

Black Brant IX (TOMEX+ mission)



The Turbulent Oxygen Mixing Experiment Plus, or TOMEX+, is a NASA sounding rocket mission that will investigate one of Earth's most turbulent atmospheric regions — the mesopause.

The mesopause is a region of the upper atmosphere stretching from about 53 to 65 miles (85 to 105 kilometers) in altitude, at the boundary between Earth's mesosphere and thermosphere. It is the coldest layer of our atmosphere, where icy noctilucent — or “night-shining” — clouds form and temperatures drop to nearly minus 148 degrees Fahrenheit (minus 100 degrees Celsius). The mesopause is a mixing ground where weather patterns from the lower atmosphere transfer energy upward into space, fueling turbulence that can increase drag on satellites.

The mission builds on the design of the original TOMEX sounding rocket launched in 2000. This time, the mission will use three rockets instead of one, and one of the rockets will carry a lidar (light detection and ranging) instrument previously used only on the ground.

The first two rockets, launched within one minute of each other, will release vapor tracers — colorful clouds made from compounds similar to those in fireworks — which scientists will photograph from the ground to map upper-atmospheric wind patterns.

The third rocket, launched about five minutes later, will carry the lidar instrument, sending out short pulses of visible light at a wavelength absorbed and re-emitted by atomic sodium. By analyzing the returned light, scientists can measure atmospheric density and motion over time.

Together, the TOMEX+ payloads will provide the clearest 3D view yet of turbulence at the edge of space, improving our understanding of high-altitude cloud formation, satellite drag, and even atmospheric processes on other planets.

ROCKETS...

The 1st two rockets

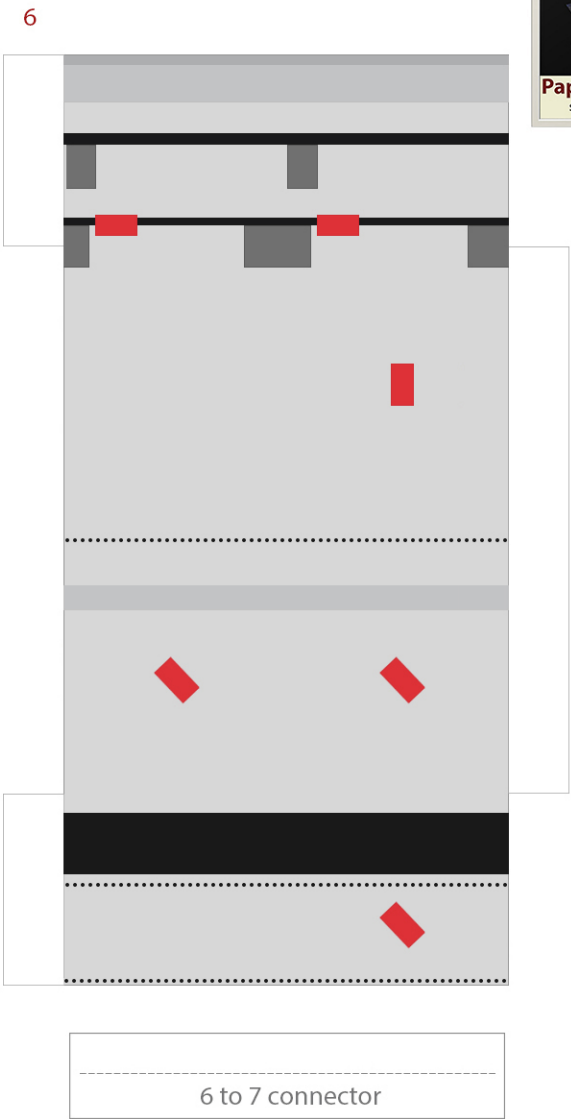
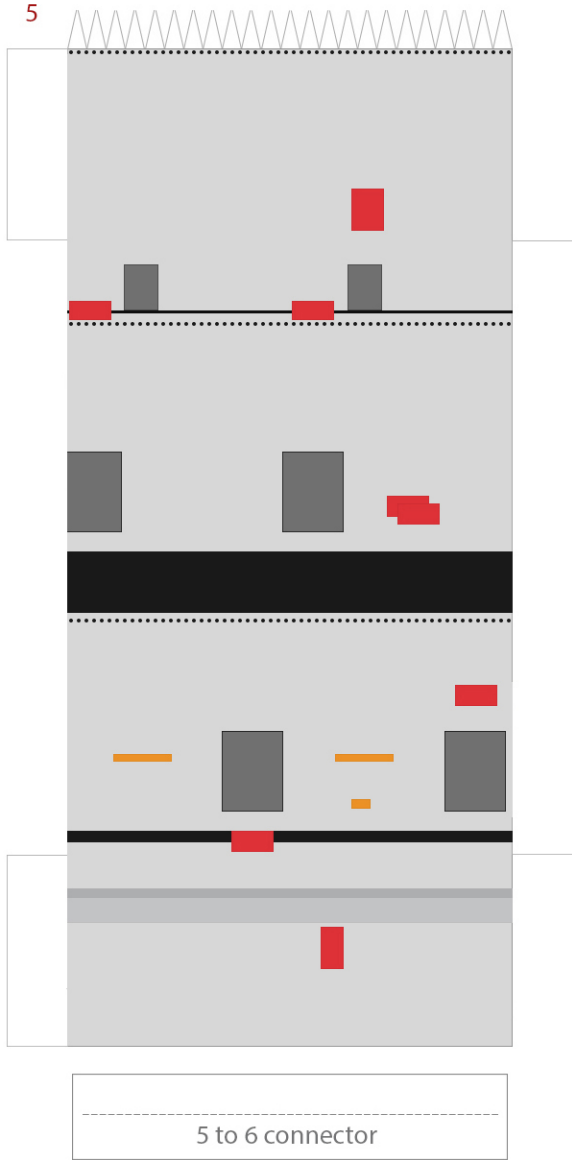
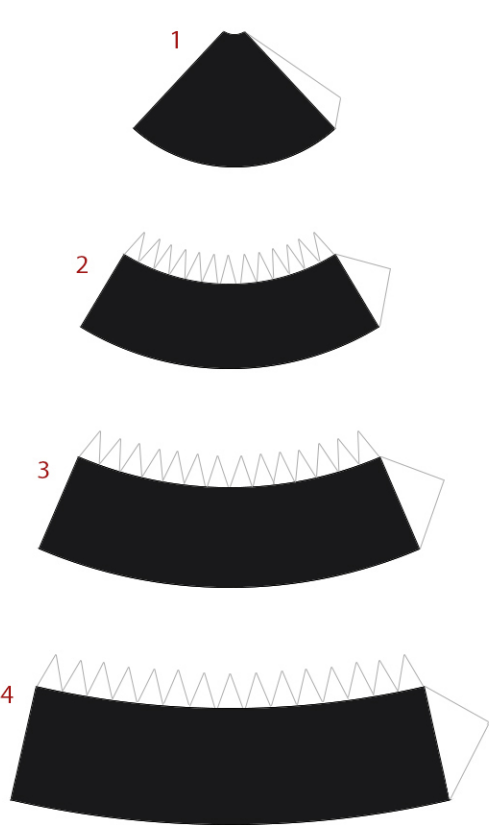
The Terrier-Improved Orion is a two stage sounding rocket consisting of a Terrier first stage and an Orion second stage. The Terrier-Improved Orion is capable of reaching altitudes of about 350 km, depending on payload mass, and can carry payloads weighing 200 to 800 pounds.

The 2nd rocket

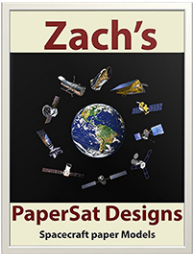
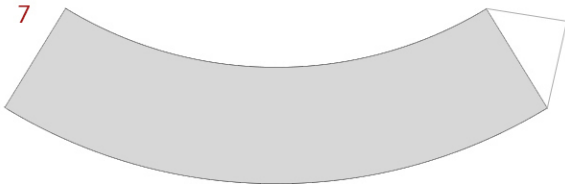
The Black Brant 9 is a two stage sounding rocket with a Terrier first stage and Black Brant second stage. The Black Brant 9 can reach altitudes of about 600 km. Payloads weighing from 400 to 1200 pounds can be flown.



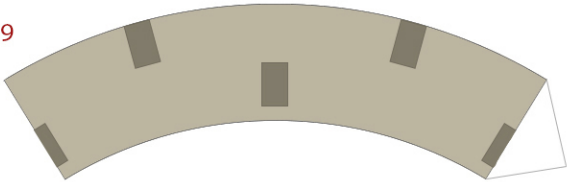
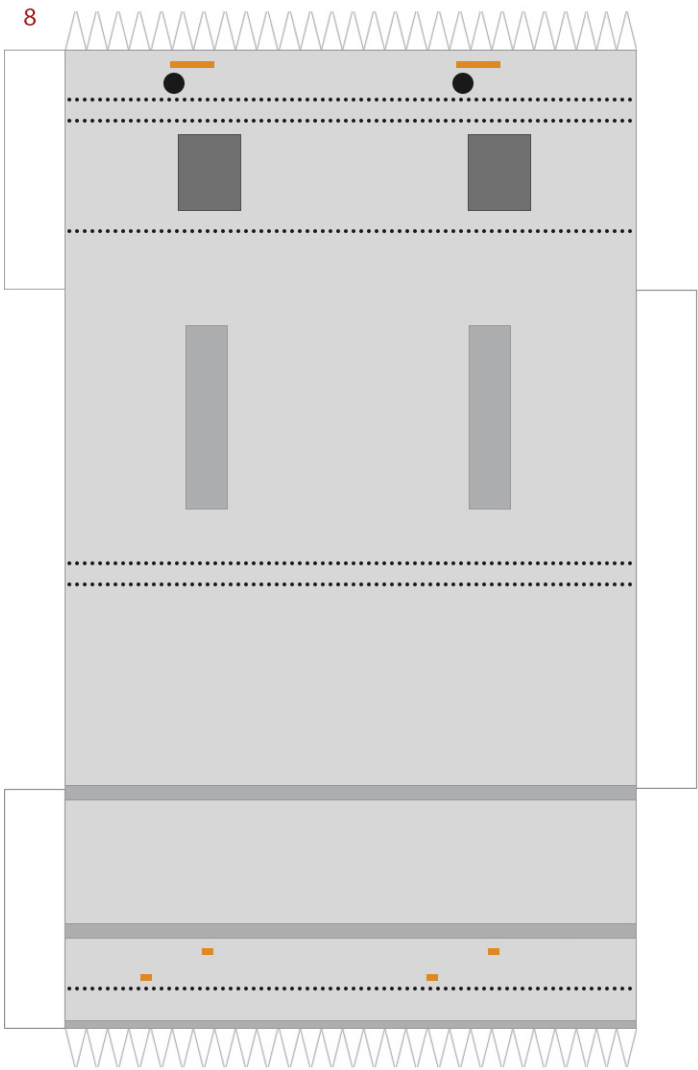
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Former
glue to
cardstock

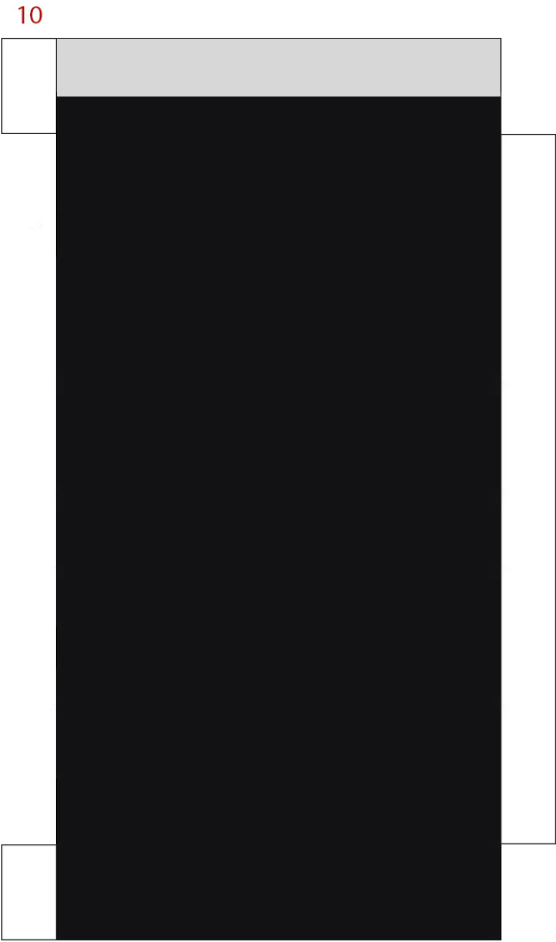


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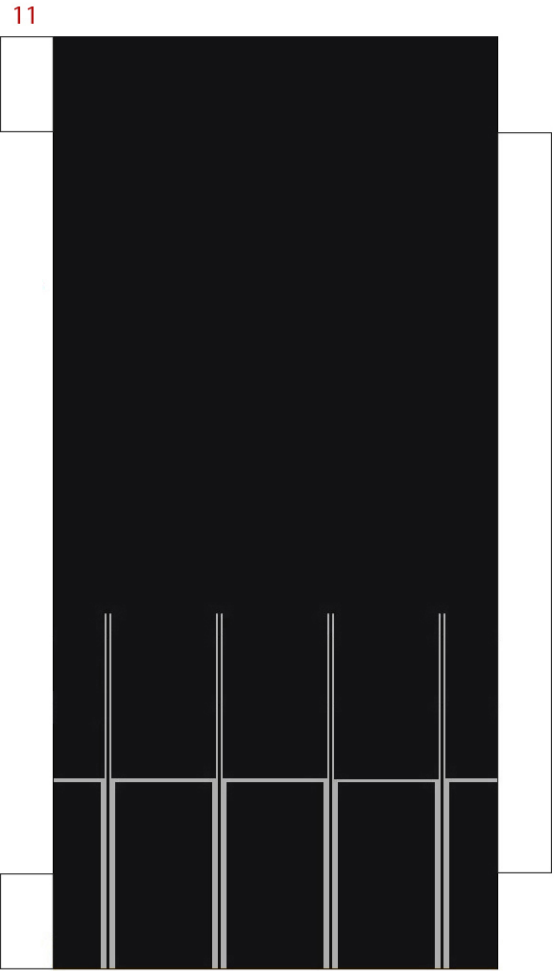


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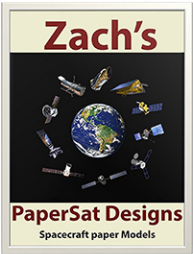
9 to 10 connector



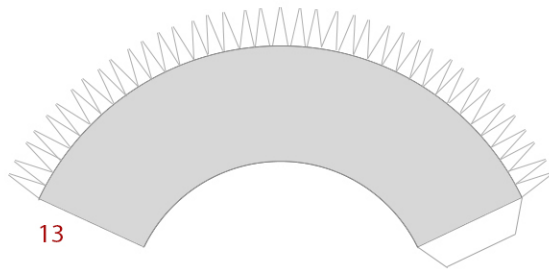
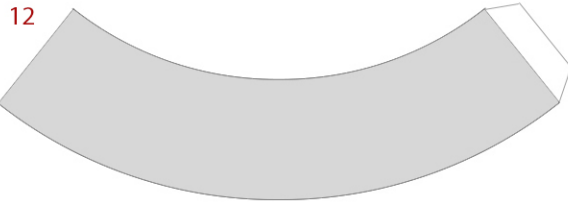
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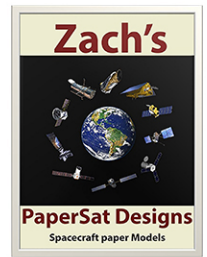
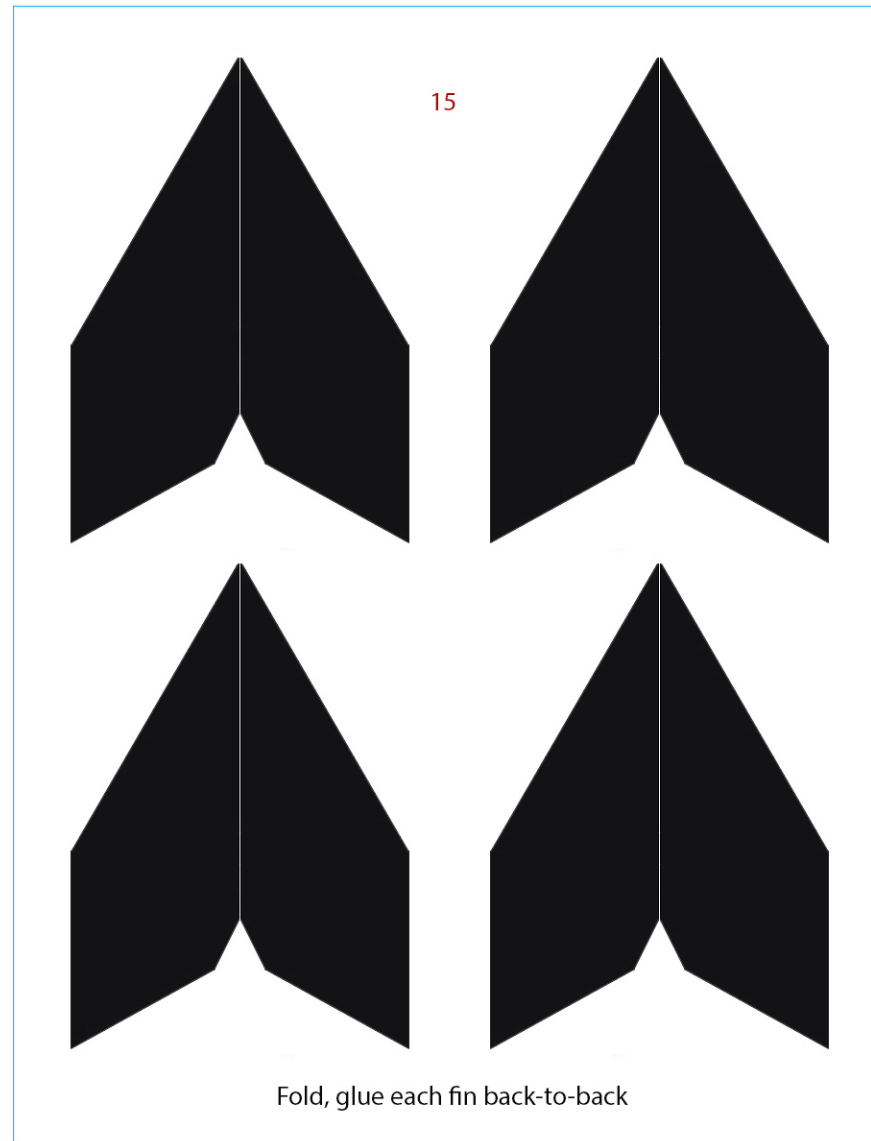
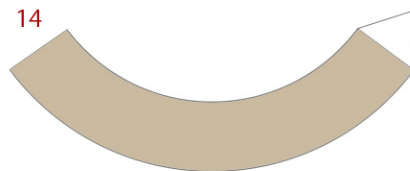
11 to 12 connector



Black Brant IX (TOMEX+ mission)



13 to 14 connector



Black Brant IX (TOMEX+ mission)

