

GPS

Putting the first four weeks together

The longitude problem, in detail



Location service in the classroom



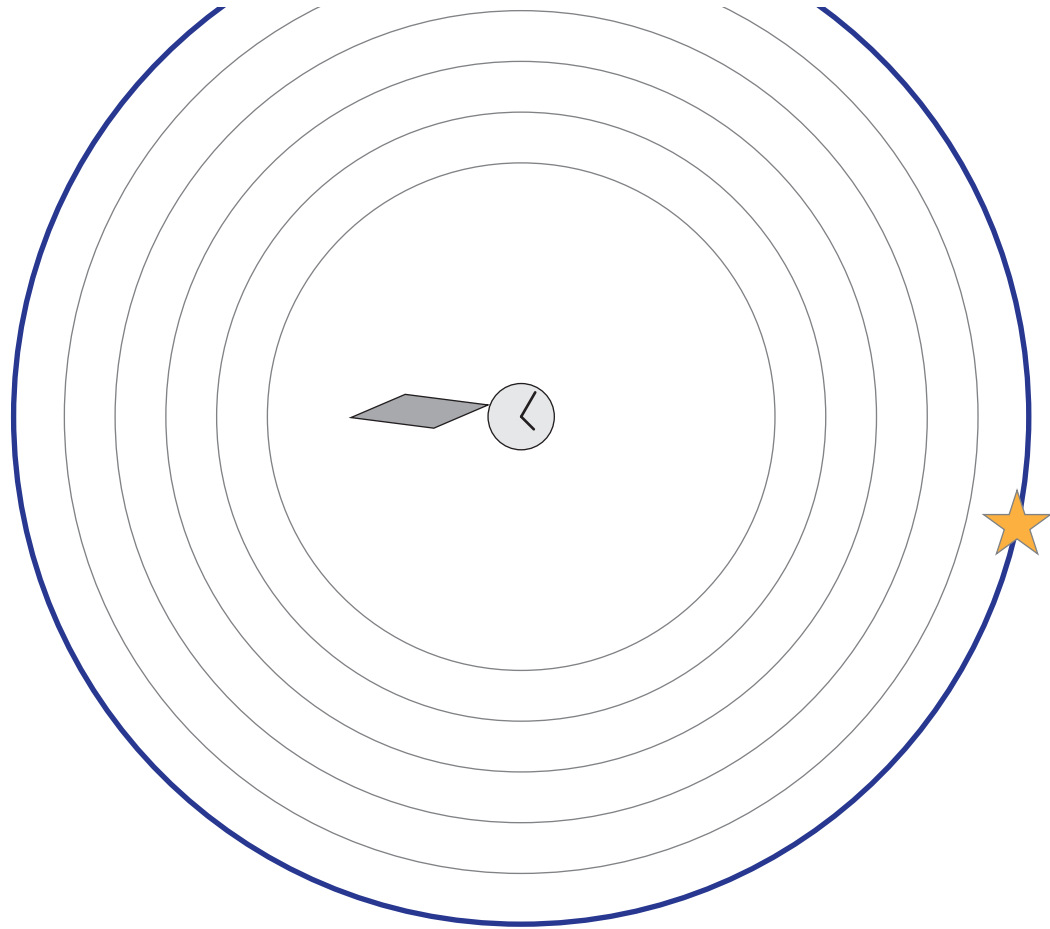
Location service in the classroom



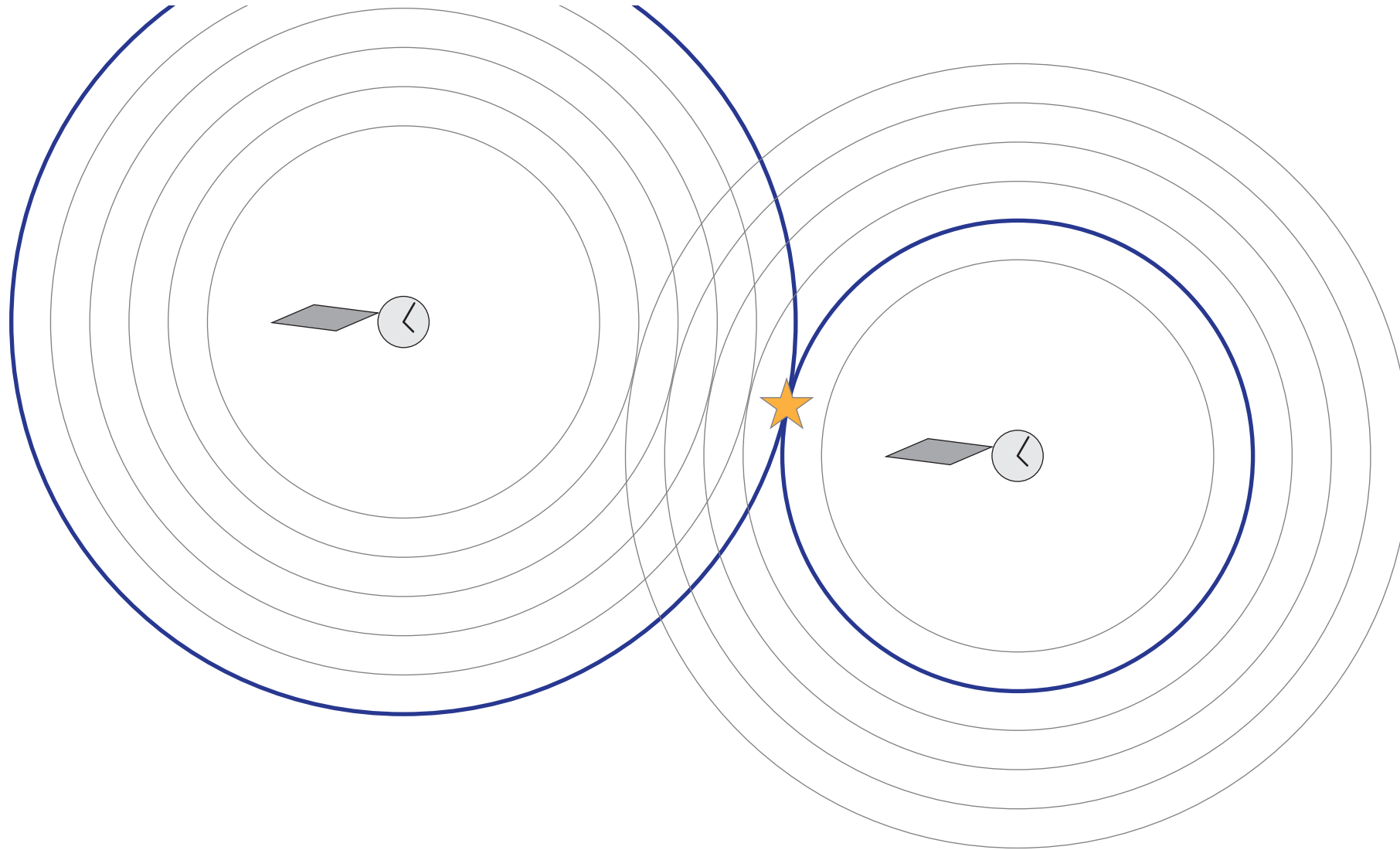
Physics we know

- The speed of light is constant
- We can make good clocks

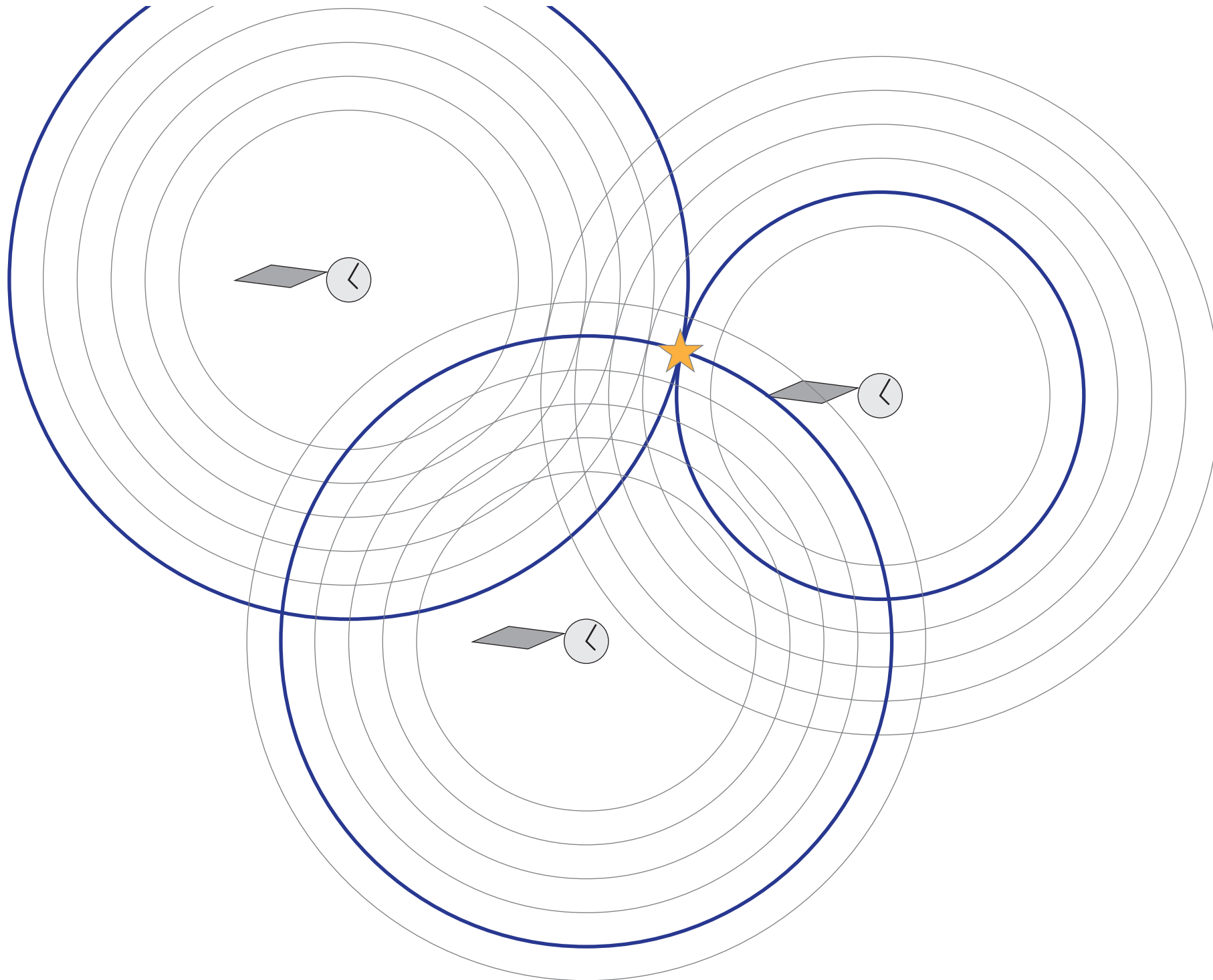
GPS in action



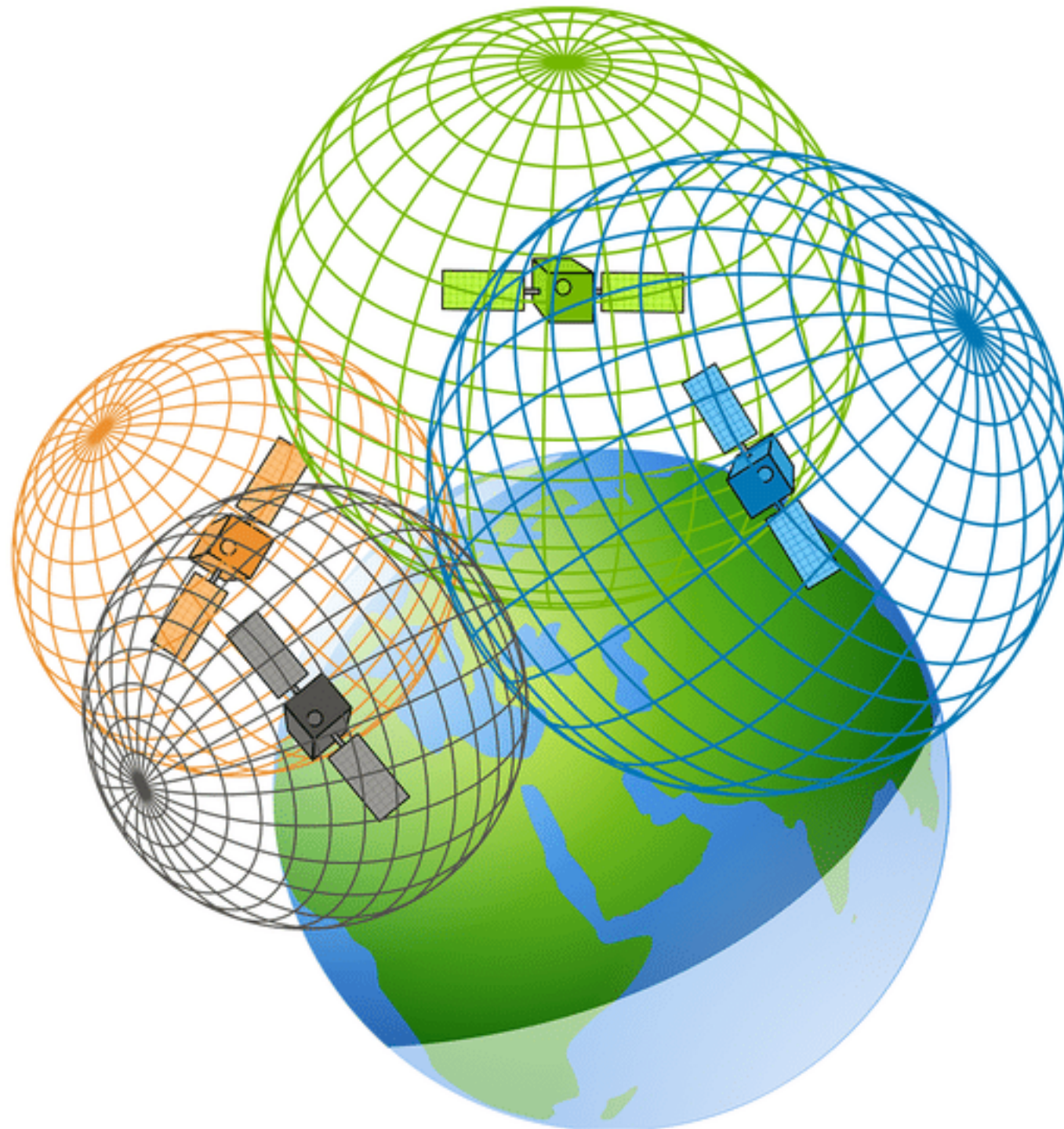
GPS in action



GPS in action



GPS in action



GPS

- Each satellite has an atomic clock, and sends out times (ticks) via radio light
- The satellites move (quickly), but the orbits are known, so distance from when the satellite sent the specific tick is known
- More satellites allows triangulation

Doing it right

- Constantly updating the atomic clocks on the satellites (based on international atomic time TAI)
- Monitoring of satellite orbits to correct for small changes
- Dealing with ionosphere

Phones



Precision clocks



Time in the outback



Time in the outback

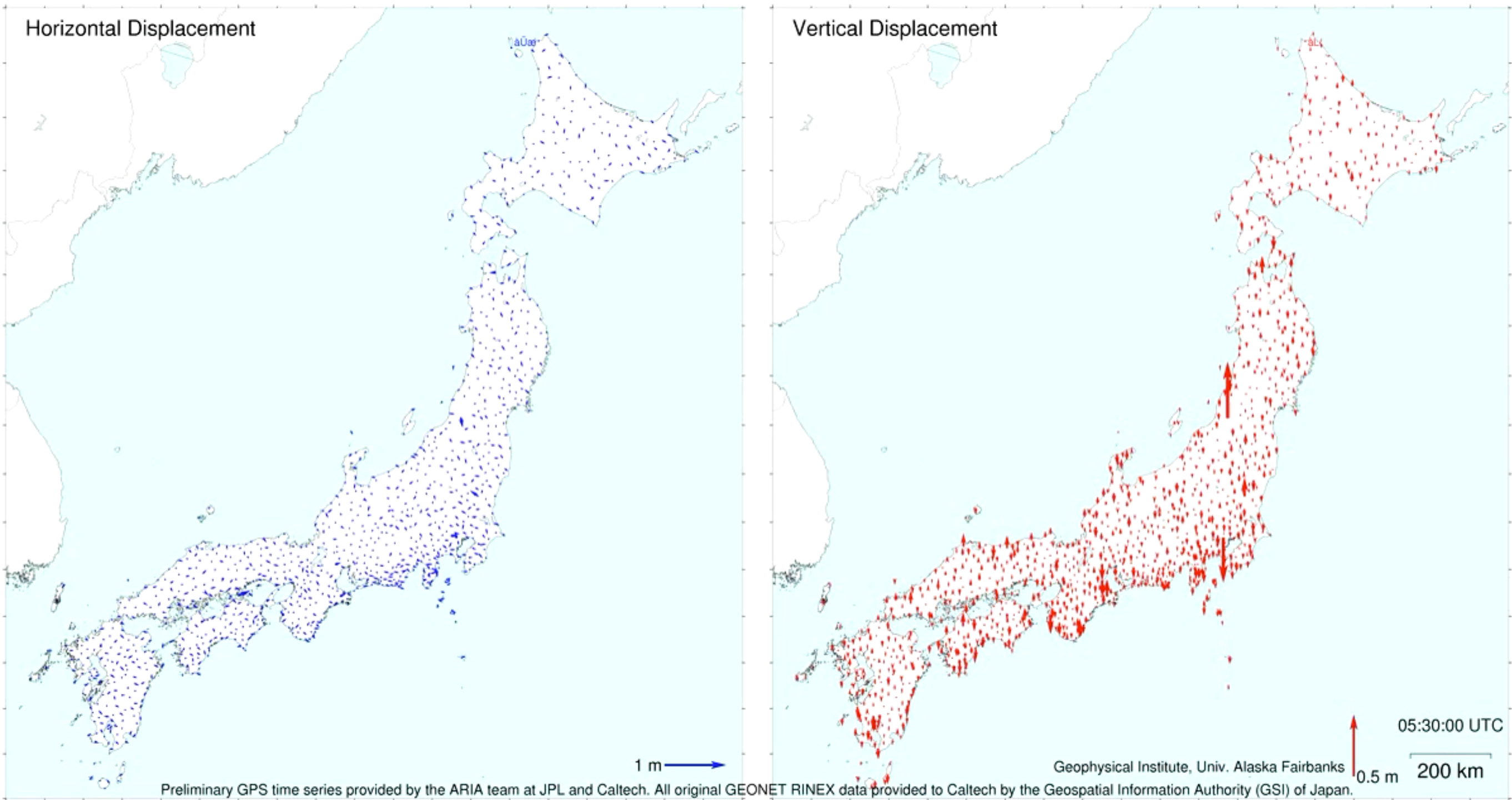


Surveyor's GPS

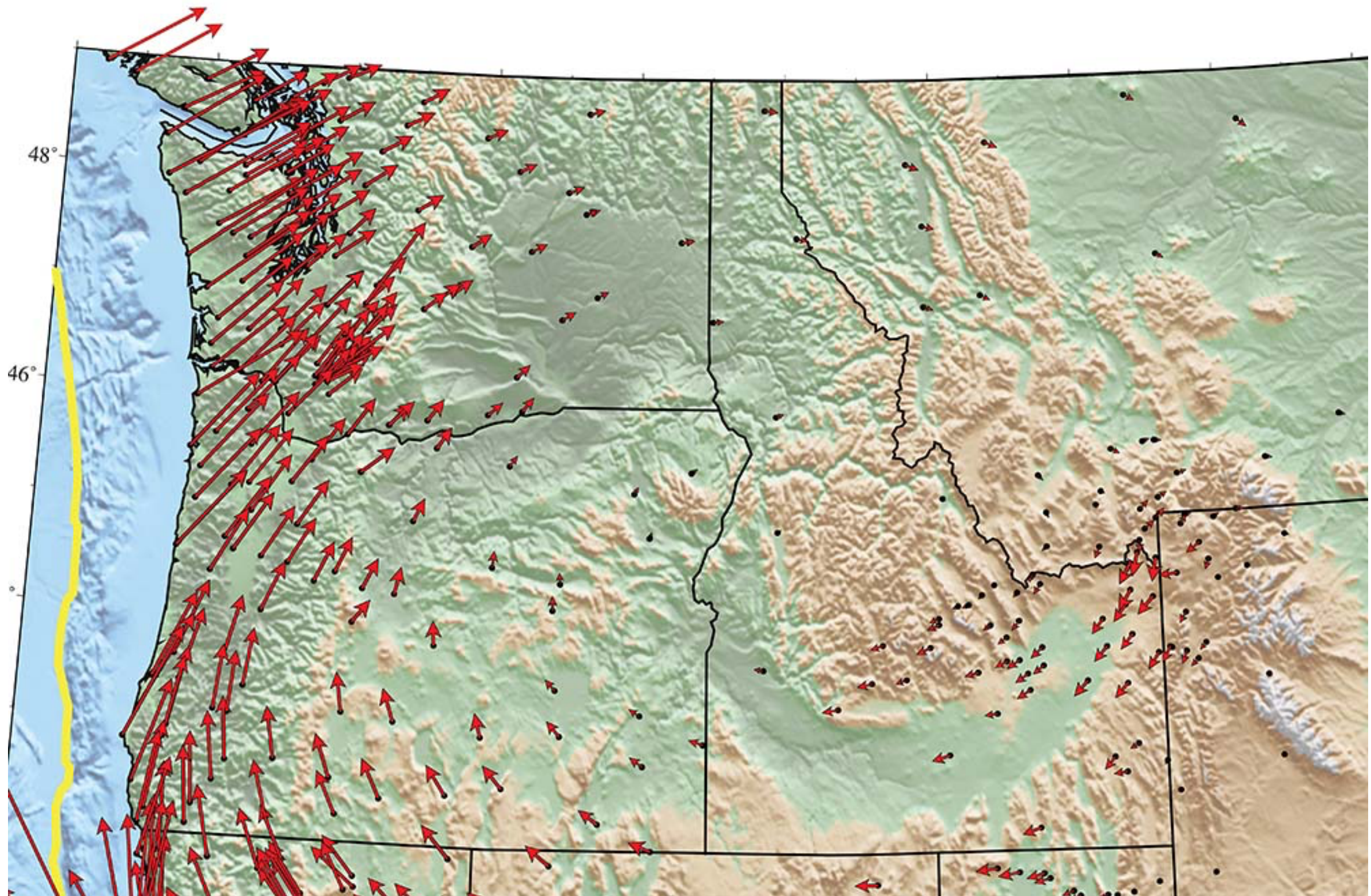




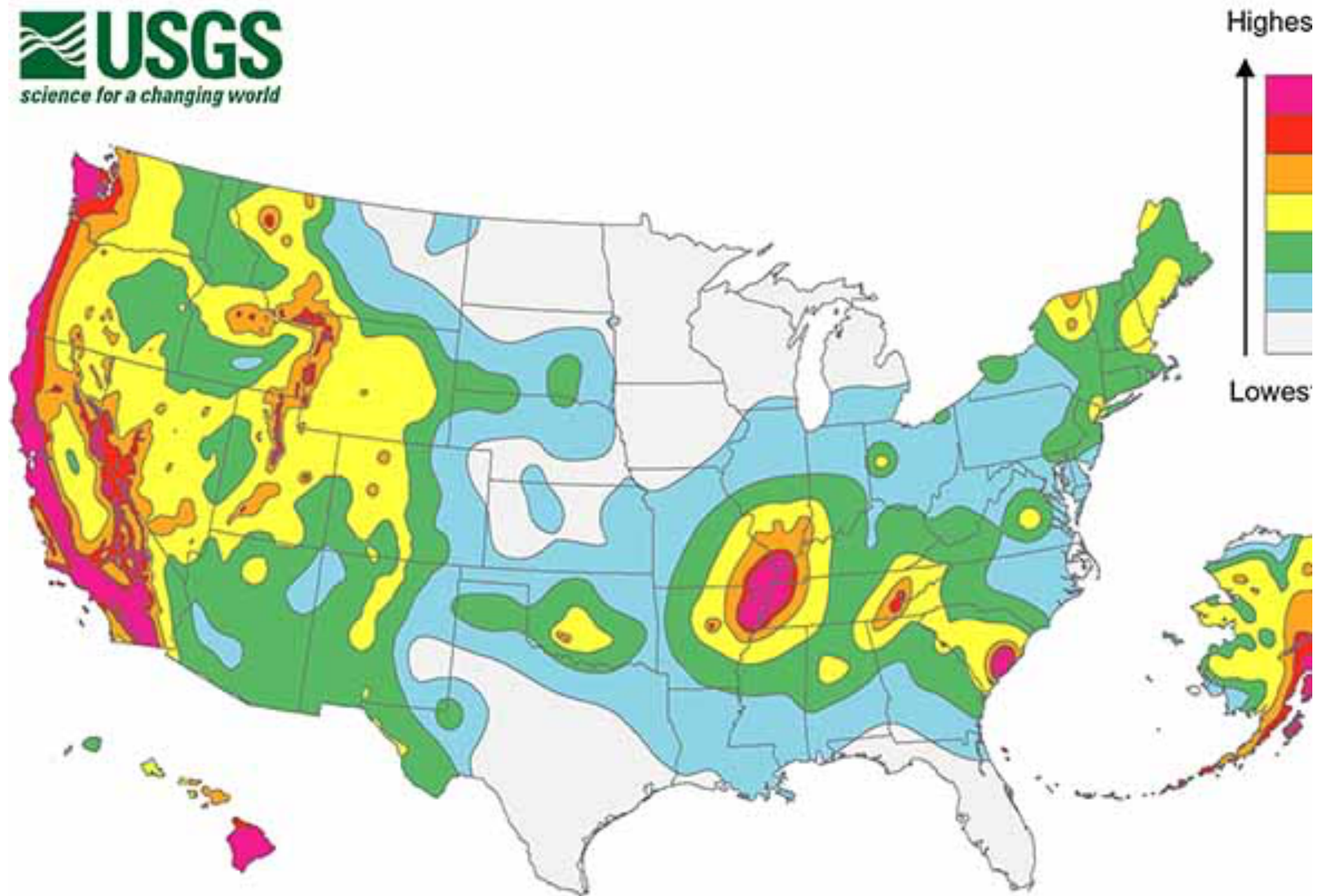
Japan Earthquake



Geology (UNAVCO)



Geology



GPS

- Atomic clocks
- Speed of light is constant
- Solves the longitude problem