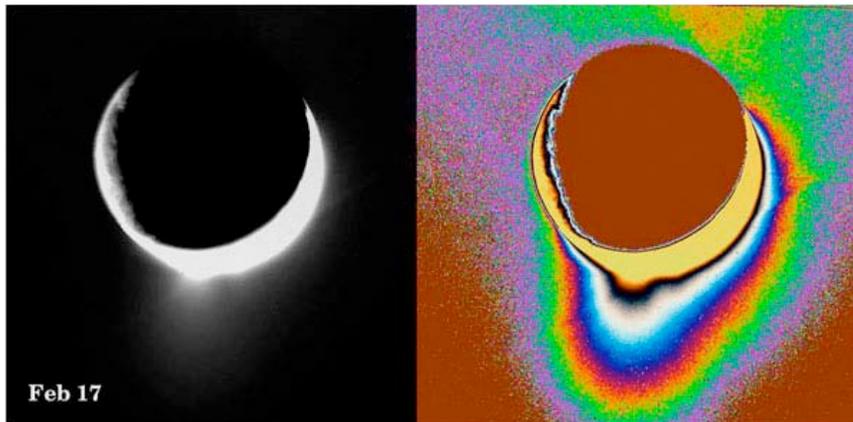


Water Plumes of Enceladus

(a brief discussion is in your textbook; most of the following is from a NY Times slide show; homework question is on the last slide.)

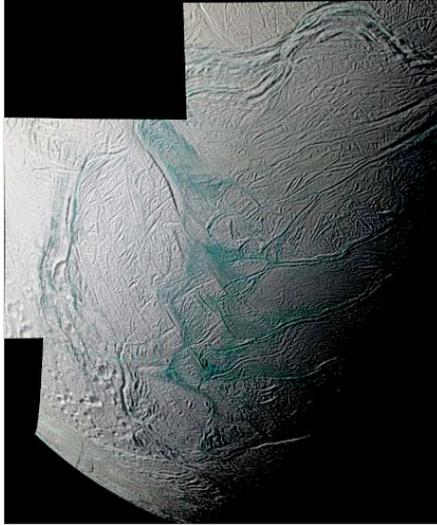


Until a few years ago, Enceladus, here seen above Saturn's rings, was a nondescript 310-mile-wide *iceball*, one of dozens of moons around Saturn. This image was taken by NASA's Cassini spacecraft at a distance of 1.3 million miles.



Then, in 2005, Cassini spotted something coming off the bottom of Enceladus -- a *plume of icy particles*. On the left, a monochrome version shows hints of the plume; the colorized version on the right makes the extent of the plume more obvious.

Water Plumes of Enceladus

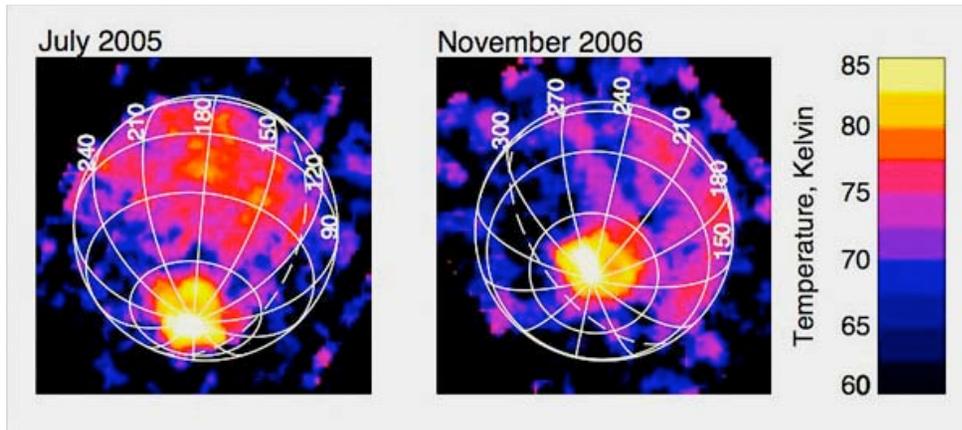


Images of the south polar region showed intriguing "tiger stripe" fractures, including four prominent ones seen in the lower right. The greenish areas in this false-color image are believed to be boulders and deposits of coarser-grained ice.

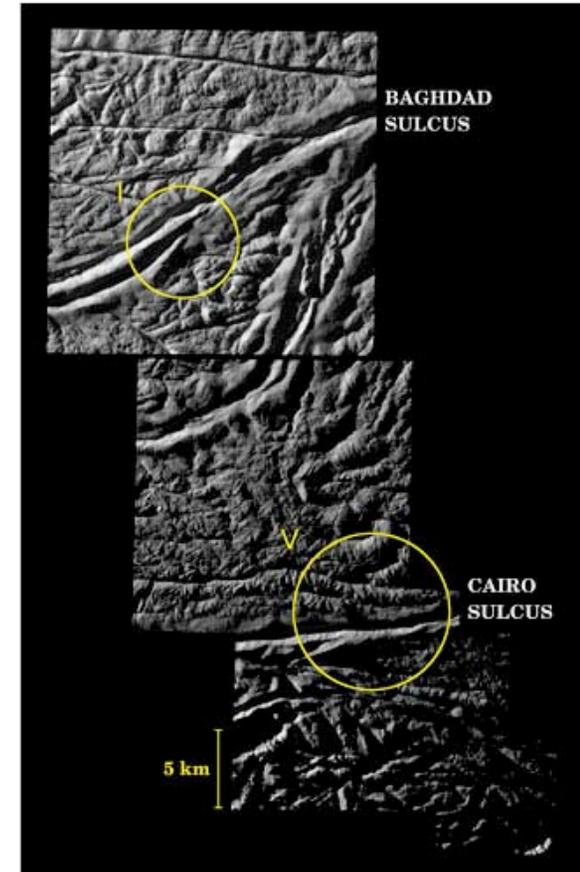


After studying the plumes for months, scientists working on the mission reported in March 2006 that they believed the plumes originated from *geysers erupting from underground reservoirs of liquid water where temperatures warmed above the melting point of ice*. Using images like this false-color one, scientists later triangulated eight specific origin sites of the plume jets, and all eight lay within the tiger stripes.

Water Plumes of Enceladus

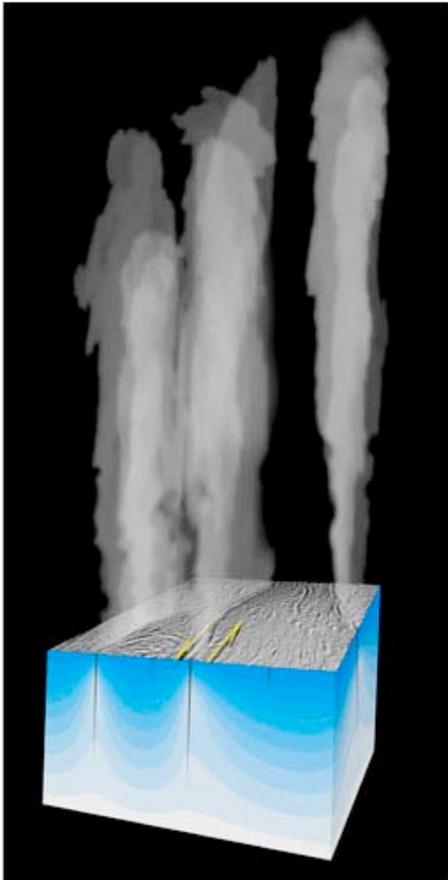


Cassini's *spectrometer* -- basically, *heat sensor* -- captured the first view of Enceladus in infrared light in Nov. 2006, right. Another image was taken July 2005, left. The data indicated that the warm areas coincided with the tiger stripes. The distribution of temperatures changed little during those 16 months.



This image shows close-ups of two of the tiger stripes, named Baghdad and Cairo. The yellow circles identify origins of two of the jets.

Water Plumes of Enceladus



This artist's drawing shows one proposed "shear heating" model for Enceladus' jets. According to this model, tidal forces caused by Saturn's gravity as Enceladus loops around Saturn once every 1.37 days cause the sides of vertical faults to rub against each other. That friction warms the ice enough to produce the jets of ice and water vapor.



Even before discovery of the jets, planetary scientists suspected that Enceladus might be the source of the particles that make up Saturn's E-ring. In this Cassini image, the wispy fingers of particles from Enceladus stretch out thousands of miles.

Homework question:

Why does anyone think the geysers of Enceladus are water?

I.e. why not some other liquid?

Use the resources at your disposal--make sure your source is up-to-date.

Check the links at the course website.