Q: How do mountains grow? A: One earthquake at at time.
- by Ravi Kanda (geophysicist)

The Presentation: This was the basic idea behind my poster, which illustrated the three basic forms of faulting (strike-slip, normal, and thrust), with classic photos of the mountains resulting from them.

- I started with the plate tectonic map of the earth with velocity arrows - introduced with a map cut into plates (and overlaid on overhead transparency paper). I showed how at some locations plates converge to create mountains (collisions/thrusts: photos of Mt. Rundle & Keystone Thrust), at others, they slide past bends to create mountains (transpressional mountains: photos and a map of San Andreas showing the bend), and at still others, they move apart and create mountains (horsts-grabens: photos of Owens Valley, bathymetry of Gulf of CA).

- I then talked about why rocks flow at depths, but not at the surface – showing examples of rocks that showed flow structures, using a candle (wax) for imagining the effect of temperature, and silly-putty® to demonstrate brittle and ductile behavior (breaking vs. flowing due to temperature difference). Thus, the "only" way for big blocks of rock to move at the earth's "surface" (the crust) is by earthquakes. So, mountains have to be built one earthquake at a time. Here, I asked them how fast they thought plates moved, or mountains grew, and gave them the analogy of plate-motion having the same rates as that of nail-growth. This analogy helped a lot of students grasp plate-motion rates, especially when asked to imagine how long they have to wait for a nail to grow as tall as a mountain.

- I then used Styrofoam models of fault blocks (by cutting blocks bought at Michael's Art store), overlaid by play-doh®, to simulate what happens to surface layers when blocks underneath moved. I allowed the kids to push and pull on the blocks, so they see what happens to the surface. Then they visually compared the deformation of the play-doh® layers directly to the above photos of actual mountain ranges and valleys (grabens) on the poster. I also built a sponge model having a transform fault with a bend, that could be "driven" from below by attached pieces of cardboard. With this, I demonstrated the formation of sag ponds (as on the San Francisco peninsula) or transpressional mountains (San Gabriels – Mt Baldy, Big Bear – skiing places people may have gone to) due to different senses of motion.

Presentation timing: The entire presentation took anywhere between 10-20 min, depending on the interest level of the students as well as their grade level. Only 6th grade (or above) students knew about Plate Tectonics. I ended up being able to demonstrate the three steps above 4-5 times (with 3-8 students at the booth at any given time).

Things that I learnt: Demonstrations with block models worked better than asking students to visualize concepts – especially because of this non-classroom, quick-turnaround setting. Kids loved the block models, and some volunteered to move them - because they could compare the surface "deformation" with actual mountain ranges in the above pictures, or with stream offsets from a photo of Wallace creek on SAF (copies of which were also given to the students). Some of them really liked the demonstration of motion at different plate boundaries from map cutouts. There is not enough time for students to get hands-on time with the models: playing with the plate map; or laying down different sediment layers (play with play-doh); or play with the block models beyond a basic demo for each fault. So, there is no time to get into more advanced concepts like erosion. Although I had a lot to demonstrate, I did have a very simple theme (the title), which made it easier to go through all my talking points.