Meeting of the COMMITTEE ON SEISMOLOGY AND GEODYNAMICS

May 9, 2019 University of California, Berkeley Berkeley Seismology Lab Conference Room The National Academies of

| SCIENCES | ENGINEERING | MEDICINE

2019 SPRING MEETING

NEW OPPORTUNITIES TO STUDY TECTONIC PRECURSORS

The topic of earthquake and volcanic eruption prediction has a long history, littered with failed attempts. While it is well known that a significant fraction of large earthquakes have precursors in the form of smaller magnitude foreshocks at the eventual rupture site, it has not to date been possible to determine which earthquakes are foreshocks and which are not until after the fact. For volcanoes, precursory phenomena have long been used to forecast eruptions on land, albeit imperfectly so.

Several recent studies have shown the potential of new technologies to detect precursory earthquakes and slow-slip phenomena as well as geodetic and gravitational transients weeks to years before large earthquakes. Together with increasing evidence of deterministic links between physical processes and seismicity patterns, there is the promise to more fully understand earthquake and eruption cycles and to enhance our predictive and forecasting capabilities for these important natural hazards.

The societal implications of understanding the range of precursory signals are large, but many questions remain. How do we assess whether there is an imminent (e.g., hours to days) threat at places such as the U.S. Pacific Northwest, the San Andreas fault, or the southeast flank of Kilauea? How frequently do these precursors occur, and in which plate tectonic settings? How often do they result in large earthquakes or eruptions? Are there certain characteristics of the precursor(s) that make them more or less likely to result in a large earthquake or eruption? What instrumentation do we need on- and off-shore to best record these potential precursory events?

Registration link for webinar: https://nasem.zoom.us/meeting/register/0b449ba8f0cb1715d746f627e8486654

If you would like to attend in person, please contact Courtney DeVane (cdevane@nas.edu).

MAY 9, 2019 OPEN SESSION		Berkeley Seismology Lab Conference Room	
7:45 AM	Doors open		
8:00 AM	Welcome	Richard Allen , Chair	
8:10 AM	Opportunities and Challenges in Studying Precursory Ph Overview	enomena: Emily Brodsky UC Santa Cruz	
8:50 AM	 Panel 1: Scientific Opportunities and Challenges in Study Phenomena Some Precursory Slow Slip Signatures in Chilean Searthquakes - Sergio Ruiz, Universidad de Chile (r Long Term Transient Deformation Prior to the 20 Tohoku-oki Earthquake - Paul Segall, Stanford Universidad Universidad Universidad University 	ying PrecursoryModerated by: Maya TolstoySubductionCommittee Memberremote)11 Magnitude 9iversityIn the second	

AGENDA MAY 9, 2019 Berkeley Seismology Lab Conference Room

9:40 AM	 Panel 2: Techniques and Technologies GRACE Gravity Signals Before a Great Subduction Earthquake - Isabelle Panet, IGN (remote) Optimizing Subduction Zone Monitoring - Sarah Minson, USGS Sea-Surface GPS: Recent Advances - Bruce Haines, NASA Towards Establishing Long Term Geodetic Benchmarks on the Seafloor using Underwater Acoustic GPS - Bud Vincent, University of Rhode Island (remote) 	Moderated by: Cindy Ebinger Committee Member
10:40 AM	BREAK	
11:00 AM	 Panel 2: Techniques and Technologies (Continued) Seafloor Pressure Sensors - Spahr Webb, Lamont-Doherty Earth Observatory, Columbia University (remote) The Use of Seafloor Cabled Observatories to Study Precursory Phenomena - William Wilcock, University of Washington (remote) Acoustic Ranging and Borehole Tilt - Jeff McGuire, USGS Broadband earthquake array seismology with fiber-optic DAS - Nate Lindsey, UC Berkeley 	<i>Moderated by:</i> Thorsten Becker Committee Member
Noon	WORKING LUNCH (Committee members, panelists, guests)	
1:00 PM	 Panel 3: Scientific Opportunities and Challenges in Studying Precursory Phenomena 2016 Bombay Beach Swarm and its Effect on the San Andreas Fault - Morgan Page, USGS Potential Precursors for Other Earthquakes from Observations of the 2016 Kaikoura Earthquake - Laura Wallace, GNS New Zealand (remote) 	Moderated by: Mark Behn Committee Member
1:50 PM	Synthesis and Concluding Remarks	Roland Burgmann UC Berkeley

2:30 PM | END OF PUBLIC SESSION