

**INTERACTIVE**  
*supercomputing*



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## **Interactive Supercomputing**

### **University of California, Santa Barbara**

**Lead investigator: Steve Reinhardt, ISC**

**Team members: Prof. John Gilbert, UCSB  
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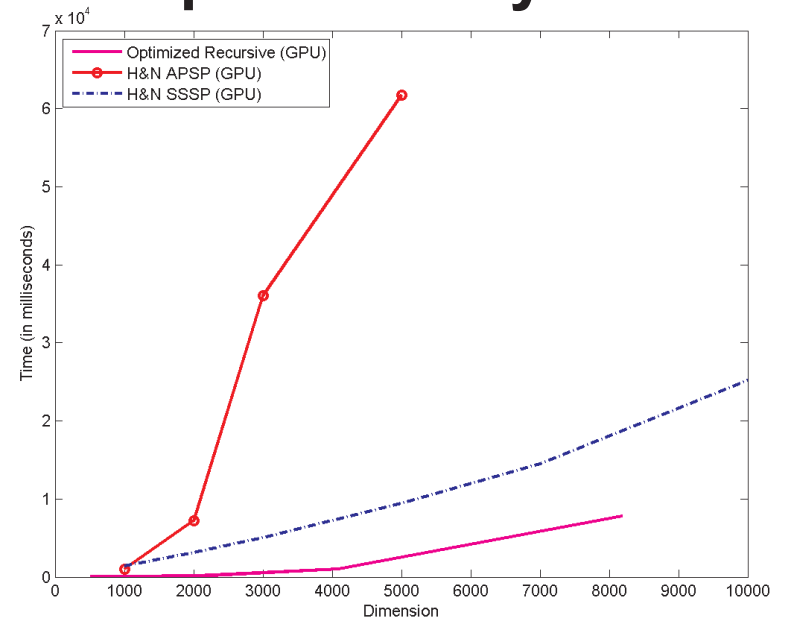
# Research Areas of Interest

## Solving very large graph-analytic problems from productivity languages, in parallel

- \* Parallel extensions to M language (MATLAB®), implemented in Star-P™
- \* Robust sparse-matrix / graph infrastructure
- \* Examples:
  - DARPA HPCS Synthetic Scalable Compact Application (SSCA) #2 up to 256 cores
  - Problems up to 1B nodes / 10B edges, on 256 cores and 5TB of memory
  - Connected components, non-negative matrix factorization, Bayesian estimation

## Exploiting hardware accelerators from productivity languages

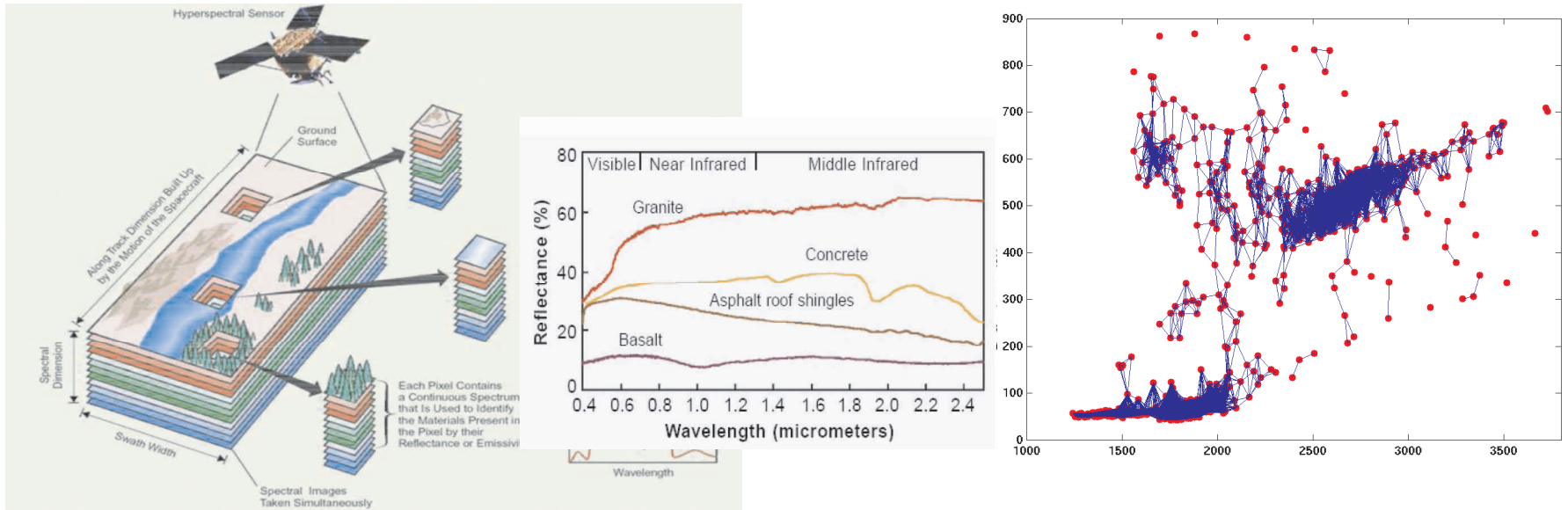
- \* Have used 48 GPUs in parallel on a single (image-processing) problem
- \* What are the right graph-analytic primitives (a la BLAS)?
- \* GPU implementation of all-pairs shortest path (basis for betweenness centrality)
  - 120-480X faster than x86 single core
  - 40-680X faster than best prior GPU alg



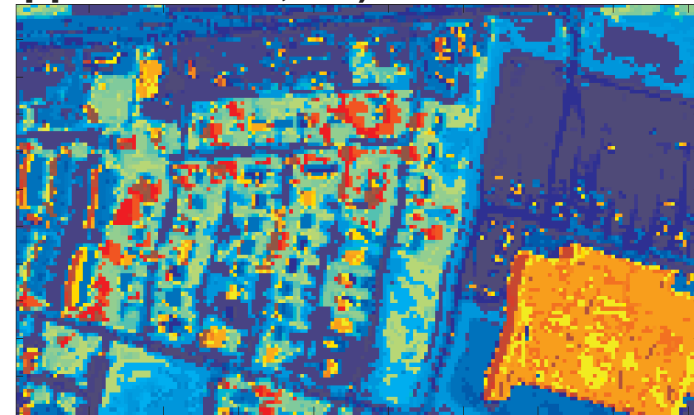
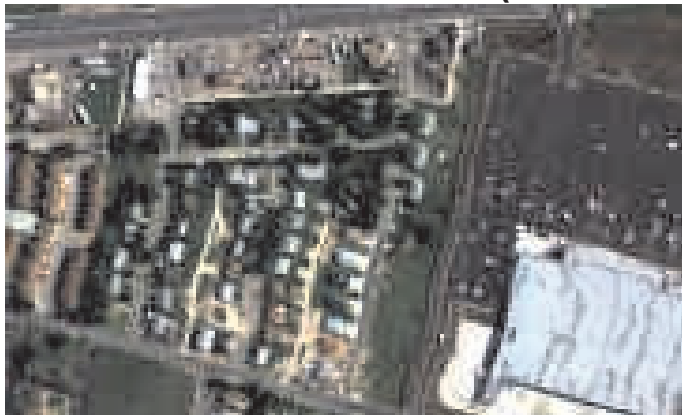
# Unique qualifications and capabilities

## Success with parallel productivity-language approach

- Case study: hyperspectral image analysis [Harkin, Lewis]



### Results (Wal-Mart, Copperas Cove, TX)



## Seeking specific capabilities or research group

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**Domain-specific graph-analytic algorithms for which**

- \* large data size**
- \* rapid algorithm exploration and/or development**
- \* much faster execution**

**are crucial<sup>†</sup>**

**Developers of visual-analytic front-ends, with expertise in reducing large data for viewing on the desktop, who need to analyze large graphs**

<sup>†</sup>Parallel expertise not required

# Contact Information

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