Using Web GIS to Enhance Tectonics Learning and Geospatial Thinking

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Middle school science teachers

Curriculum Design Approach for Geospatial Learning

- Curriculum framework
- Design principles
- Instructional model for the development of inquiry learning activities with spatially-enabled learning technologies
- Educative materials to support teacher enactment

Design Principles

1. Design curriculum materials to align with the demand of classroom contexts.
2. Design activities to apply to diverse contexts.
3. Use motivating entry points to engage learners.
4. Provide personally relevant and meaningful examples.
5. Promote spatial thinking skills with easy to use geospatial learning technologies.
6. Design image representations that illustrate visual aspects of scientific knowledge.
7. Develop curriculum materials to better accommodate the learning needs of diverse students.
8. Scaffold students to explain their ideas.

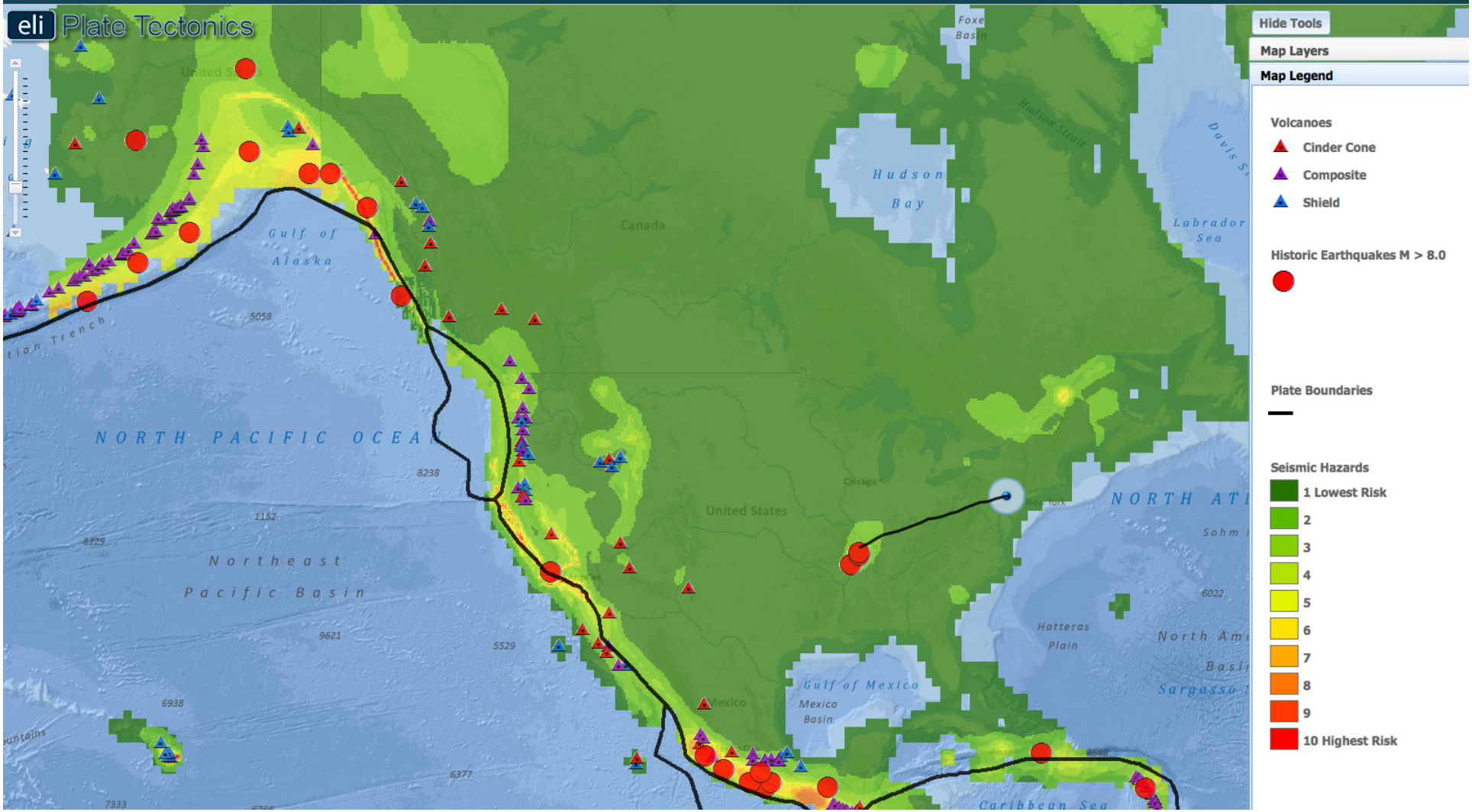
Spatial Learning Design Model

1. **Elicit prior understandings of lesson concepts.**
2. **Present authentic task.**
3. **Model task.**
4. **Provide worked example.**
5. **Ask learners to perform task.**
6. **Scaffold task.**
7. **Ask learners additional questions to elaborate task.**
8. **Review activity concepts.**

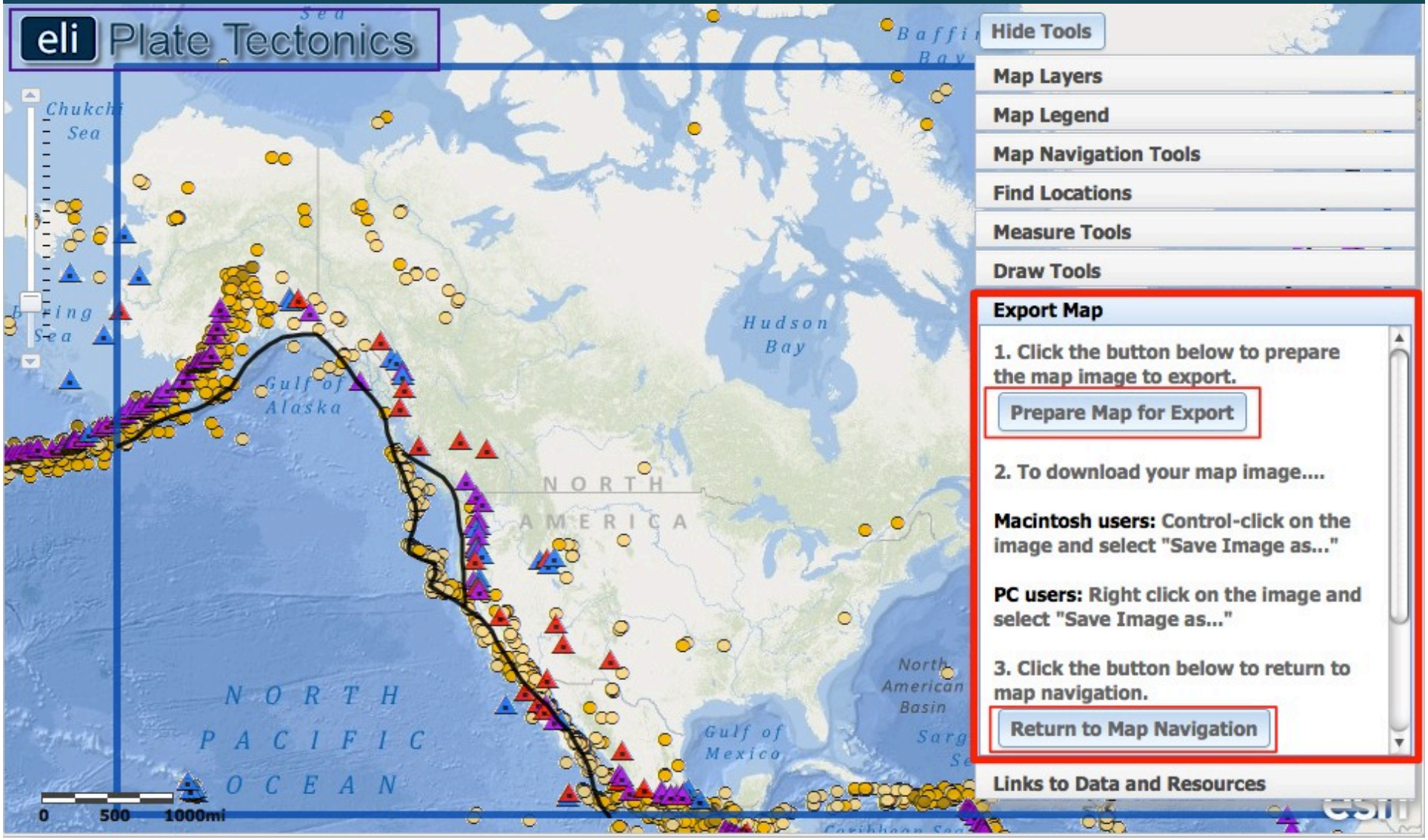
Key Features

- Tectonics investigations for curriculum enhancement
- Javascript Web GIS to be platform independent (i.e. tablets, laptops, cellphones)
- Interface design and customized data display for middle school learners
- Visualizations and tool features designed to enable spatial thinking
- Content and pedagogical supports for teachers to implement geospatial learning investigations

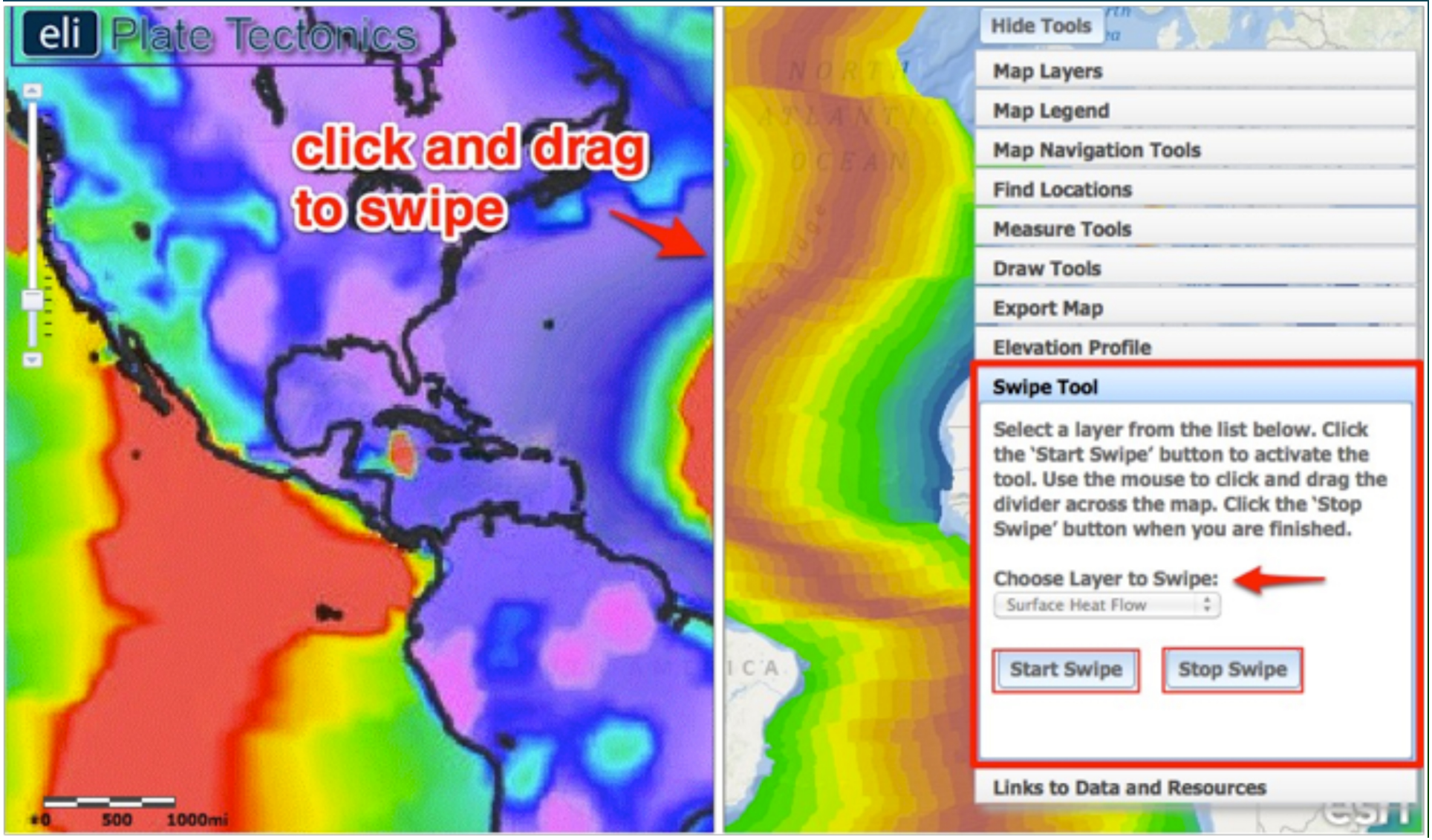
Where's the nearest hazard to my location?



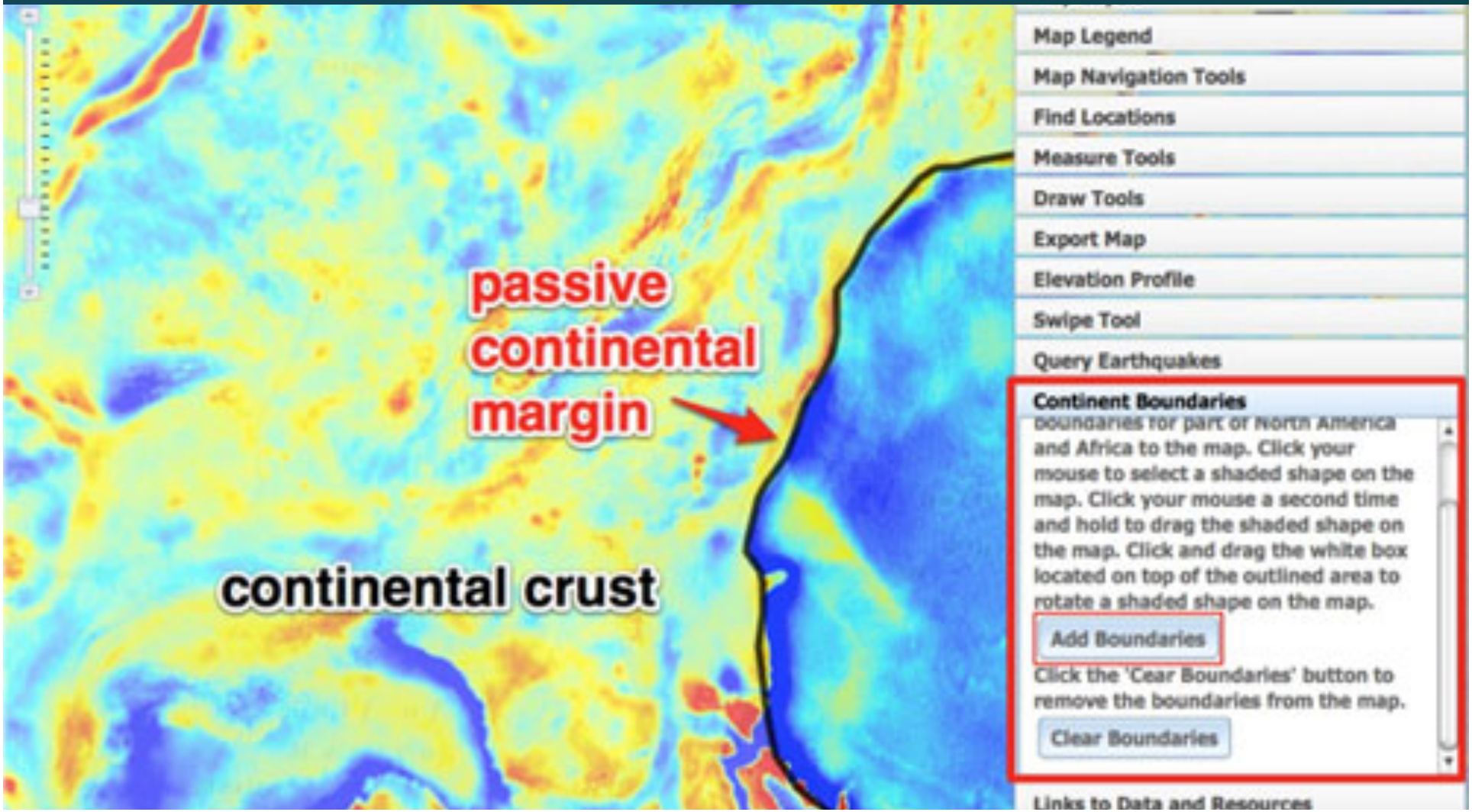
How do we recognize plate boundaries?



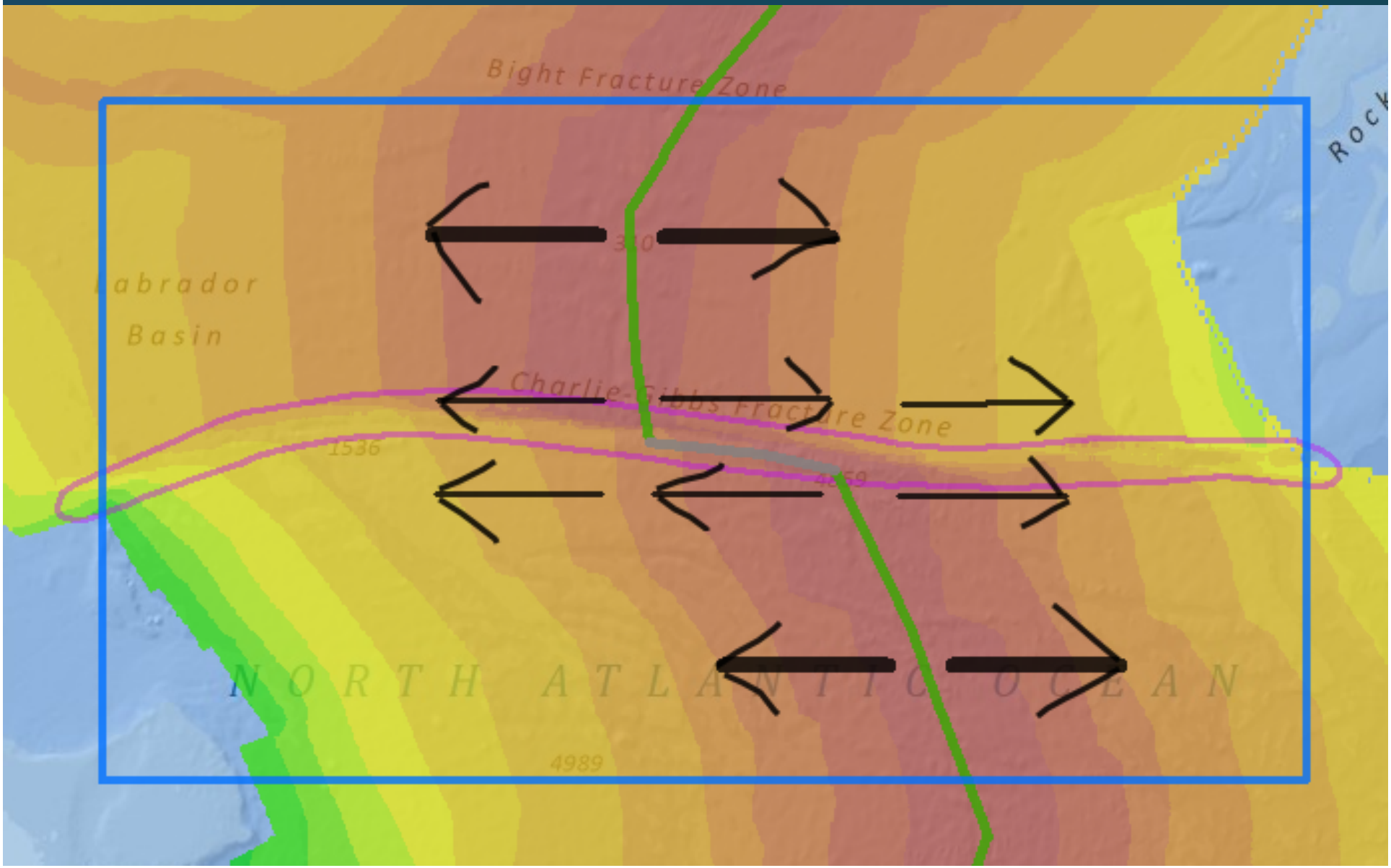
How does thermal energy move around in the Earth?



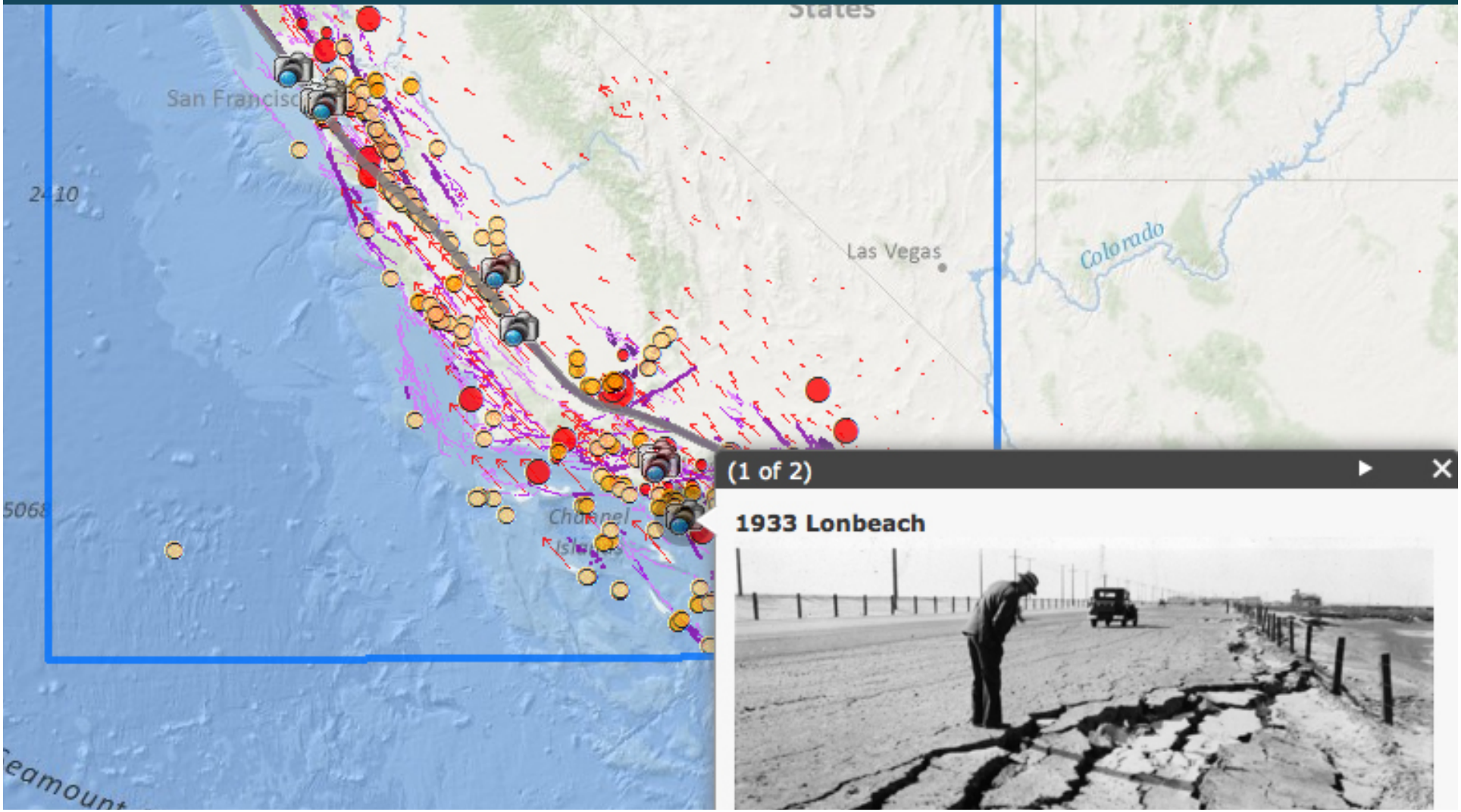
Spatial patterns at a continental shelf



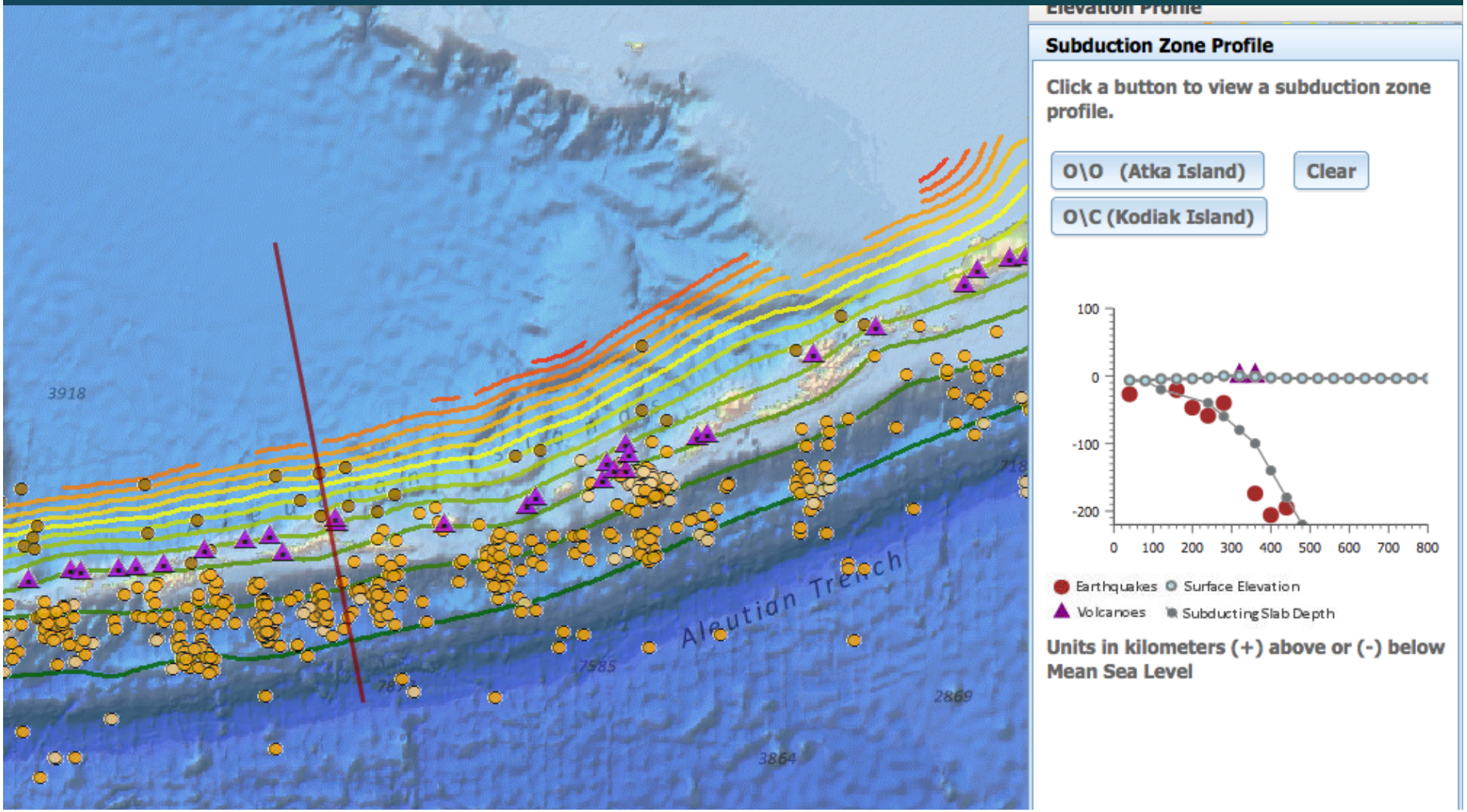
What happens when plate diverge?



Investigating the San Andreas Fault Zone



What happened when plates move sideways past each other?



What happens when plates collide?

Prototype testing findings

- **High fidelity of implementation – adherence to the events in the instructional model**
- **High student engagement**
- **Ease of use for urban middle school teachers**
- **Some server issues identified with map services that were resolved to handle large numbers of users**

Questions and Comments

http://www.ei.lehigh.edu/eli/tectonics

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