HPWREN as an Enabler: Past - EarthScope USArray Future? - Research on Beaches

Frank Vernon

HPWREN UG
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Acknowledgements

•**EarthScope** is funded by the National Science Foundation.

•**EarthScope** is being constructed, operated, and maintained as a collaborative effort with UNAVCO, IRIS, and Stanford University, with contributions from the US Geological Survey, NASA and several other national and international organizations.

Array & Station Design

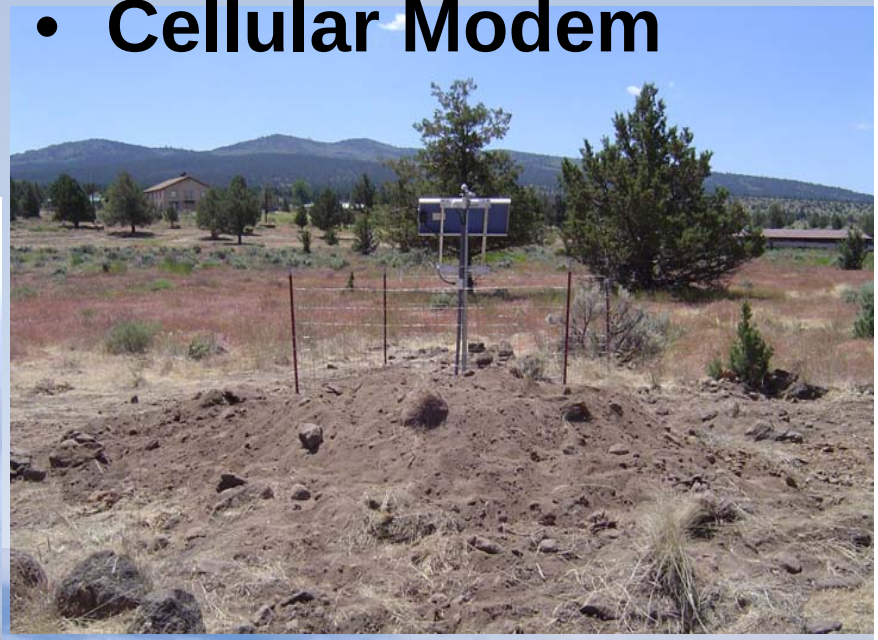
- 400 broadband seismic stations
  - ~70 km spacing
  - ~1500 x 1500 km “footprint”
  - ~2 year deployments at each site
  - 10 years and 1623 sites to roll across the country
- Goals
  - High-quality broadband data
  - Maximize data return (>85%)
  - Data in near real time
    - 40 and 1 sps continuous

QuickTime™ and a
TIFF (LZW) decompressor
are needed to see this picture.

Modularity in Communications

60% Cellular
35% AC VSAT
5% Solar VSAT

- **Cellular Modem**



QuickTime™ and a
Animation decompressor
are needed to see this picture.

USArray Data Flow at ANF

- 2.9+ Terabytes of data Apr. 2004 – May 2008 (compressed)

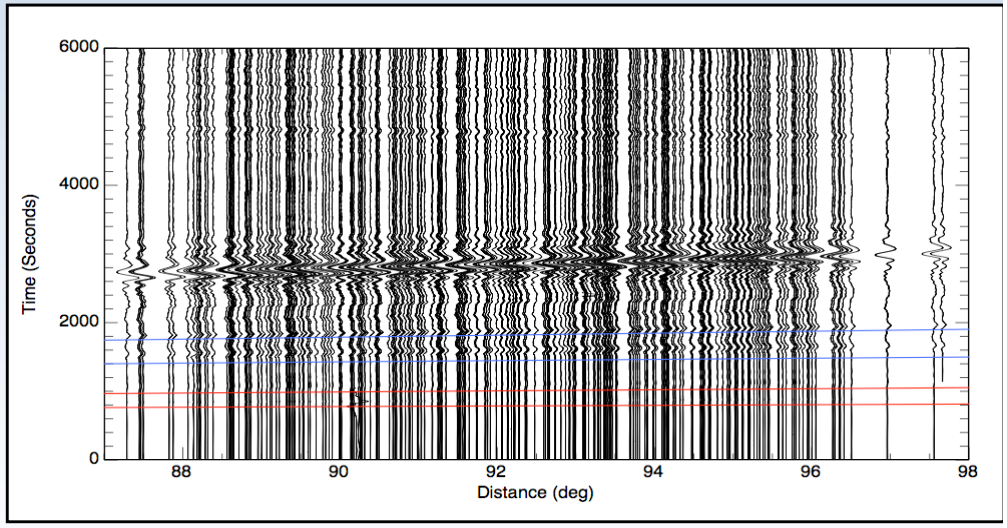
- As of May 2008:
  - 4.0 GB/day ingestion rate (compressed)
  - 2 Mb/sec export
  - 436 seismic stations
  - 2616 seismic channels
  - 13516 monitoring channels
  - 1.5M picks
  - 32K events

Waveforms: Teleseismic

April 1, 2007 Solomon Island earthquake,
Mw = 8.1, recorded on USArray

C. J. Ammon , Pennsylvania State University

QuickTime™ and a
decompressor
are needed to see this picture.



Movie illustrates both minor and major arc arrivals

Tomography

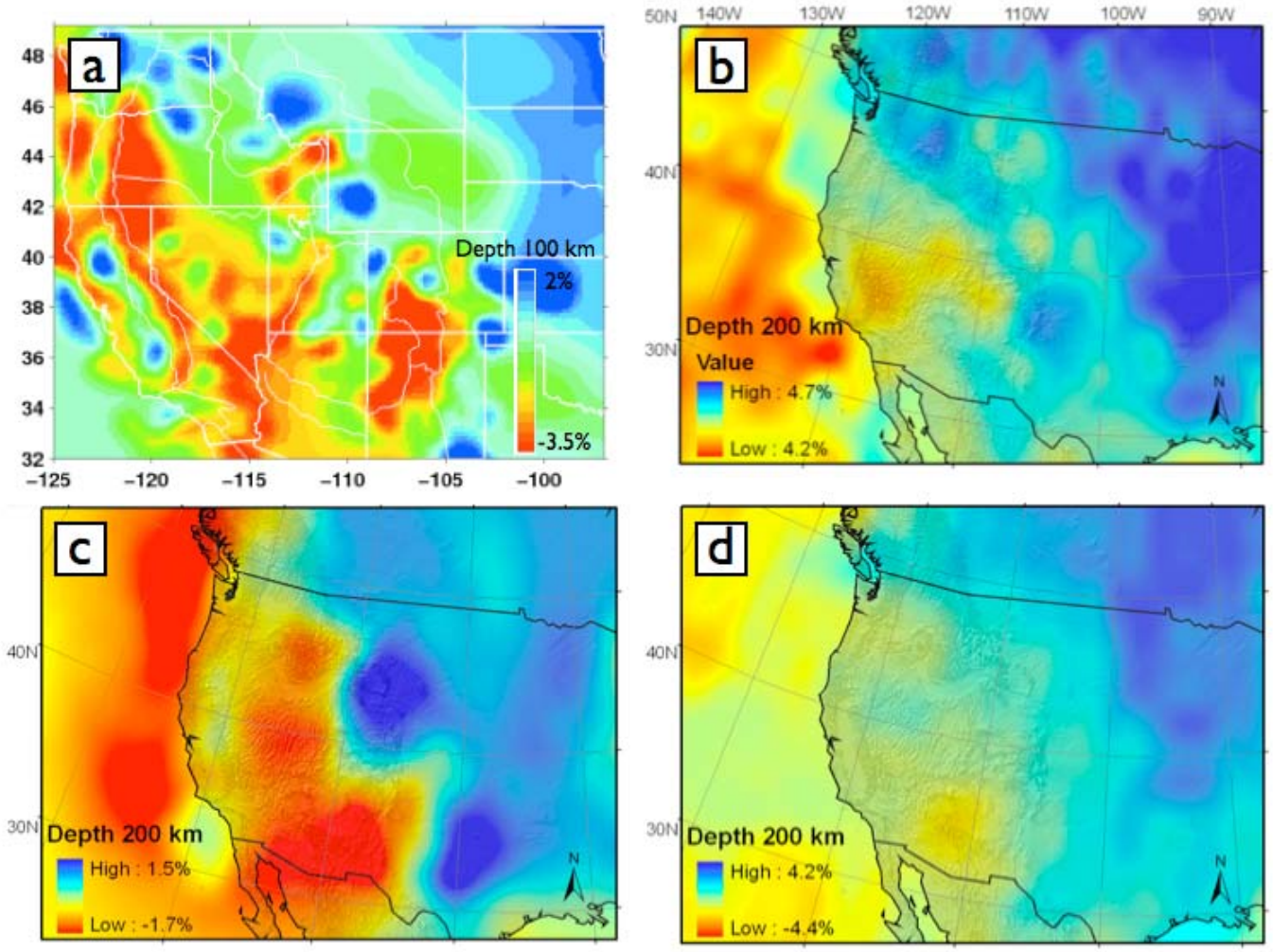
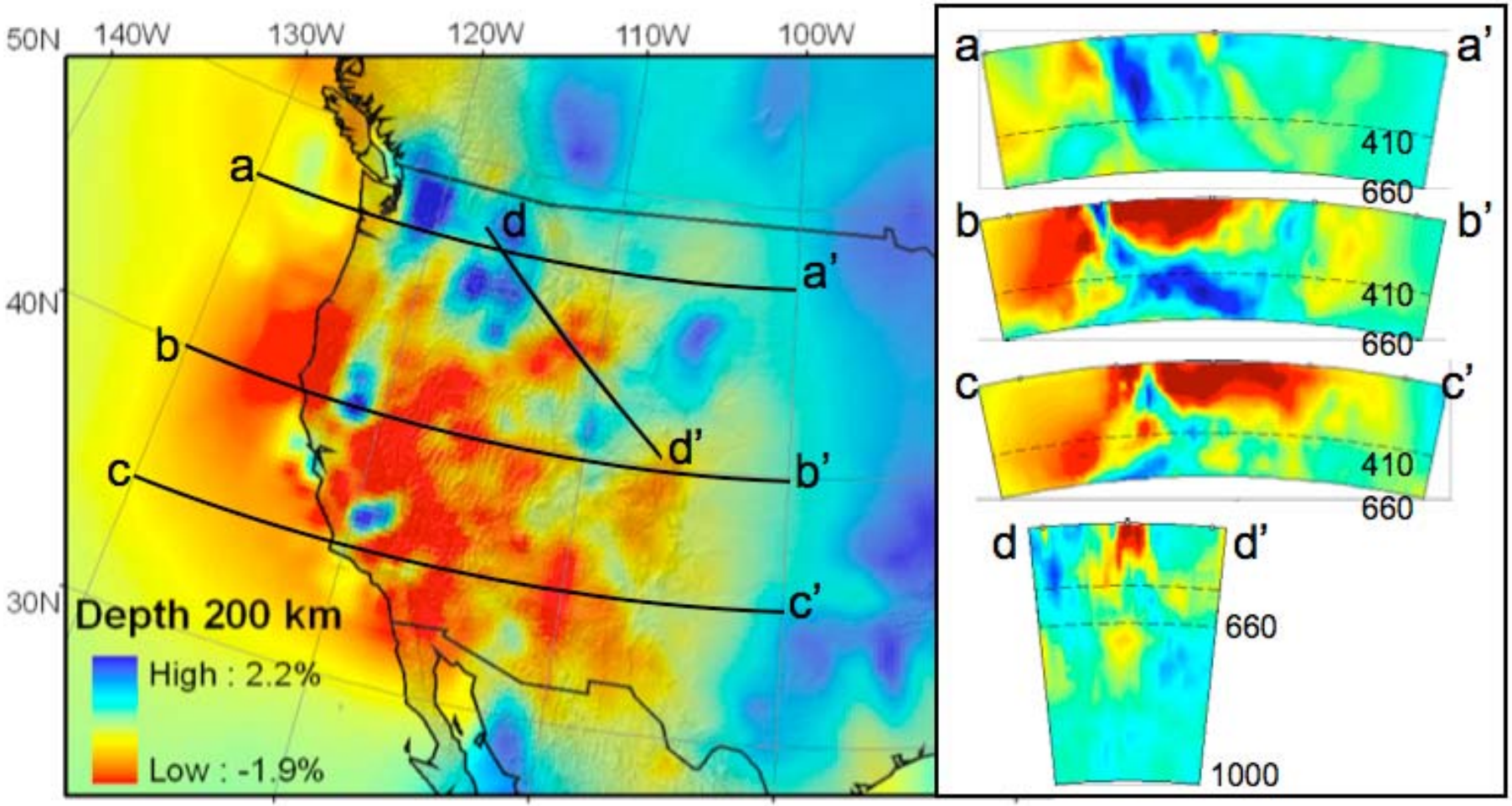
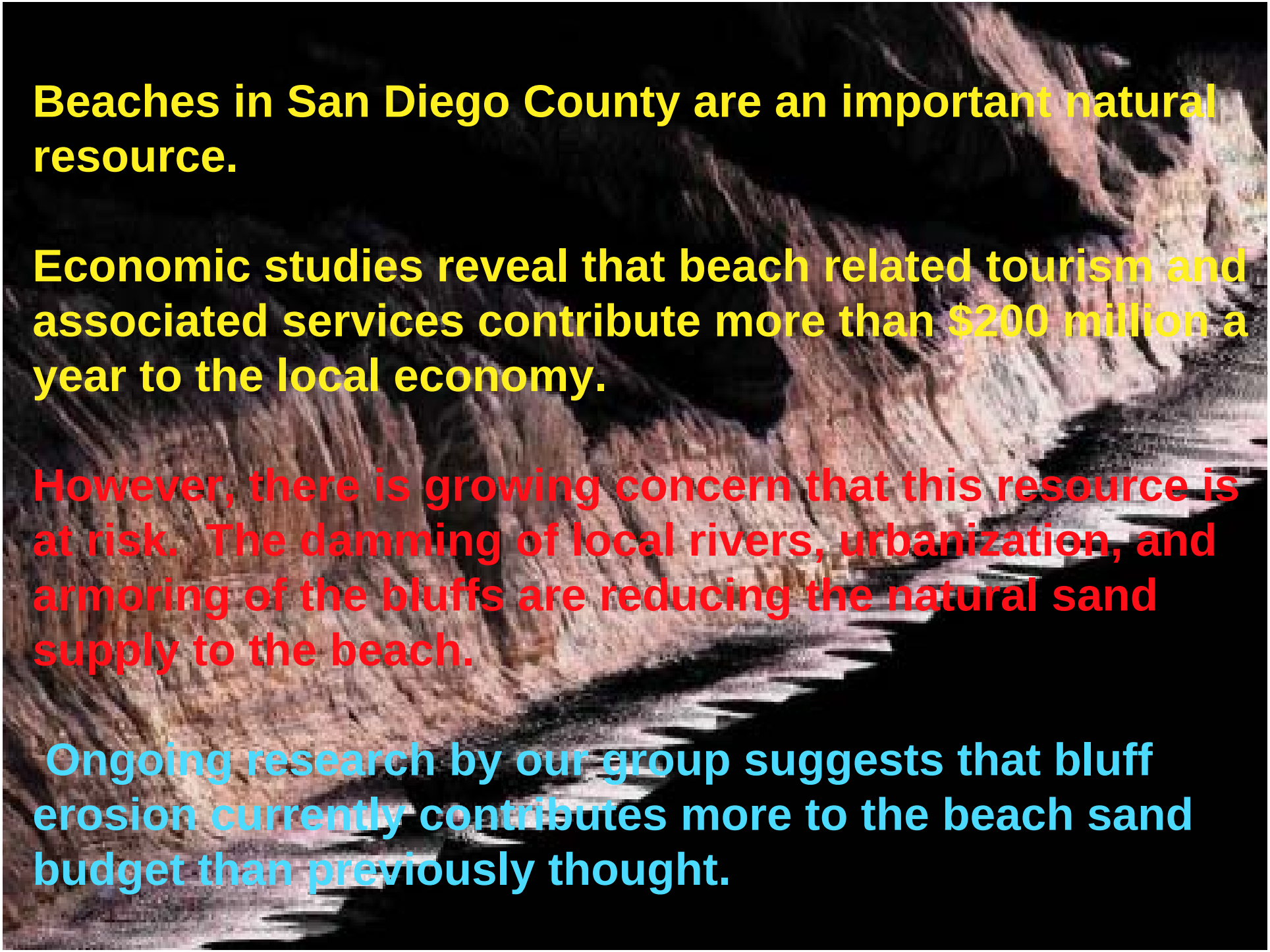


Figure 1. *a.) Model made by piecing together local tomography studies from Humphreys and Dueker, 1994 and inverting with global data set (Dueker et al. 2001). b.) Global S-wave model from surface wave diffraction (Ritzwoller et al. 2002) c.) Global P-wave model using finite frequency kernels (Montelli, et al. 2004). d.) Global S-wave travel-time model (Grand 2002).*

Tomography

Current model - Burdick et al. 2008





Beaches in San Diego County are an important natural resource.

Economic studies reveal that beach related tourism and associated services contribute more than $200 million a year to the local economy.

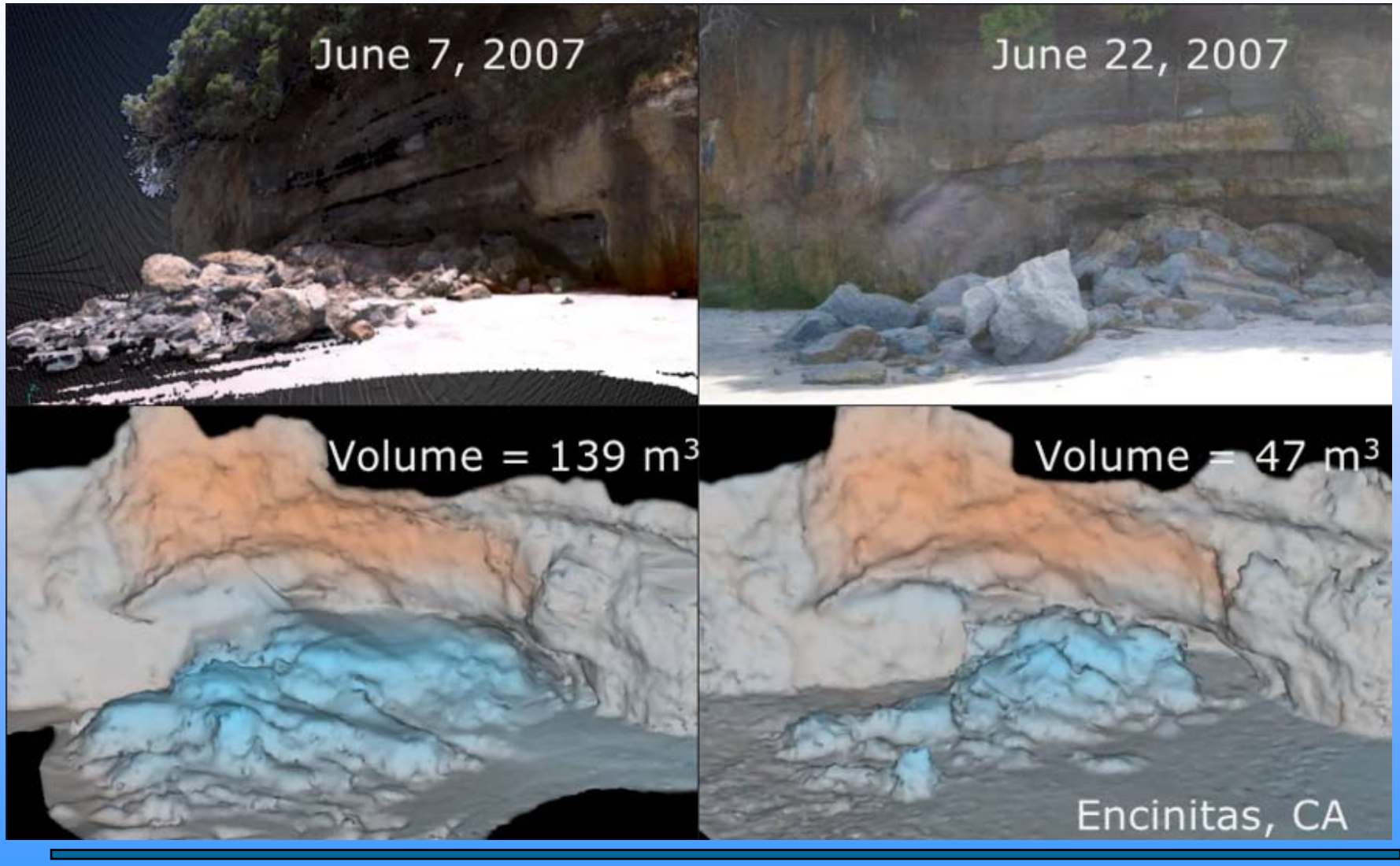
However, there is growing concern that this resource is at risk. The damming of local rivers, urbanization, and armoring of the bluffs are reducing the natural sand supply to the beach.

Ongoing research by our group suggests that bluff erosion currently contributes more to the beach sand budget than previously thought.

Mapping Cliff Erosion

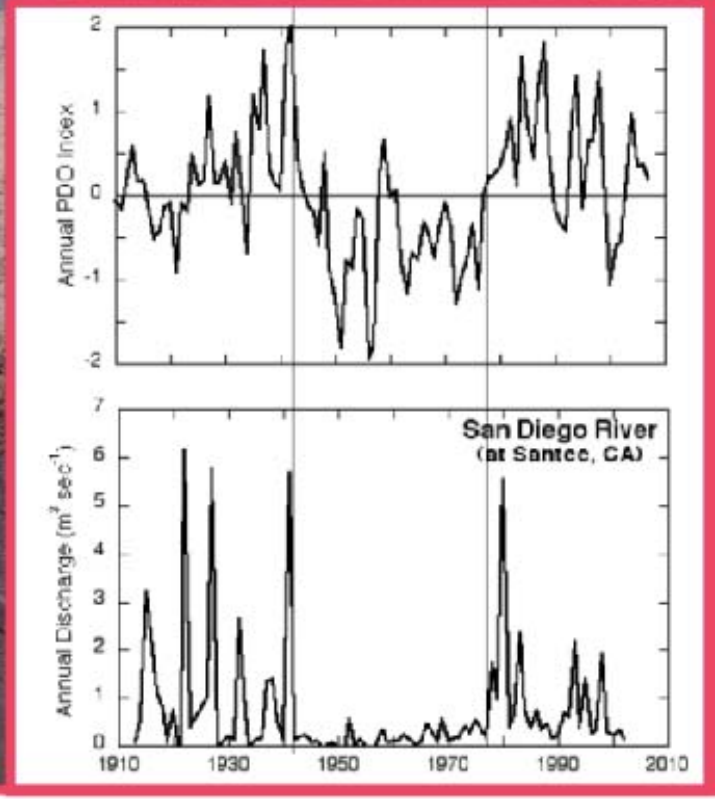
Liz Johnstone

Scripps Institution of Oceanography



Annual discharge for the San Diego River suggests that high discharge predominantly occurs in El Nino years with a positive PDO index.

If correct, than the rivers do not supply sediment to the ocean for 20-40 years at a time! Maybe rivers don't supply 90% of the sand to the beaches as proposed. Our work suggests >50% of the sand is supplied by cliff erosion.



To test our hypothesis, we are acquiring bathymetry and subsurface CHIRP data offshore the river systems and mapping cliff erosion. We want to collect LIDAR data up the Santa Magarita River to establish a baseline from which to assess future change and constrain the amount of fluvial erosion.

We also are in interested in any estimates of Qw (water discharge) and Qs (suspended sediment discharge for the Santa Magarita River. Thanks!