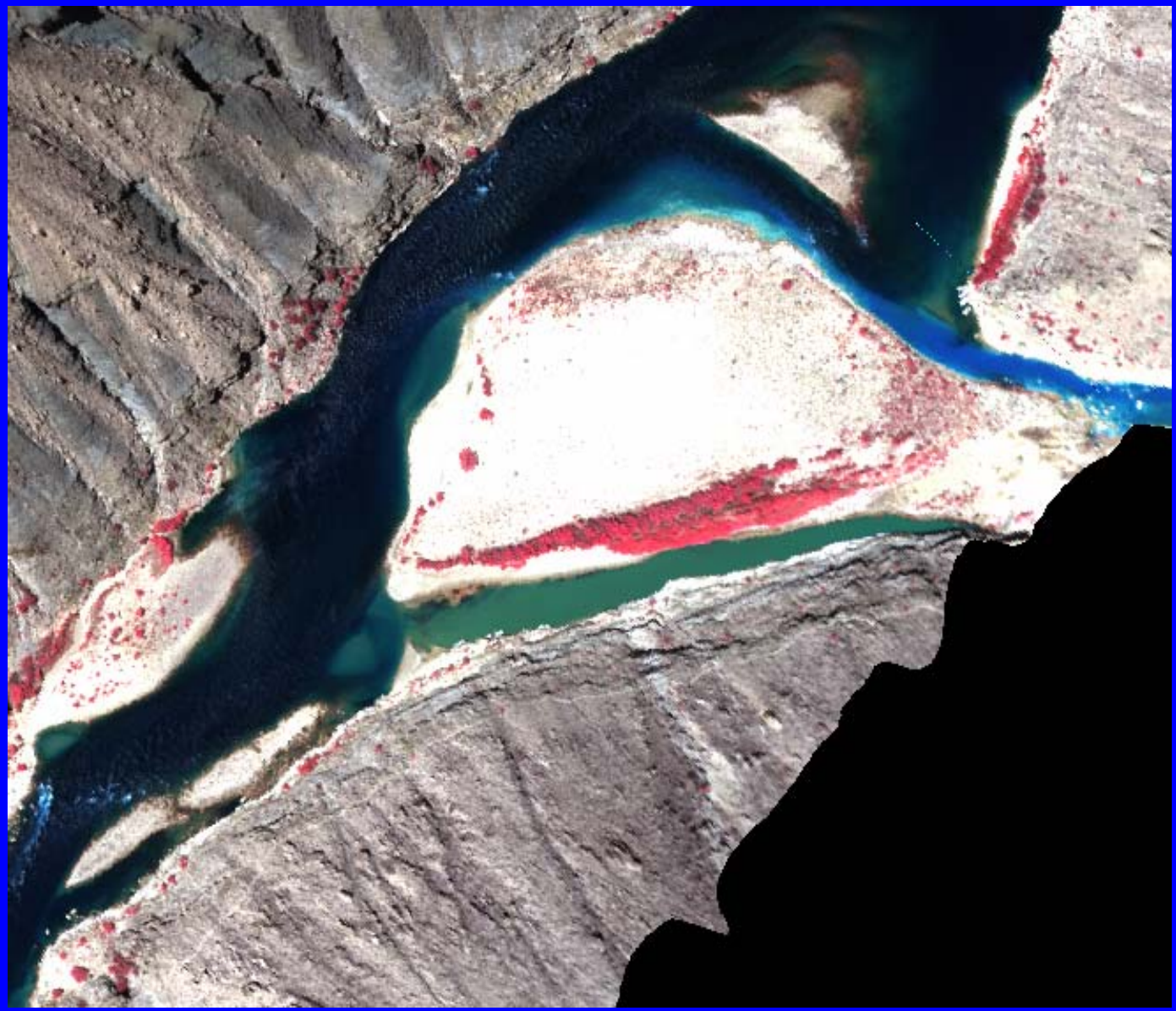
Orthorectified Digital Imagery



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Remote Sensing Initiative - Update