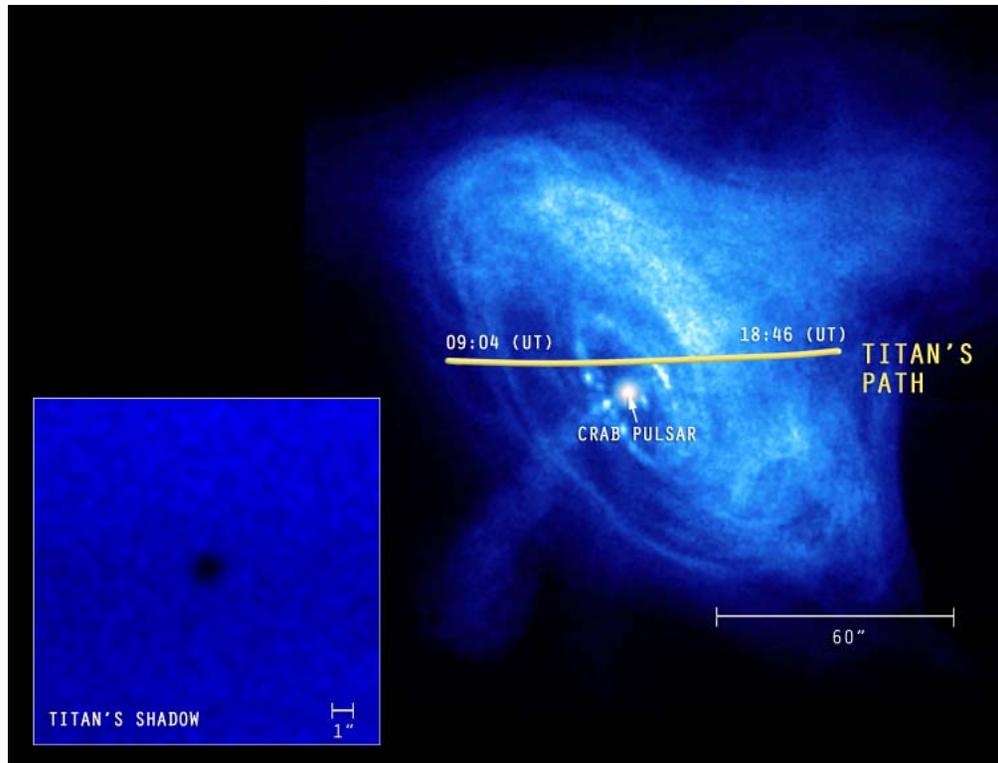




Chandra Science Highlight

AN X-RAY MEASUREMENT OF TITAN'S ATMOSPHERIC EXTENT FROM ITS TRANSIT OF THE CRAB NEBULA



On January 5, 2003, Titan - Saturn's largest moon and the only moon in the solar system with a thick atmosphere - transited the Crab Nebula, a bright extended X-ray source. Titan's transit enabled Chandra to image the one-arcsecond-diameter X-ray shadow cast by the moon (inset)

Reference: K. Mori et al. 2004, astro.ph 04328.

- The diameter of Titan's occultation shadow was found to be larger than the diameter of Titan's solid surface. The difference in diameters yields a measurement of about 880 km for the height of the X-ray absorbing region of Titan's atmosphere.
- The extent of the X-ray absorbing region of Titan's upper atmosphere is consistent with, or slightly (10-15%) larger than that implied by Voyager I observations made at radio, infrared, and ultraviolet wavelengths in 1980. Saturn was about 5% closer to the Sun in 2003, so increased solar heating of Titan may have caused its atmosphere to expand.
- Although Titan passes within a few degrees of the Crab Nebula every 30 years, it rarely passes directly in front of it. This may have been the first transit of the Crab Nebula by Titan since the nebula was formed by a supernova that was observed to occur in the 1054. The next similar conjunction will take place in the year 2267, so this was truly a once in a millennium event.