

How to see presenter notes . . .

- The following slide set contains the presenter's notes (when provided) explaining the slide.
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- Double click the icon and the notes will appear. Adjust the size of the text box containing the notes by dragging the lower corners.

Overview of ARkStorm

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BIOGRAPHICAL SKETCH

Dale A. Cox is the Project Manager of the USGS Multi-Hazards Demonstration Project (MHDP) and Region 9 Lead of the Department of Interior, Regional Emergency Coordination Council. In 2008, Cox coordinated the work of over 300 scientists and experts to create the ShakeOut Earthquake Scenario, the most comprehensive earthquake scenario ever devised. He is one of the creators of the "The Great Southern California ShakeOut", the largest emergency response exercise in the Nation's history. Cox also coordinated the USGS 2007 Firestorm Response that included ash chemical analysis, endangered species assessment and recovery, and a real-time debris flow warning system completed in time for the first rains. Cox is responsible for interdisciplinary working groups, community partnerships, interorganizational collaboration, and is presently leading ARkStorm, a disaster scenario examining modern impacts of a storm analogous to those that impacted California in 1861-62.

Cox joined the US Geological Survey in 1994, where he surveyed and reported on the hydrologic conditions of the High Plains Aquifer. While in Nebraska, he helped to create Groundwater Guardian, an international collaborative partnership between the USGS and the Groundwater Foundation. Cox later served as Chief of Communications at the USGS California Water Science Center. He was a coordinator of the Lake Tahoe Presidential Forum and the bathymetric mapping of Lake Tahoe. Cox also served as a coordinator of the National Oceans Conference, another presidential forum to raise awareness and develop global partnerships to tackle ocean issues. Later, Cox served as the USGS Western Publishing Manager.

Cox is a graduate of the University of Nebraska and is married to Kristin Cox, a middle school math and science teacher in El Dorado Hills, CA. He is the father of five daughters, Kathryn, Elizabeth, Suzanne, Madeline, and Amelia.

ABSTRACT

The United States Geological Survey (USGS) Multi-Hazards Demonstration Project (MHDP) is preparing a new emergency-preparedness scenario, called ARkStorm, to address massive U.S. West Coast storms analogous to those that devastated California in 1861–62. Storms of this magnitude are projected to become more frequent and intense as a result of climate change.

The MHDP has assembled experts from the National Oceanic and Atmospheric Administration (NOAA), USGS, Scripps Institute of Oceanography, the State of California, California Geological Survey, the University of Colorado, the National Center for Atmospheric Research, and other organizations to design the large, but scientifically plausible, hypothetical storm scenario that would provide emergency responders, resource managers, and the public a realistic assessment of what is historically possible.

The ARkStorm is patterned after the 1861–1862 historical events but uses modern modeling methods and data from large storms in 1969 and 1986. The ARkStorm draws heat and moisture from the tropical Pacific, forming Atmospheric Rivers (ARs) that grow in size, gain speed, and, with a ferocity equal to hurricanes, slam into the U.S. West Coast for several weeks. Using sophisticated weather models and expert analysis, precipitation, snowlines, wind, and pressure data the modelers will characterize the resulting floods, landslides, and coastal erosion and inundation. These hazards will then be translated into the infrastructural, environmental, agricultural, social, and economic impacts. Consideration will be given to catastrophic disruptions to water supplies resulting from impacts on groundwater pumping, seawater intrusion, water

supply degradation, and land subsidence. Possible climate-change forces that could exacerbate the problems will also be evaluated.

In contrast to the recent U.S. East and Gulf Coast hurricanes, only recently have scientific and technological advances documented the ferocity and strength of possible future West Coast storms. A task of ARkStorm is to elevate the visibility of the very real threats to human life, property, and ecosystems posed by extreme storms on the U.S. West Coast. This enhanced visibility will help increase the preparedness of the emergency management community and the public to such storms.

ARkStorm is scheduled to be completed by September 2010 and will be the basis of a statewide emergency response drill, Golden Guardian, led by the California Emergency Management Agency in 2011.



ARKSTORM: WEST COAST STORM SCENARIO

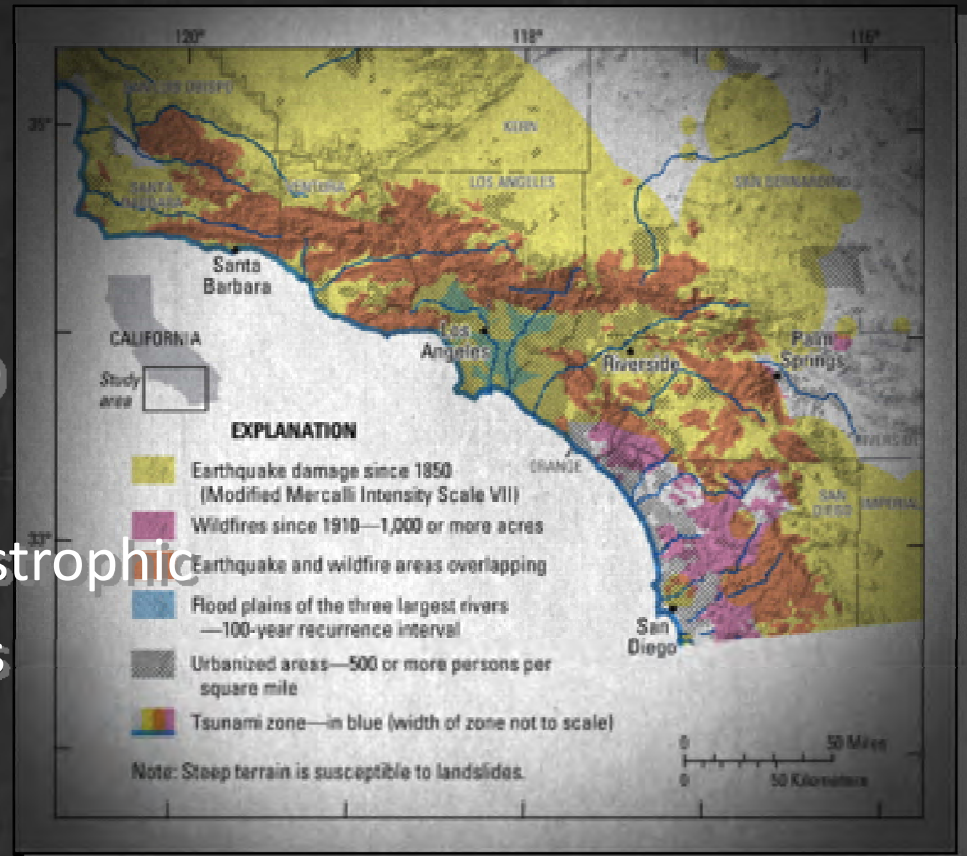
Lucy Jones, Chief Scientist, USGS Multi-Hazards Demonstration Project
Dale Alan Cox, Project Manager, USGS Multi-Hazards Demonstration Project



MULTI-HAZARDS DEMONSTRATION PROJECT

Southern California

- Eight counties
- ~ 23 million people
- Growing at around 276,000 people a year.
- Great risk for extreme catastrophic losses from natural hazards



MULTI-HAZARDS DEMONSTRATION PROJECT

- Earthquakes
- Landslides
- Floods
- Tsunamis
- Wildfires
- Coastal Erosion





Multi-Hazards Approach

The goal of the Multi-Hazards Demonstration Project is to improve community resiliency to natural hazards through the application of multi-discipline science.





"In California, the emergency services deal with disasters as a matter of course. It's the catastrophic events that push us to our limits.

We look to science to help us better prepare for catastrophes.

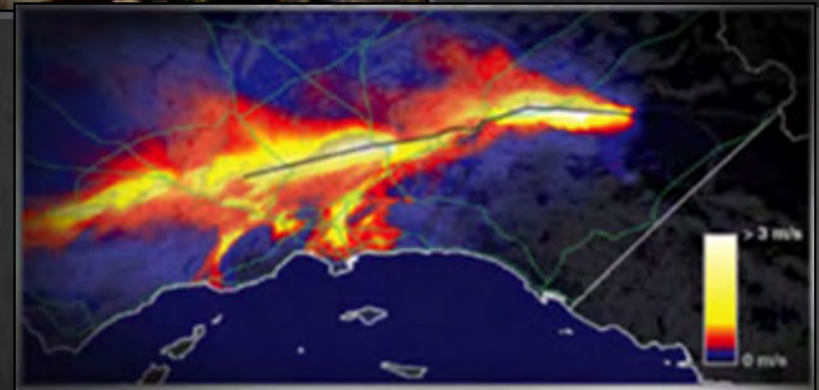
By preparing for catastrophes, we can deal with disasters that much better."

- Larry Collins, Captain, County of Los Angeles Fire Department



MULTI-HAZARDS DEMONSTRATION PROJECT

- **Earthquake / Tsunami:**
Earthquake Scenario
and Tsunami Scenario
- **Community Interface:**
Tools and Information for emergency
responders and decision makers.
- **Fire / Debris Flow:**
A debris flow warning system
Fire Scenario: Risk Analysis
- **Winter Storm:**
Winter storm scenario





THE GREAT SHAKEOUTS

- **Great Southern California ShakeOut:**
November 13, 2008
5.4 Million Participants
Based on ShakeOut Earthquake Scenario
Over 2,500 Golden Guardian Participants
- **Annual Statewide Great California ShakeOut:**
October 15, 2009
6.4 Million Participants

Events and products designed to inspire Californians to improve their earthquake resiliency





"This is the best single effort in emergency preparedness in my nearly 20 years in the business. The Golden Guardian / Great Shake Out project did more to prepare our cities than all previous efforts combined for many years past. I have never had so much participation and interest in disaster preparedness. And it continues!"

- Mike Martinet, Los Angeles County Emergency Manager





THE SHAKEOUT SCENARIO

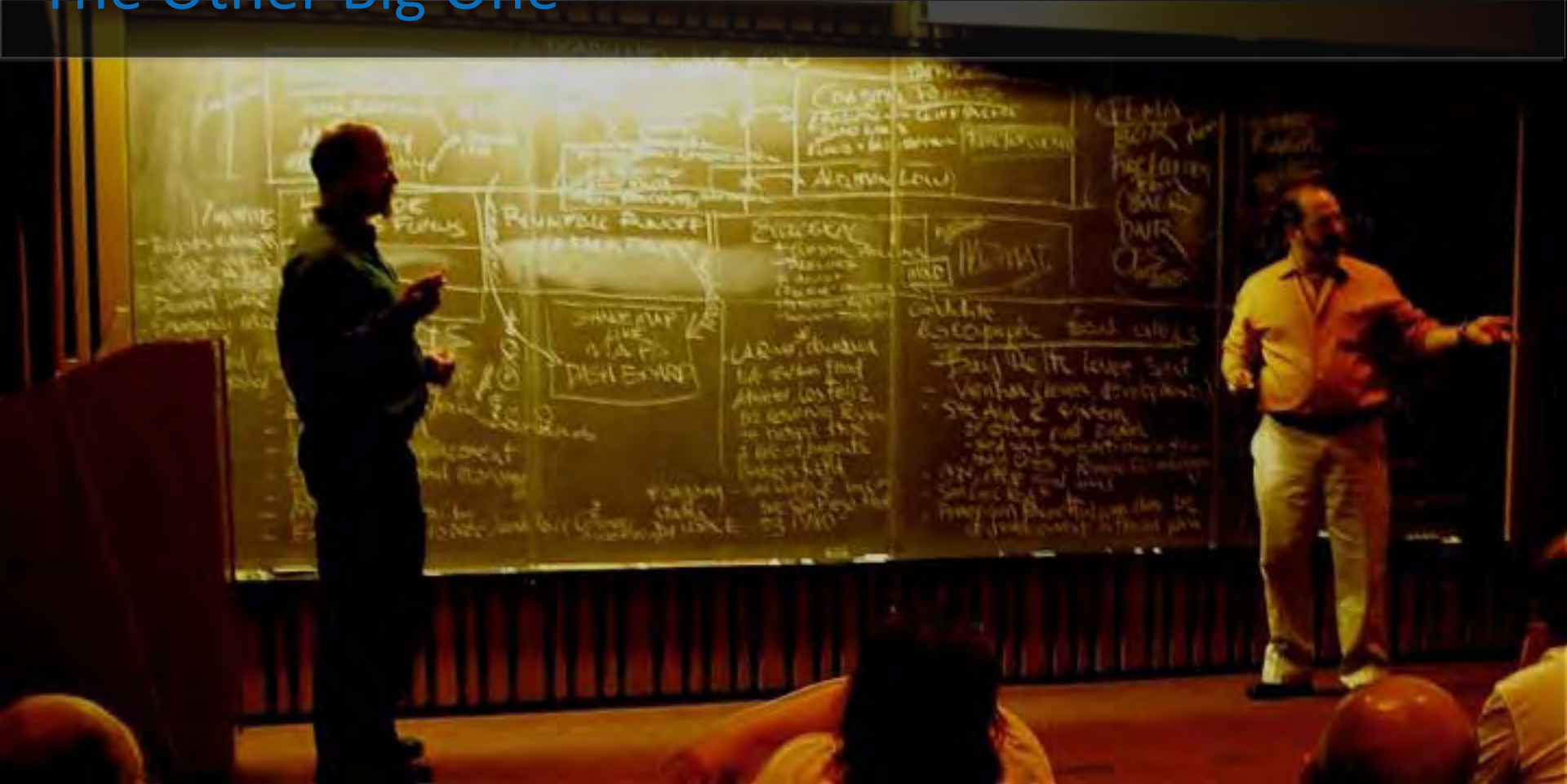
QuickTime™ and a
H.264 decompressor
are needed to see this picture.



Brad Aagaard, USGS



The Other Big One



First Public Meeting: Oct. 28, 2008
Caltech, Pasadena, California





AR = Atmospheric River

- 1997, 1986, 1969, etc.
- AR 1000 = ARk Storm
- A scale to measure and compare past and present storm?
- Explicitly beyond our

Great Storms in California

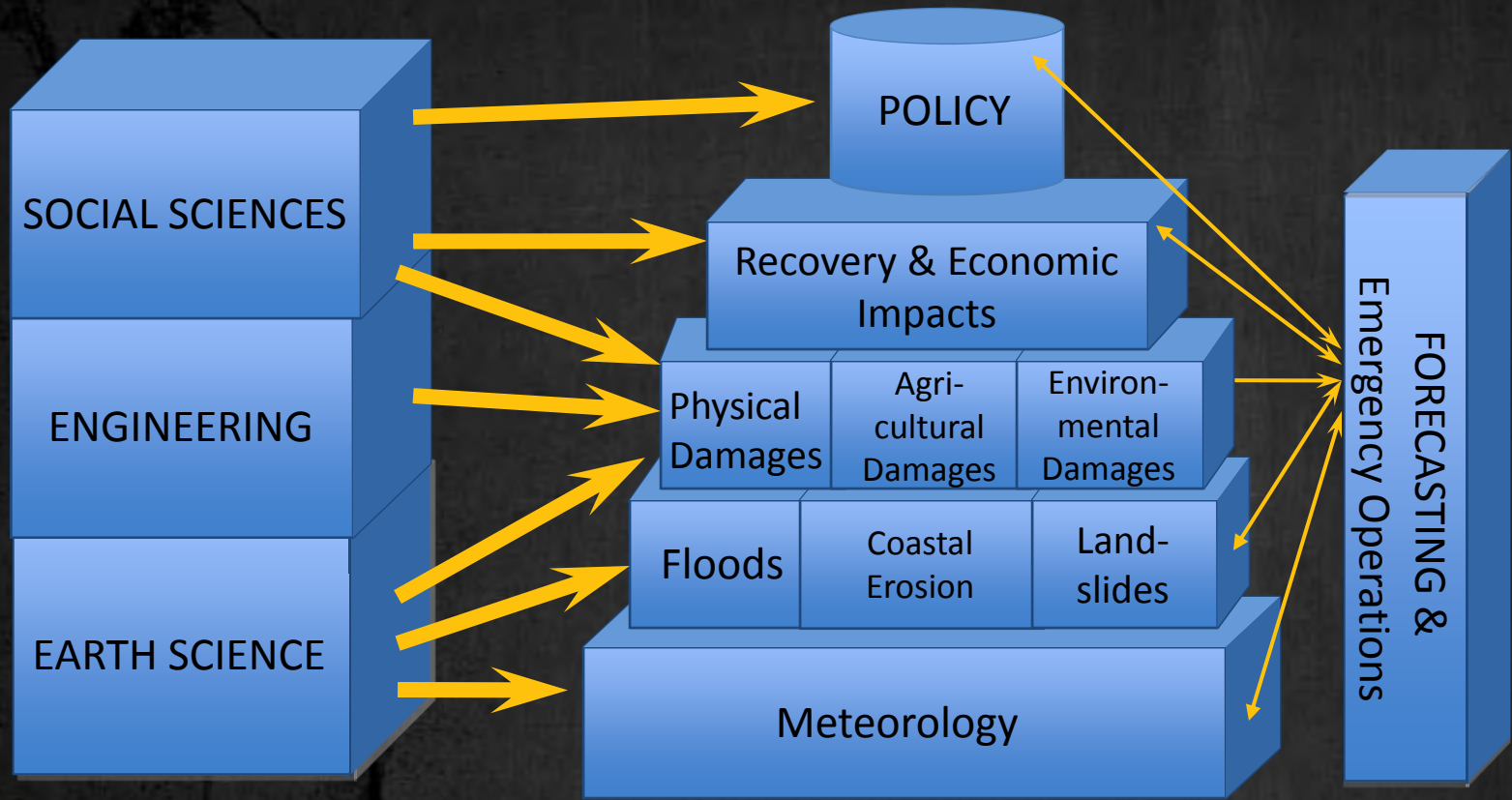
- 1861-1862: Largest storm in historic record
- Geologic record in Santa Barbara Channel shows 6 events 212-1605 AD with massive sediment deposits
- 1861-2 produced no significant deposits in the Santa Barbara Channel
- Storms bigger than 1861-2 have occurred repeatedly.



K Street Sacramento, looking east



Building a Scenario



ARkStorm Coordinators

- Atmospherics: Mike Dettinger, USGS Scripps
- Atmospherics: Marty Ralph, NOAA Research/ESRL/PSD
- Historical Flood: Cary Mock, University of South Carolina
- Historical Flood: Marcia Eymann, Center for Sacramento History
- Paleoflood: Justin Ferris, USGS California Water Science Center
- Paleoflood: Robert Jarrett, USGS National Research Program
- Floods: Bill Croyle, DWR Flood Operations Center
- Floods: Justin Ferris, USGS California Water Science Center
- Floods: Kathleen Schaefer, FEMA
- Floods: Keith Porter, University of Colorado



ARkStorm Coordinators

- Landslides: Chris Wills, California Geological Survey
- Landslides: Jon Stock, USGS Earth Surfaces Processes Team
- Coastal: Patrick Barnard, USGS Coastal Marine Geology
- Coastal: Dan Hoover, USGS Coastal Marine Geology
- Physical Damages: Keith Porter, University of Colorado
- Environmental: Geoff Plumlee, USGS Minerals Program
- Environmental: Charles Alpers, USGS California Water Science Center
- Forecast: David Reynolds, NOAA NWS, San Francisco
- Emergency Response: Mitch Miller, CalEMA
- Emergency Response: Sue Perry, USGS MHDP



ARkStorm Coordinators

- Policy: Ken Topping, California State Polytechnic, San Luis Obispo
- Policy: Laurie Johnson, Laurie Johnson Consulting
- Economics: Anne Wein, USGS Western Geographic Team
- Economics: Adam Rose, University of Southern California
- Visualization: James Done, National Center for Atmospheric Research
- GIS: David Strong, USGS, Eastern Geographic Science Center



What's Next

- July 15 Content: Content Roundup
- October 1, 2010: ARkStorm Published
- November: ARkStorm Conference
- May 17, 2011: Golden Guardian 2011 Exercise

