

The Character of the DART Impact Site & Shape of Dimorphos



DART
Double Asteroid Redirection Test

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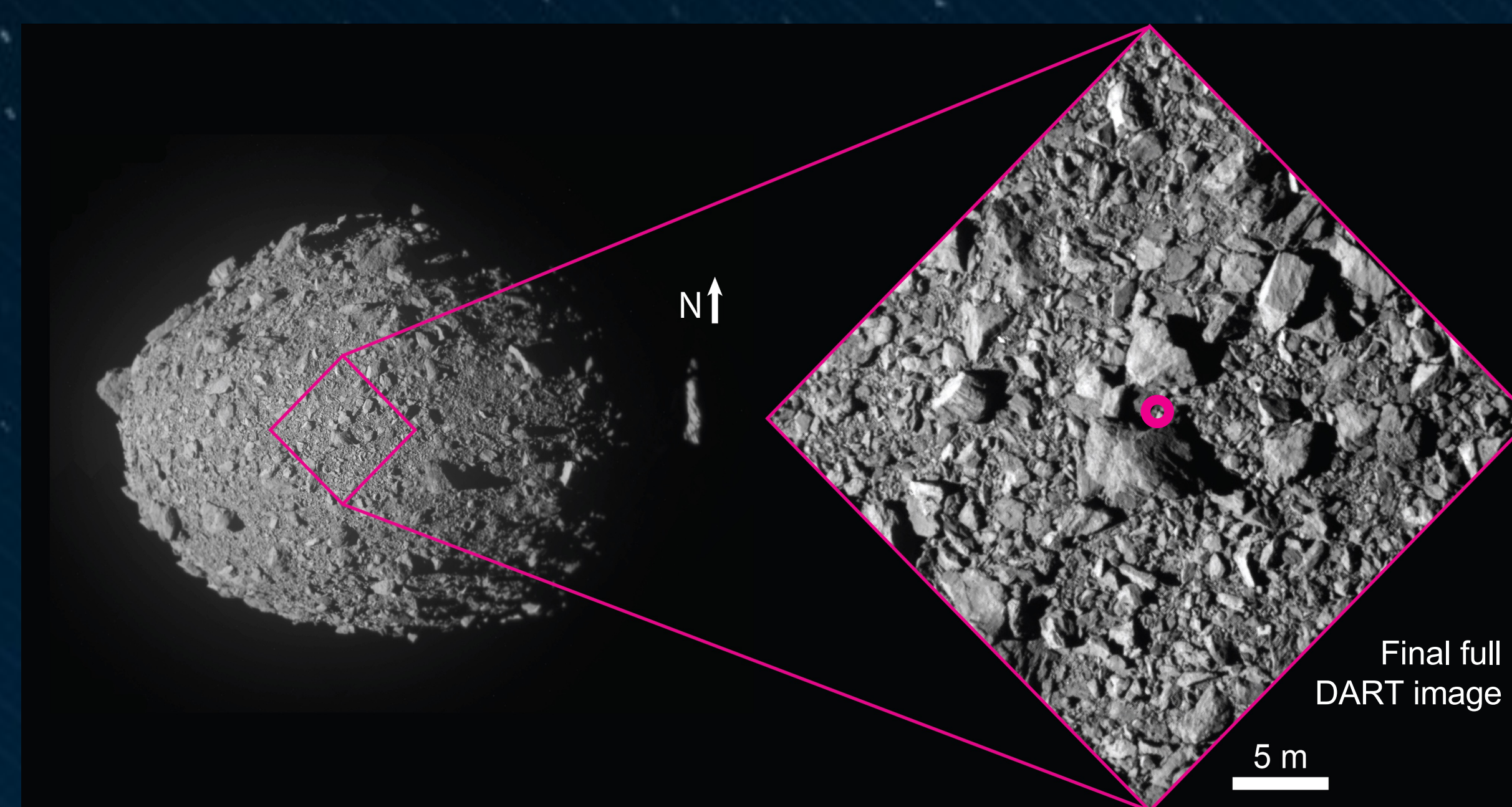
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Where did DART hit?

The DART spacecraft hit Dimorphos at $8.84 \pm 0.45^\circ$ S, $264.30 \pm 0.47^\circ$ E, which was 25 ± 1 m from the center of figure of the asteroid.

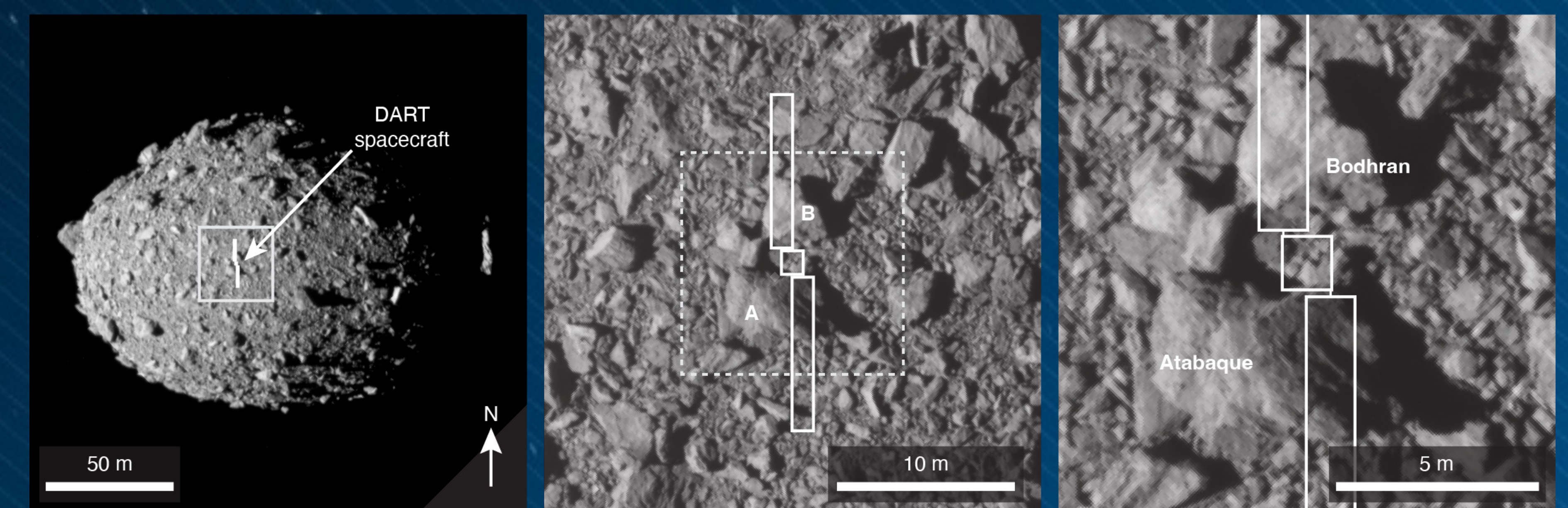
What did DART hit?

The spacecraft bus impacted between two large boulders, Atabaque (6.5 m long) and Bodhran (6.1 m long). The solar arrays interacted with these two large boulders.



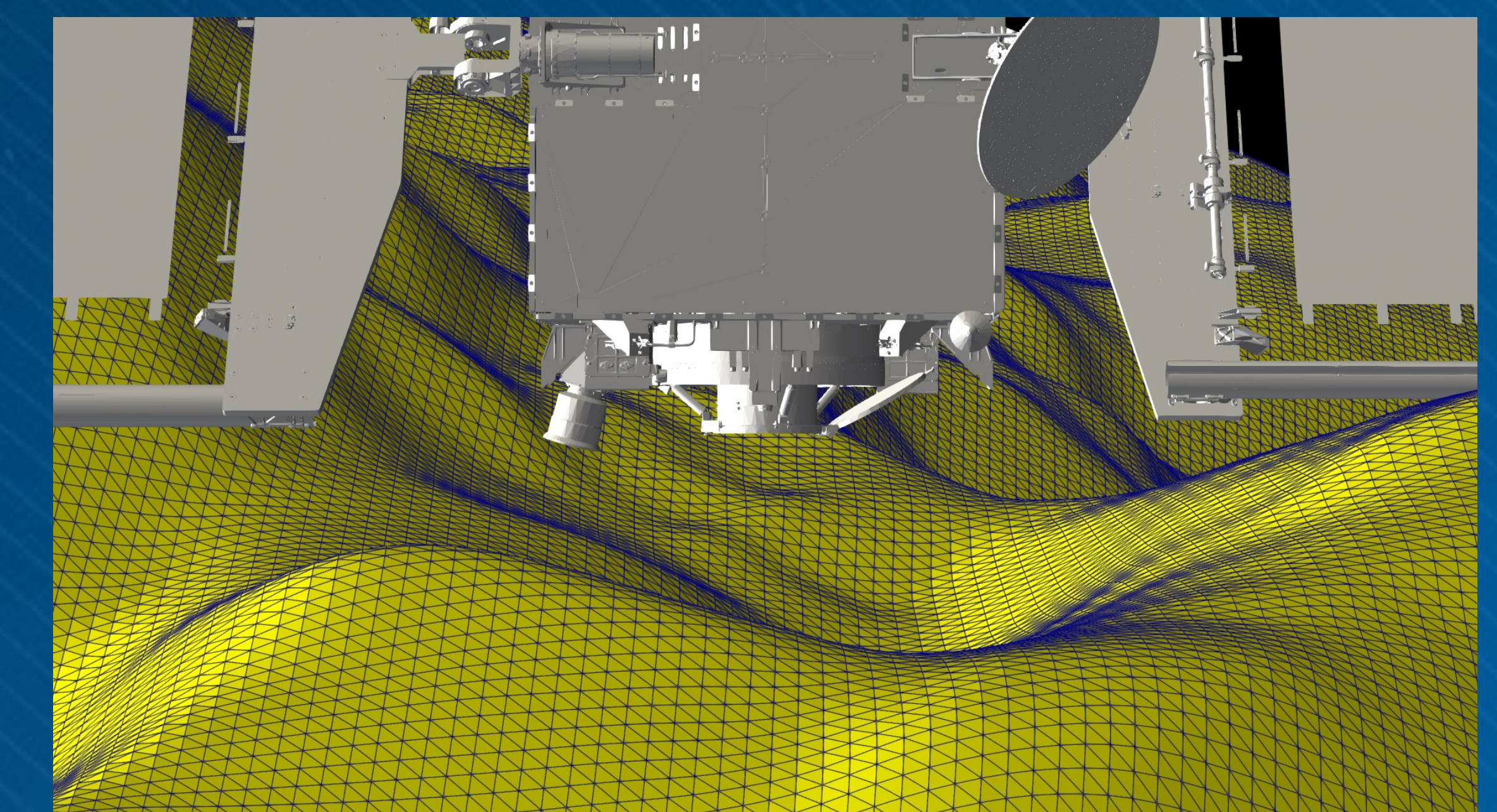
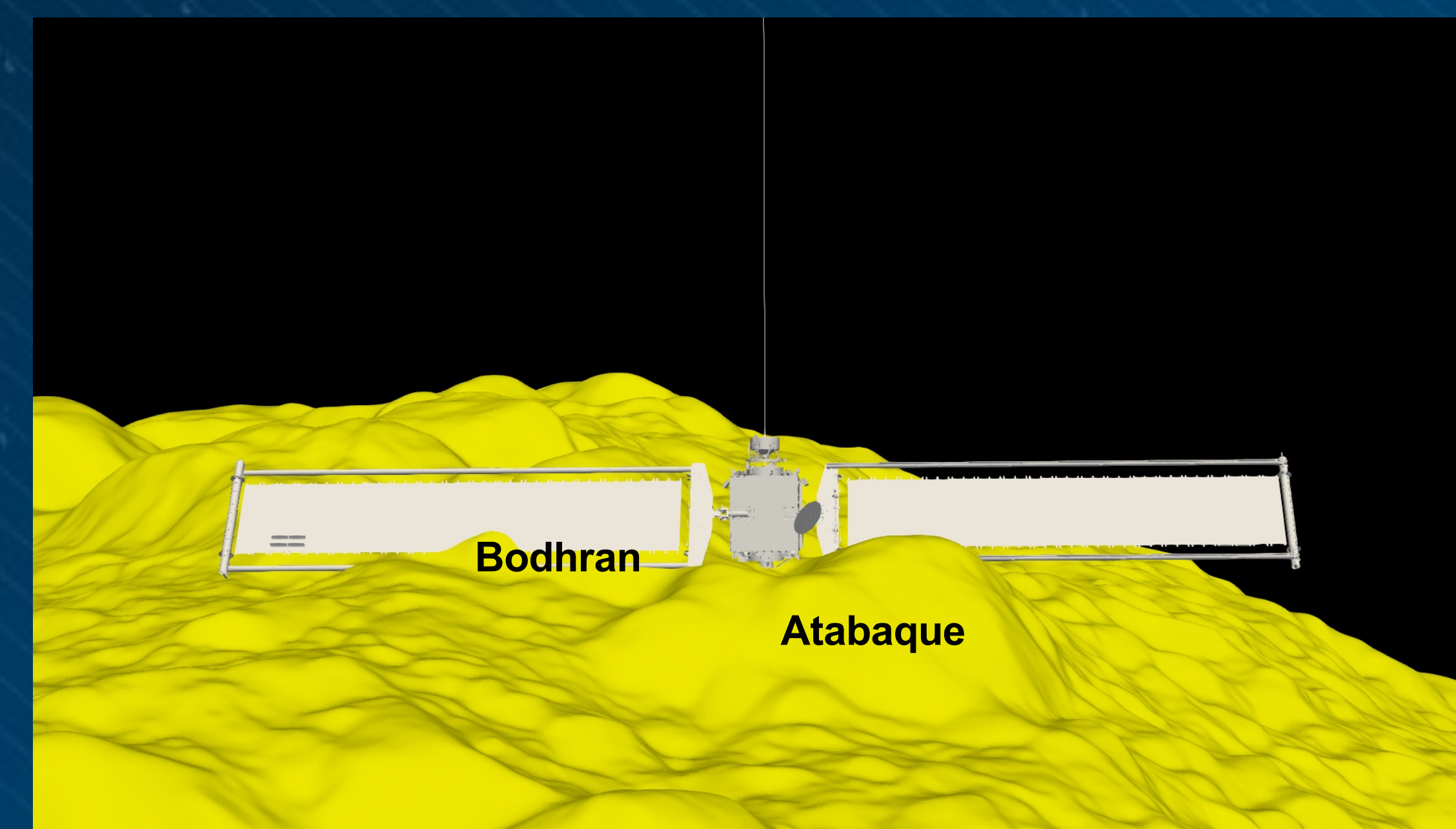
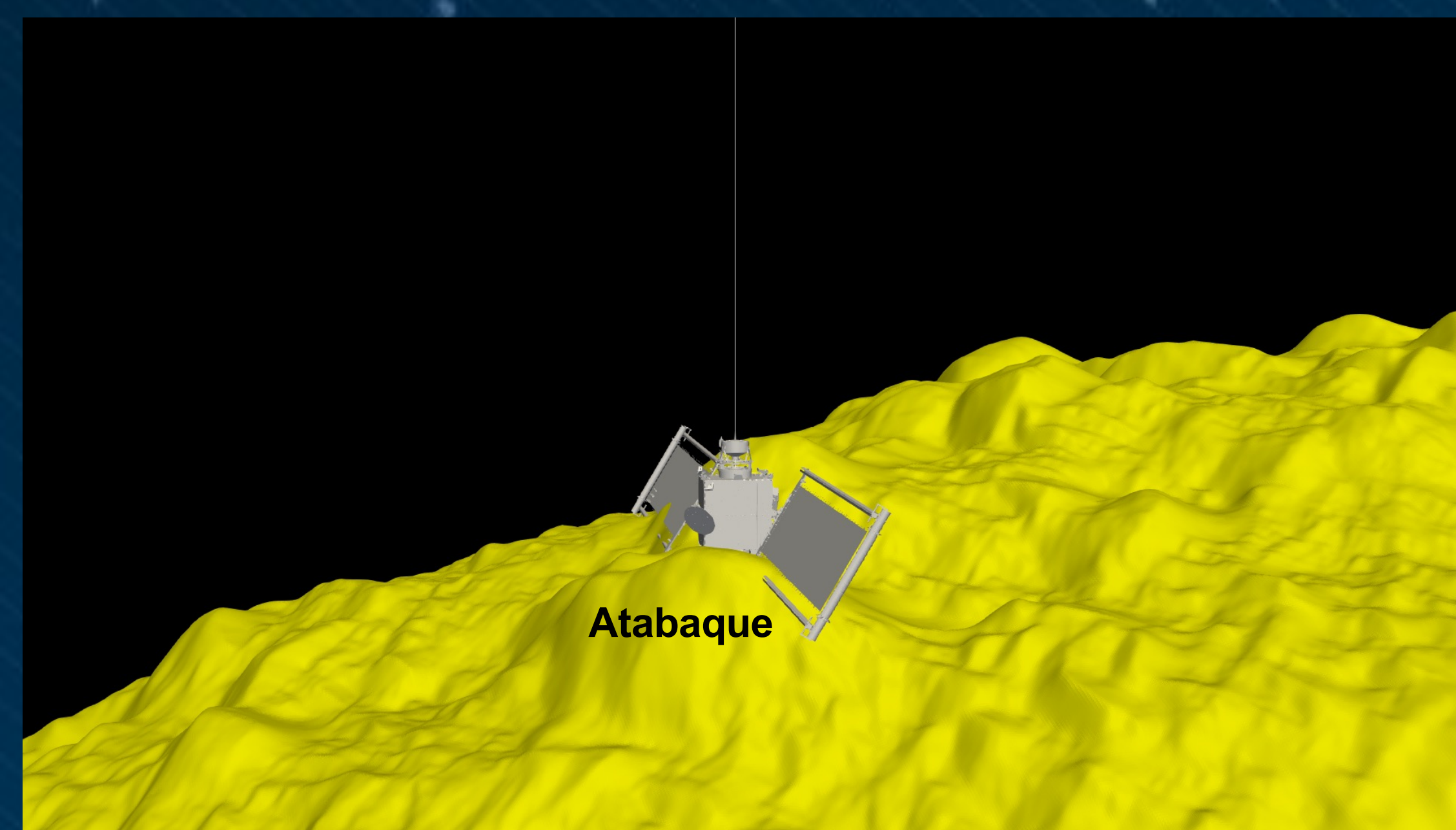
Left: Dimorphos mosaic made of images from the DART spacecraft. The magenta diamond marks the edges of the final full image.

Right: A magenta circle marks the impact site in the final full image. The impact site, like Dimorphos' surface, is covered in boulders. No evidence exists for extensive smooth deposits (grain size smaller than the image pixel scale). Cracks within boulders, "rocks on rocks", and partially buried boulders appear in the image.



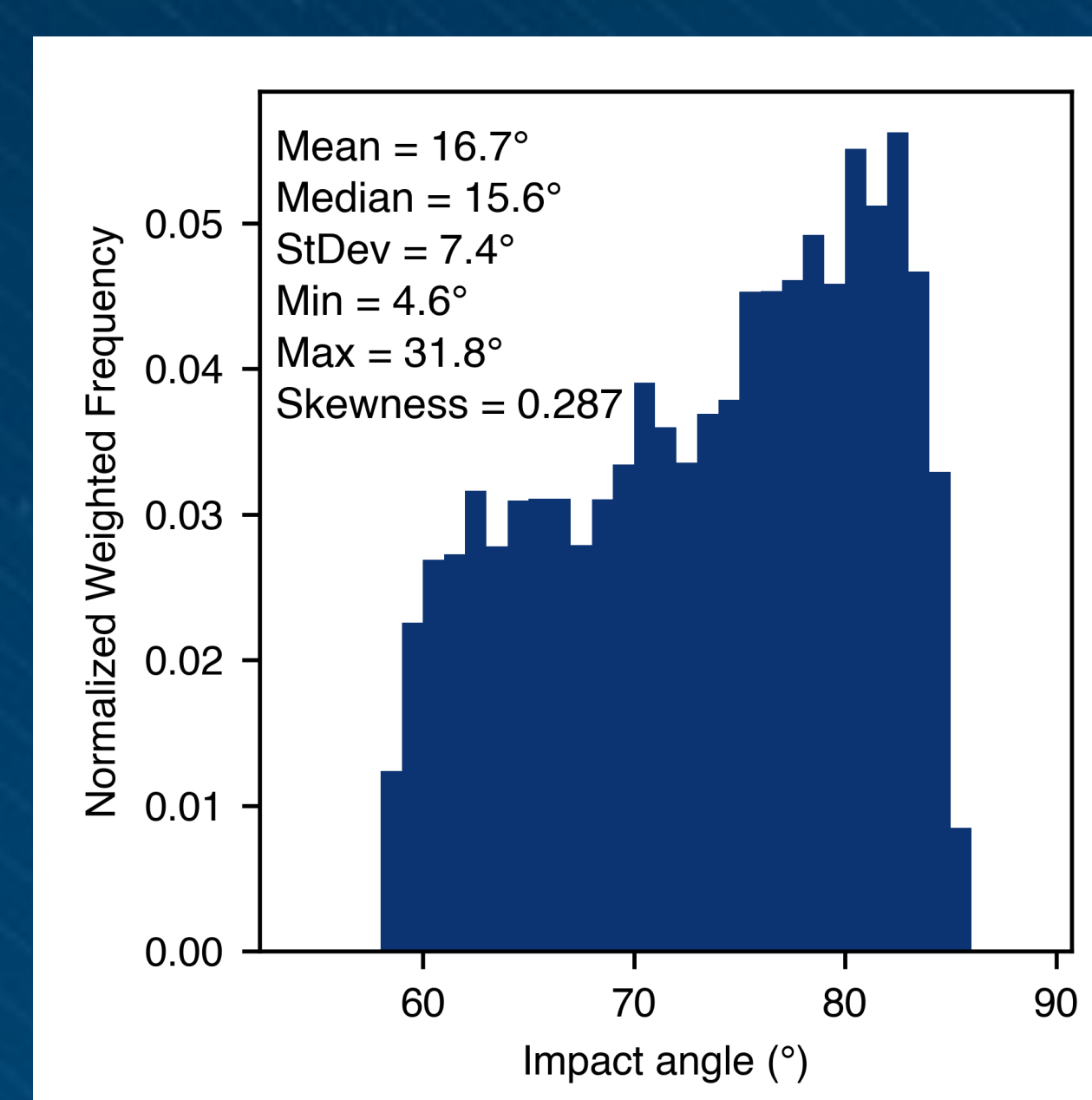
What parts of the spacecraft hit when?

The bus and solar arrays impacted Dimorphos within microseconds of one another. There would not have been time for shock communication across the spacecraft. The -Y solar array impacted Atabaque edge on (left). The +Y solar array hit Bodhran face on (center). The star tracker was the first part of the spacecraft bus to contact the asteroid (right).



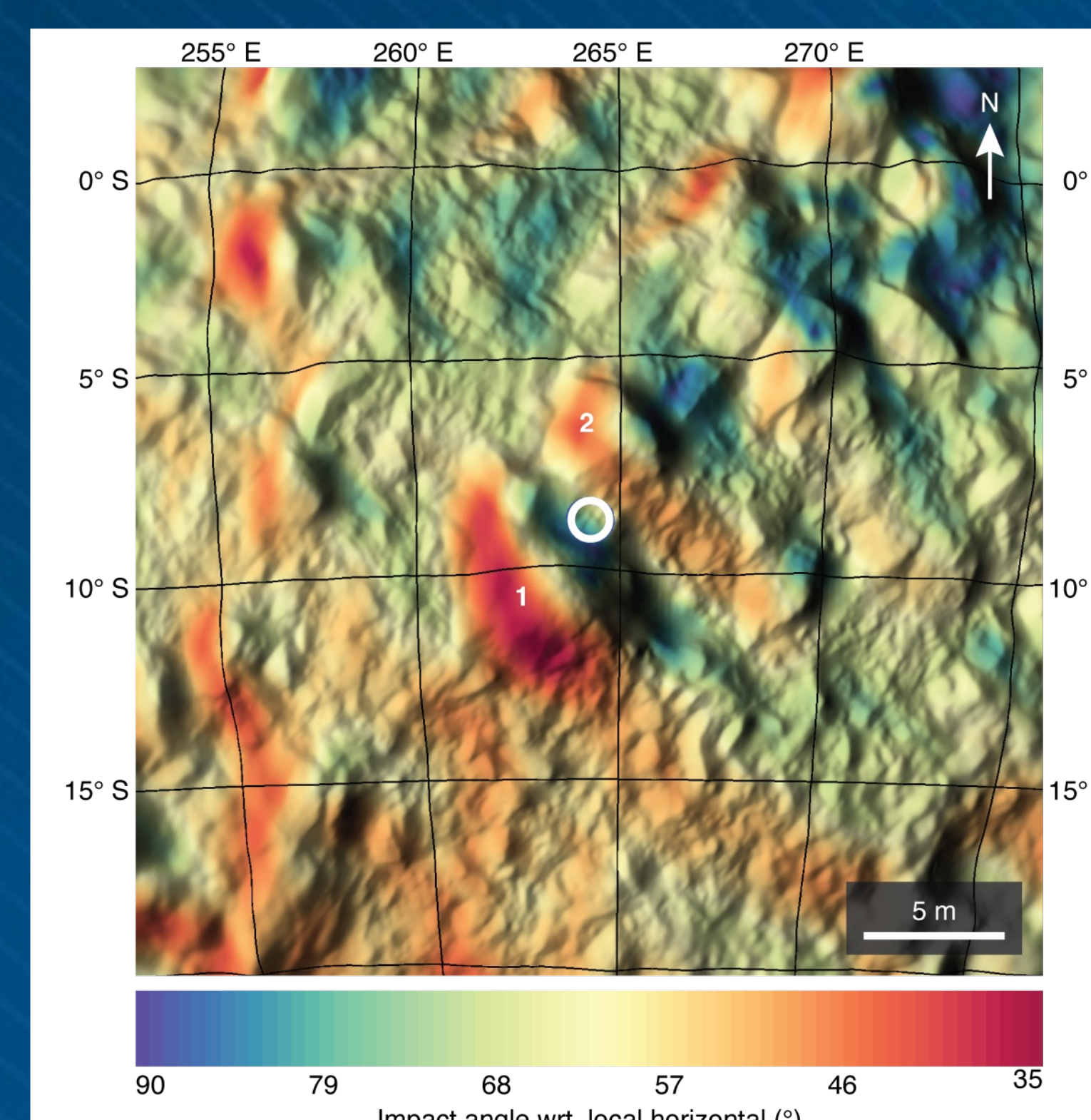
What was the impact angle?

The impact angle was $73 \pm 7^\circ$ from horizontal, as determined from surface tilts over a 1.5-m radius.



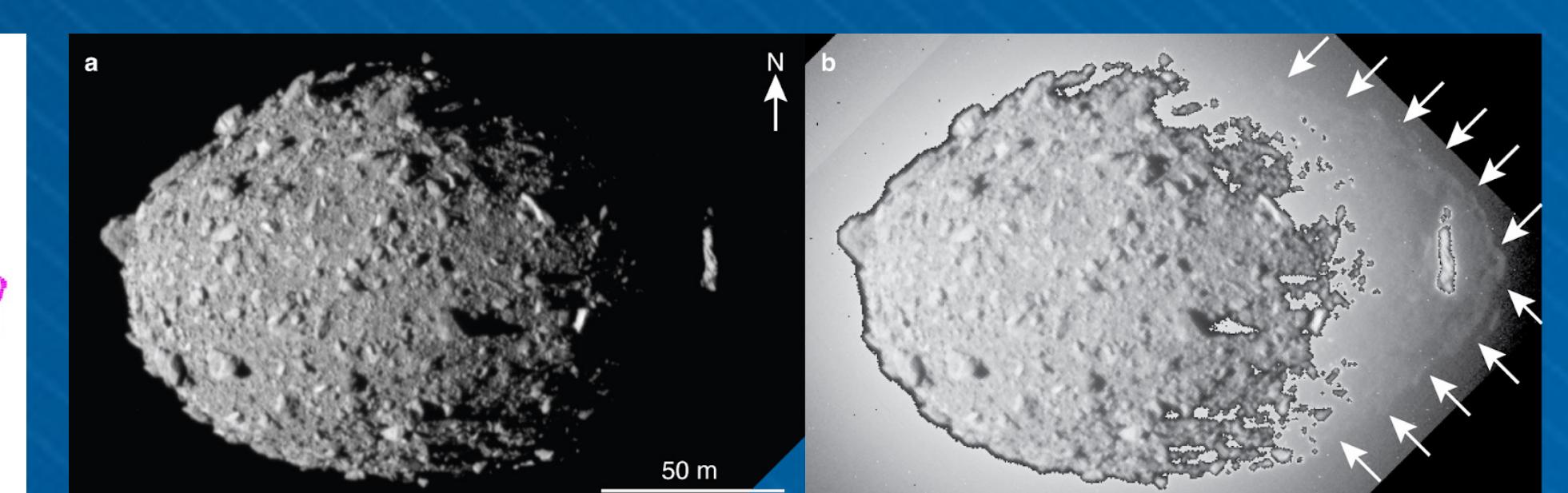
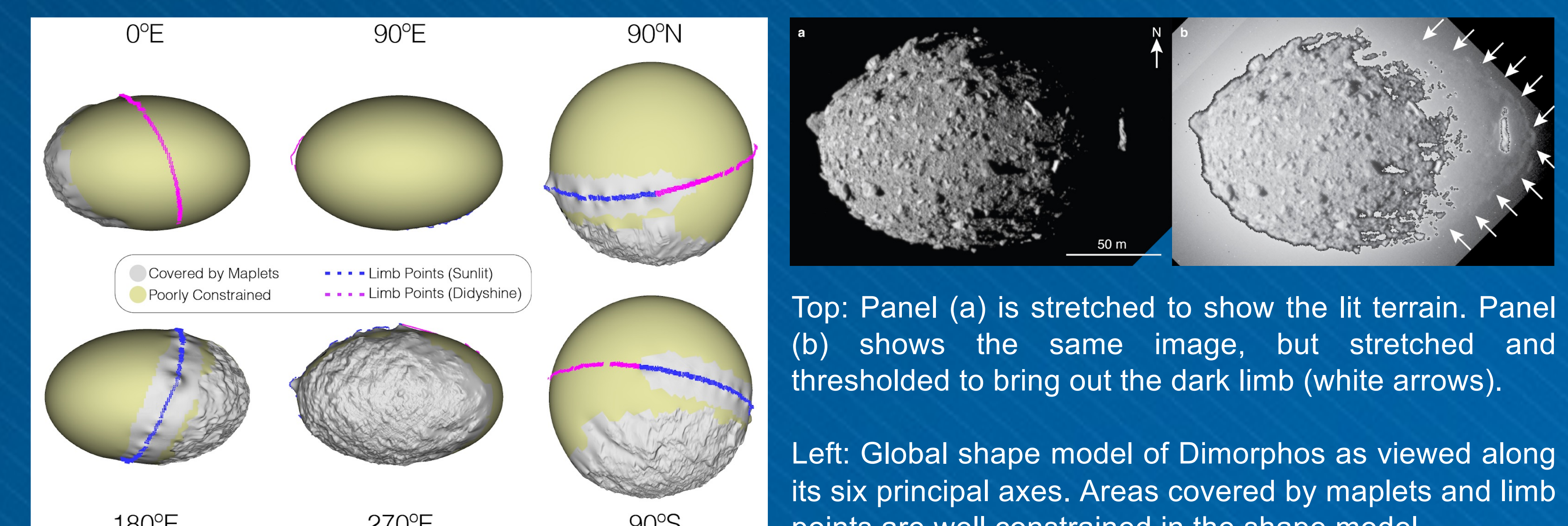
Left: Histogram of impact angle based on the tilts within the circle.

Right: Impact site Digital terrain model (DTM). It is colored by the impact angle for each facet in the DTM. The white circle is centered on the impact site. Its size shows the uncertainty in impact site location.



What is the shape of Dimorphos?

Dimorphos has an oblate shape, rather than prolate one. Scattered light off Didymos revealed the complete outline of the asteroid, which reduces uncertainty in the shape.



Top: Panel (a) is stretched to show the lit terrain. Panel (b) shows the same image, but stretched and thresholded to bring out the dark limb (white arrows).

Left: Global shape model of Dimorphos as viewed along its six principal axes. Areas covered by maplets and limb points are well constrained in the shape model.