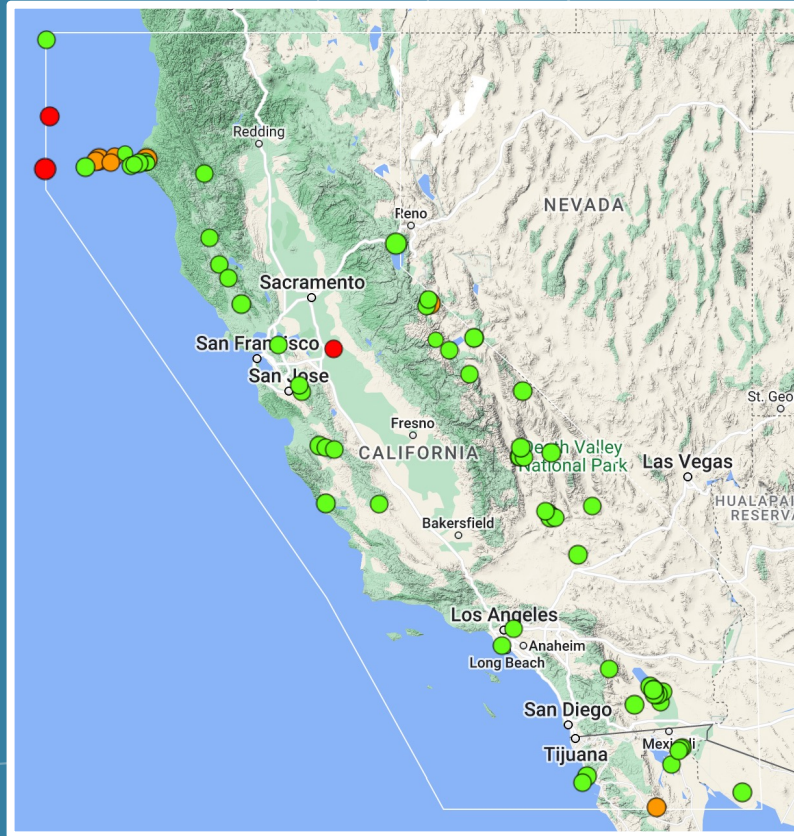


# DAS for Earthquake Early Warning

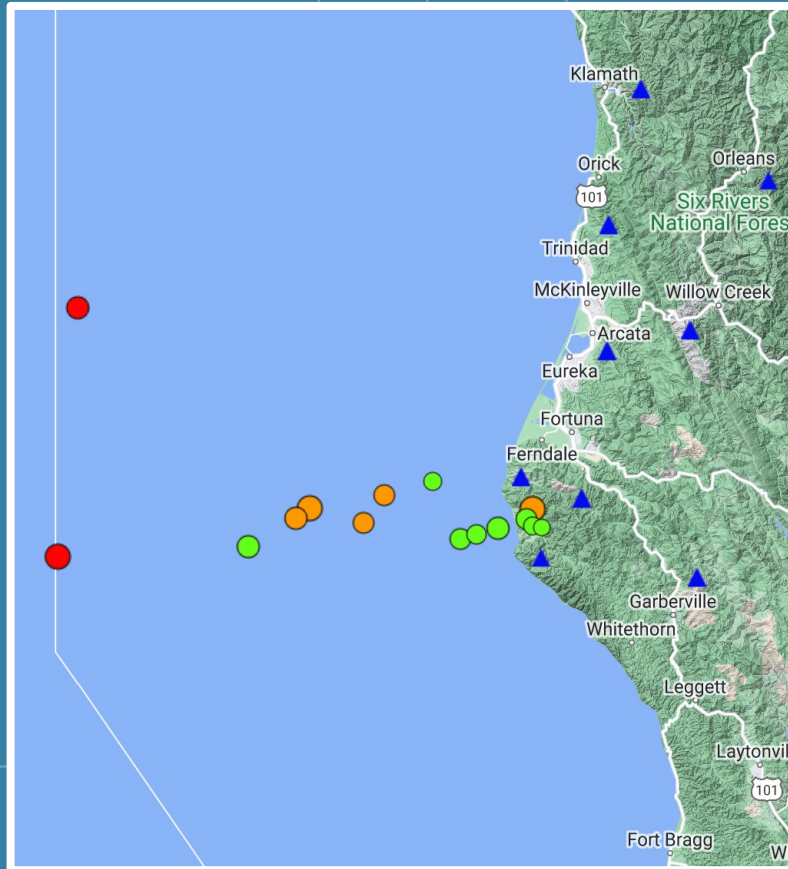
Dr. Julien Marty  
*Operations Manager*  
*Berkeley Seismology Lab*

# CEEWS Performance



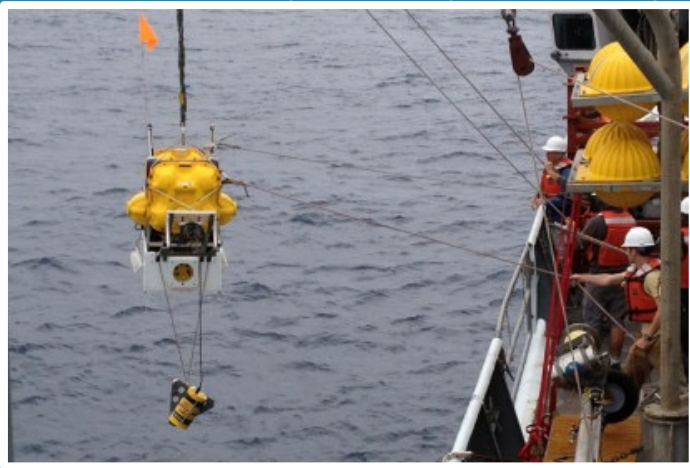
- 3 years of operations
- Public Alerts M4.5+
- 61 **True** Alerts
- 3 **False** (real earthquakes with poor location)
- 7 **Missed** (edges of network)
- 70% of false/missed alerts related events in the Mendocino Triple Junction (MTJ) area

# Offshore Events



- The MTJ is the main seismically active offshore area in California
- M7.3 (1980) M7.2 (1992)
- CEEWS stations far from events (no islands)
- Larger uncertainties in location and magnitude estimations
- Increased latency
- Solutions: machine learning, offshore measurement systems

# Ocean–Bottom Seismometers

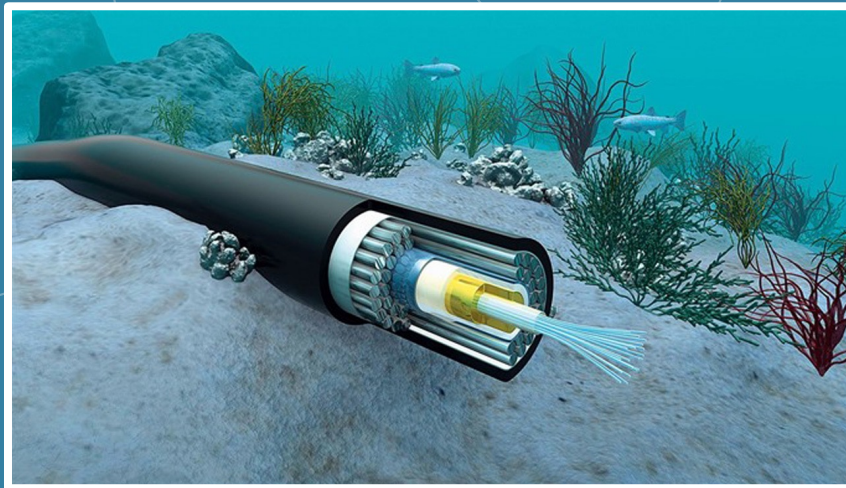


*Cascadia Initiative (temporary)*

- Usually designed for short-term experiments
- Challenge of long-term power and communication solutions
- Expensive to install and repair

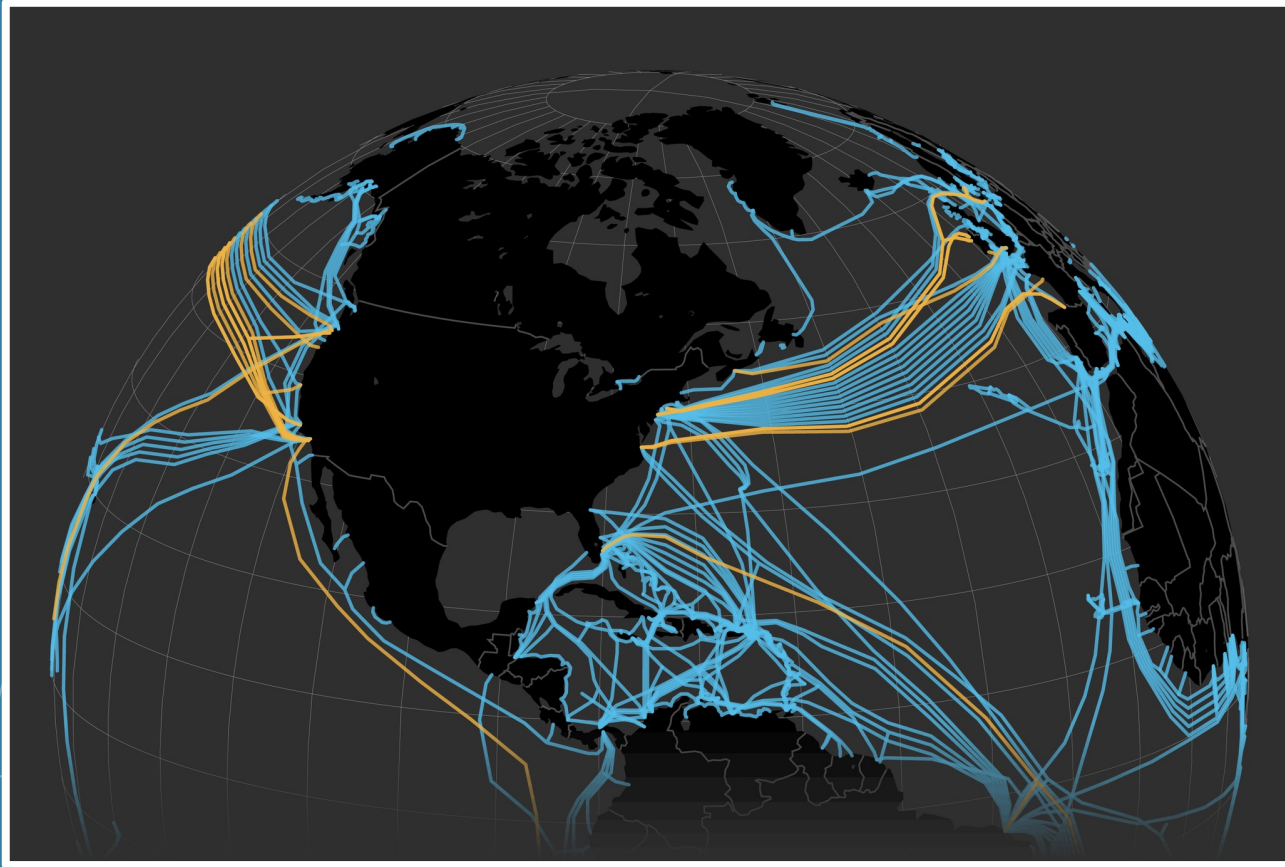
# Distributed Acoustic Sensing

- Use fiber optic cables as a measurement system instead of for long-distance telecommunication
- Many applications: hazard mitigation, energy industries, geohydrology, environmental monitoring, and civil engineering



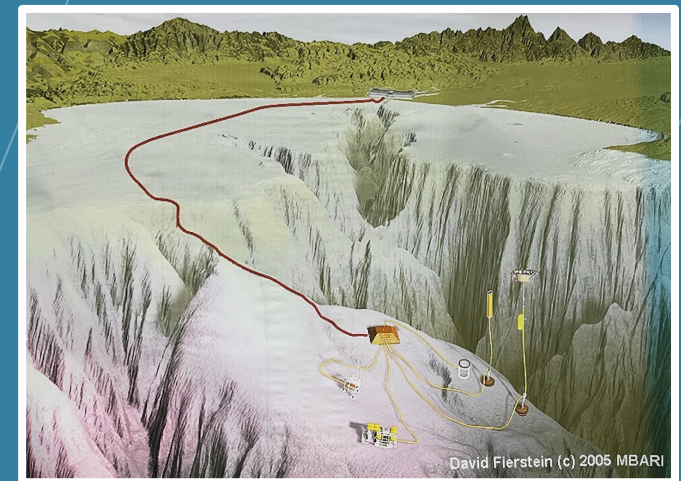
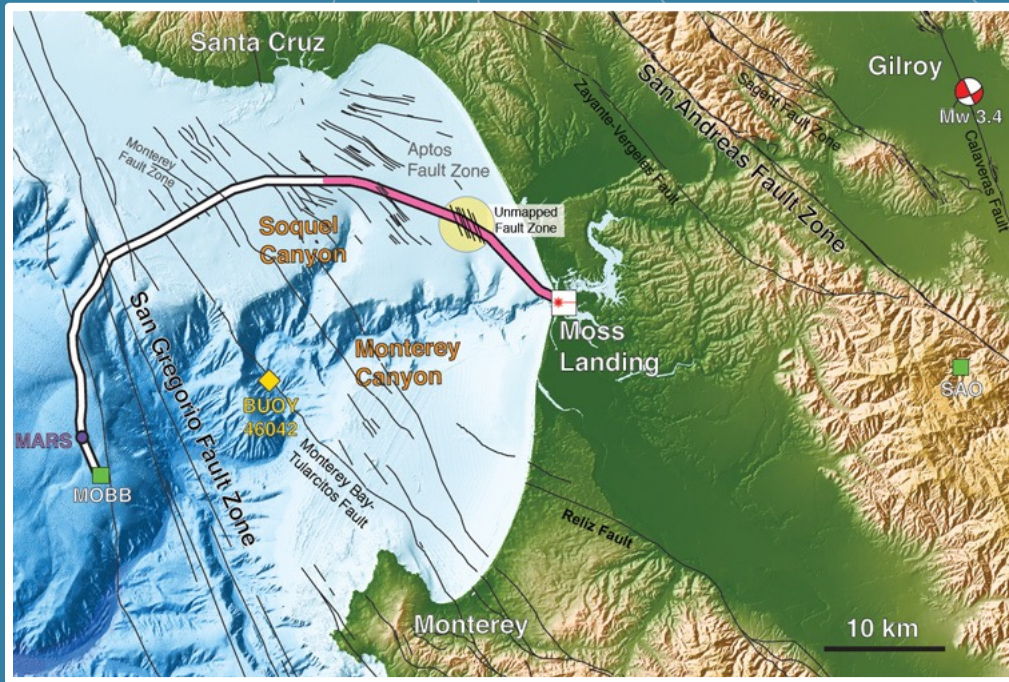


# Submarine Cables



*Graphic courtesy of New York Times*

# Monterey Accelerated Research System (MARS)



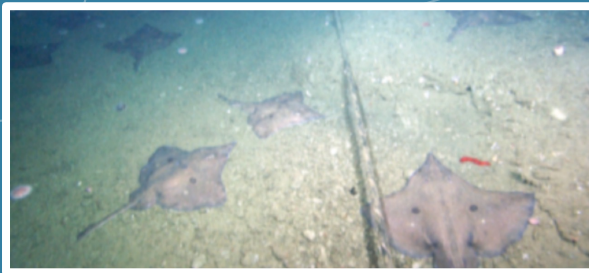
*Infrastructure operated by the Monterey Bay Aquarium Research Institute (MBARI) (Lindsey, 2019)*



# DAS Interrogator & Cable

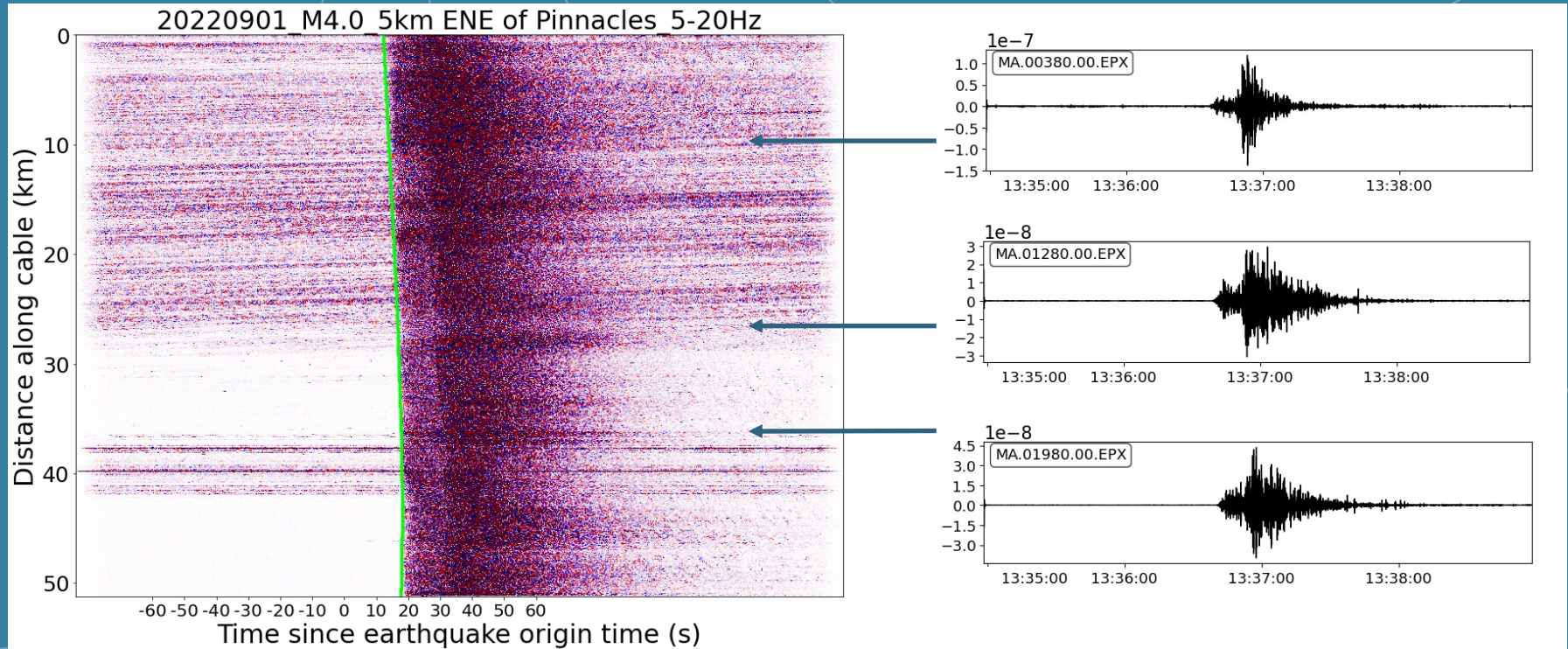


- System operational since **July 2022**
- **10400** measurement points along the cable
- Data streamed in **real-time** to UCB Data Center

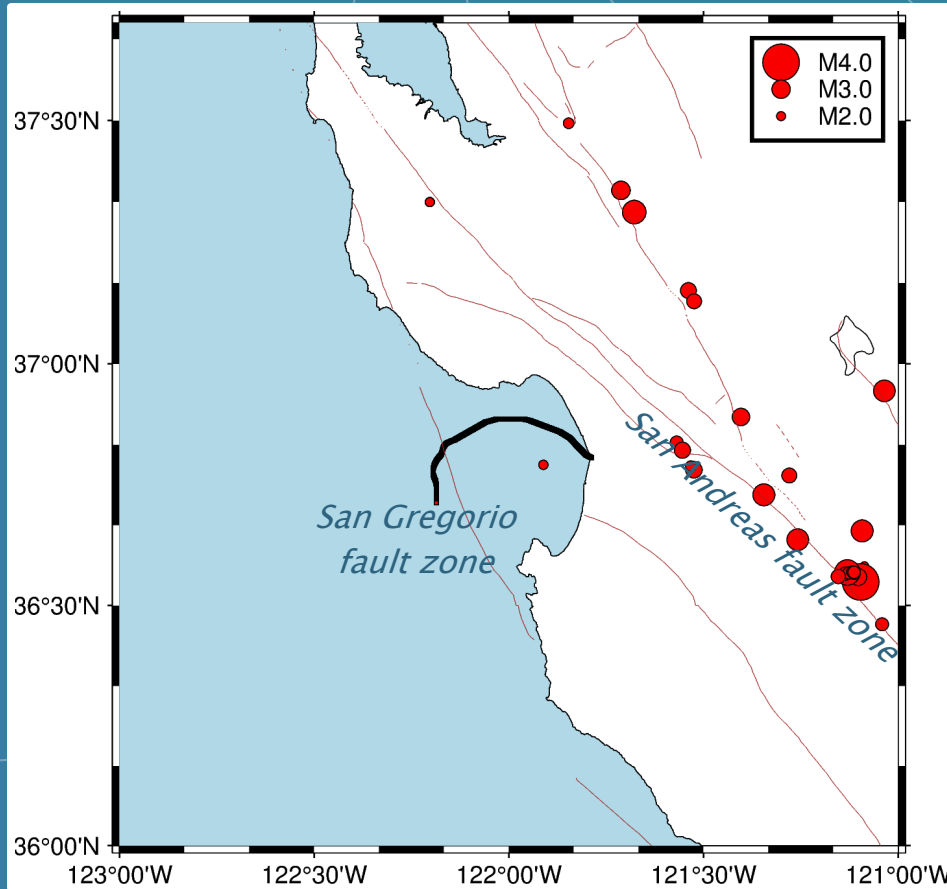




# Earthquake Detections



# Earthquake Detections



- Detection of 30+ earthquakes in 2 months
- Monitoring of San Gregorio Fault (historical M7+)
- R&D on system detection capability and real-time data processing
- Software development for integration into EEW pipeline

# DAS – Conclusion

- Cost-efficient technology to extend seismic monitoring offshore and beneath urban environments
- Improvement to earthquake and tsunami warning systems
- Integration into existing CEEWS processing pipeline
- Rapidly evolving technology
- Access to existing/future cables ?

