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# Joints in a Cornstarch Analog

**Type of activity:** in-class exercise

**Brief description:** Desiccated cornstarch-water mixture provides an interactive introduction to joints and joint sets. Students interpret relative ages, examine intersection angles, use surface textures to determine propagation direction, and evaluate the role of flaws in joint initiation.

## Instructor's notes:

*Materials:*

- cornstarch (available at any grocery store)
- water
- food coloring (optional)
- mixing bowl and spoon
- petri dishes (available from most biology depts.)
- small pebbles or granules (2-4 mm diameter)

*Preparation:* Mix cornstarch and water in approximately 1:1 proportion. Consistency should be of a stiff pancake batter. Add a few drops of food coloring to improve visibility of joint surface textures. Pour mixture into petri dishes, about 1 cm deep. I use plastic dishes, 9 cm diameter x 1.5 cm deep (3 1/2 x 1/2 in.), but any similar transparent container will work. Seed each dish with a small pebble. Set dishes aside to dry. Drying time will depend on local relative humidity. In a heated office, joints are fully developed in about two days. After 4 or more days, the cornstarch is too friable to be effectively dissected for observation of joint surface texture. Drying can be accelerated with heat lamps.

*Student preparation:* Students are asked to read the chapter on joints in their structural geology textbook.

*In-class:* Before the exercise, I give a short review, using photographs and illustrations, of joints, joint sets, joint surface textures, how to interpret propagation direction, and determining relative age.

I give students the lab hand-out, a blank sheet for sketching, and distribute a cornstarch "outcrop" to each group. The class spends about 20 minutes describing and interpreting the joint patterns and surface textures. This can be a good precursor to sketching and describing structures in the field.

After the groups are finished, I reconvene the class, and we review observations. How many joint sets? What is the intersection angle? Where did the joints initiate? How can you tell? We discuss the role of the flaw in the medium in the context of earlier discussions of deformation mechanisms. We end the class by discussing how joints might effect rock strength and permeability, and the practical applications of joint analysis.

*Clean-up:* Dry cornstarch is easily swept up, is not hazardous, and can be thrown away. Petri dishes can be rinsed and re-used.

*Possible extensions of this exercise*:

- Hypothesis testing: how does joint pattern (spacing, orientation, number of joint sets) vary with thickness of cornstarch layer, rate of desiccation, shape of container?
- Time-lapse photography for direct observation of joint propagation and joint-pattern development