**Introduction**

- Scientists want to visually explore massive datasets
- Problem: existing visual exploration systems don’t scale to larger datasets
- Our approach:
  - Support detail-on-demand interfaces
  - Pre-compute zoom levels offline
  - Predict when users will move beyond cached regions
  - Pre-fetch predicted regions to reduce latency

**Exploring MODIS Data**

- Divide datasets into fixed-sized subsets (i.e. tiles)
- Create layers of tiles to support zoom levels
- Users explore MODIS data in three phases:
  - Foraging
  - Sensemaking
  - Navigation

**Architecture**

- Client retrieves tiles from backend
- Middleware queries SciDB to compute and fetch tiles

**User Study**

- Participants: 18 researchers in earth sciences
- Explored NASA MODIS satellite imagery

**Performance**

- Cache hit = 19.5ms, cache miss = 984ms
- 400% improvement over non-prefetching systems
- 88% improvement over existing prefetching algo’s

**Future Work**

- Supporting both pre-computation and prefetching
- Building a general-purpose signature toolbox
- Extending caching model for multi-user system
- Provide recommendations client-side to help users find new regions to explore