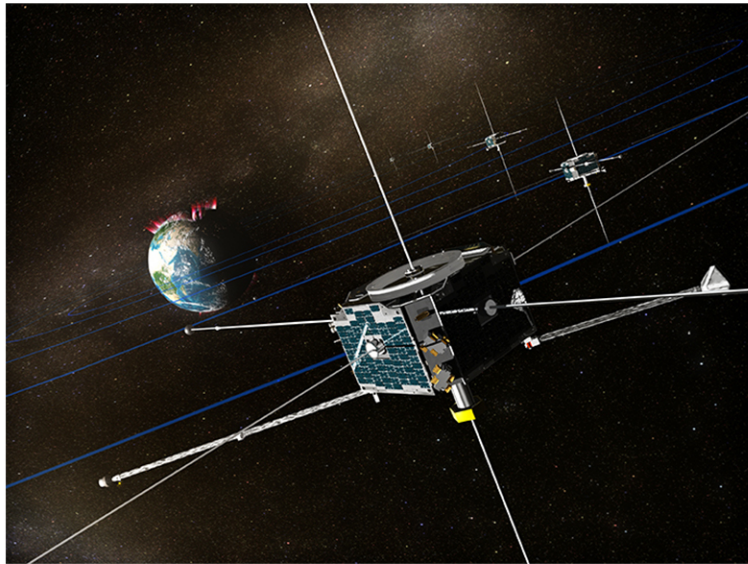


# THEMIS, the Time History of Events and Macroscale Interactions during Substorms



THEMIS (Time History of Events and Macroscale Interactions during Substorms) mission, will help resolve the mystery of what triggers geomagnetic substorms. For the first time, scientists will get a comprehensive view of the substorm phenomena from Earth's upper atmosphere to far into space, pinpointing where and when each substorm begins.

Substorms are fundamental modes of explosive energy release in Earth's environment. They are often embedded within large space storms, and can also occur in isolation. Scientists believe some of the most intense space storms – the ones producing the most penetrating radiation – are accompanied by substorms. Understanding substorms is a prerequisite to understanding space weather and protecting commercial satellites and humans in space from the adverse effects of particle radiation.

THEMIS is NASA's first five identical satellite mission, launched as a constellation, to resolve the tantalizing mystery of what causes the spectacular sudden brightening of the Northern Lights or the aurora borealis – the fiery skies over Earth's northern pole. These lights are the visible manifestations of sudden large energy releases (called substorms) in near-Earth space, out to halfway to the moon. THEMIS will answer the 30-year old question: where and when do substorms start?

The THEMIS satellites were launched February 17, 2007 from Cape Canaveral Air Force Station Space Launch Complex 17 aboard a Delta II rocket.

On May 19, 2008 the Space Sciences Laboratory (SSL) at Berkeley announced NASA had extended the THEMIS mission to the year 2012. NASA officially approved the movement of THEMIS B and THEMIS C into lunar orbit under the mission name ARTEMIS (Acceleration, Reconnection, Turbulence and Electrodynamics of the Moon's Interaction with the Sun). They will conduct measurements of the Moon's interaction with the solar wind and its crustal magnetic fields.

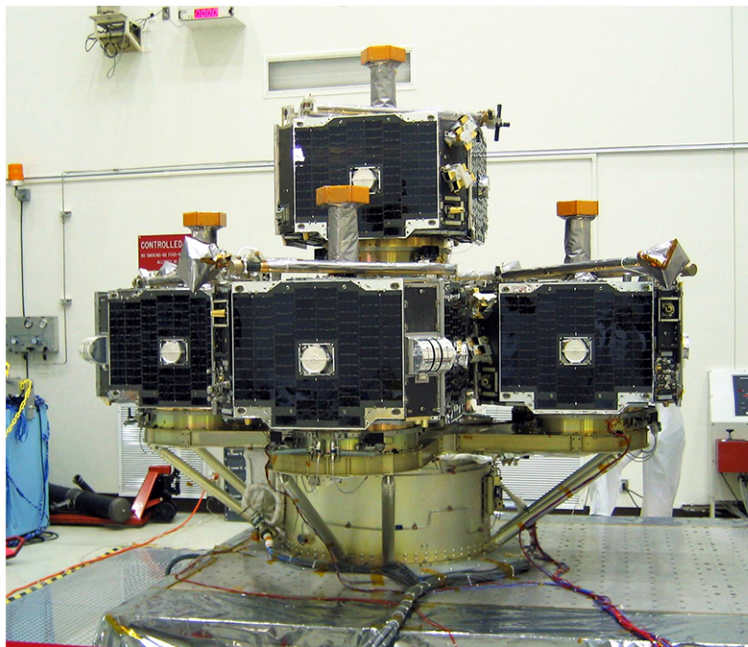
As of November 2013, both probes are in very stable orbits, and the health of all instruments and the spacecraft remains very good.

Mission science goals:

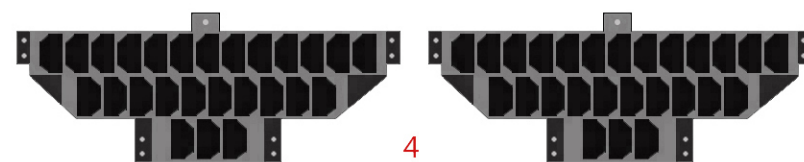
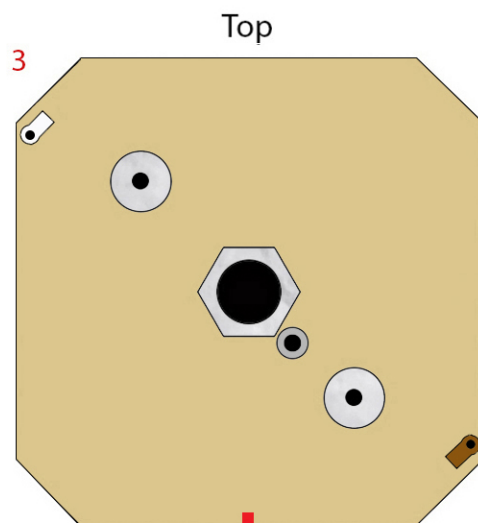
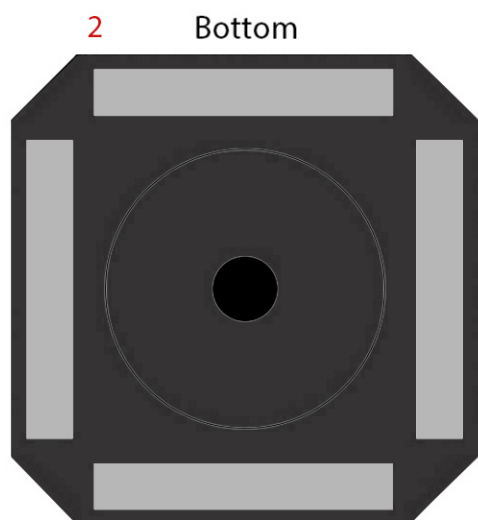
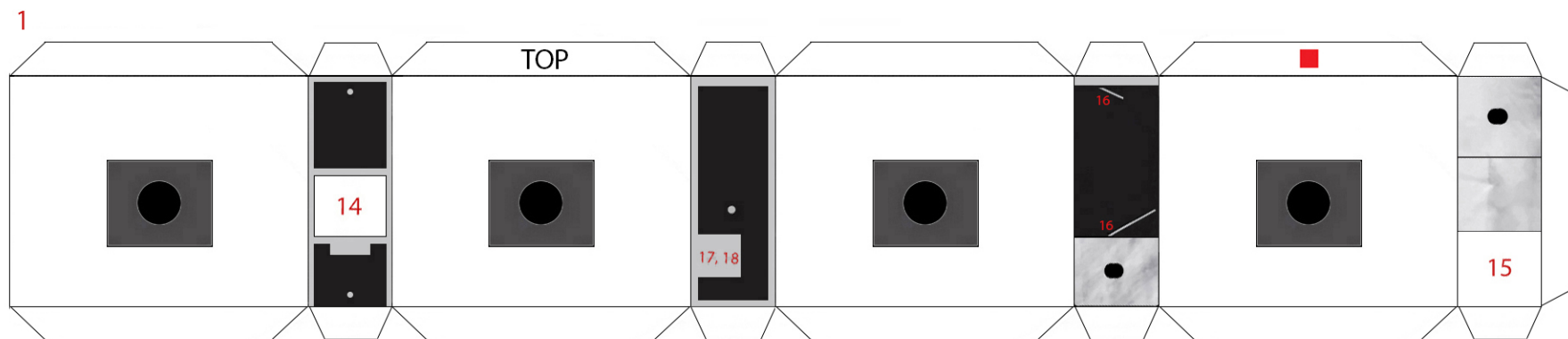
To establish where and when the explosive energy releases that power auroral eruptions called substorms start in Earth's environment.

To determine how the solar wind is affected by its interaction with Earth's bow shock prior to energizing the Earth's magnetosphere.

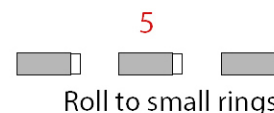
To determine how the "killer" electrons in the Earth's radiation belts are accelerated.



# THEMIS, the Time History of Events and Macroscale Interactions during Substorms



Glue these to cardstock  
Color edges light grey



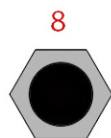
Roll to small rings



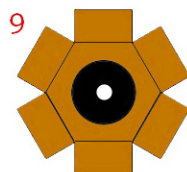
roll to a ring  
Drill small hole on the white circle



Color back Black



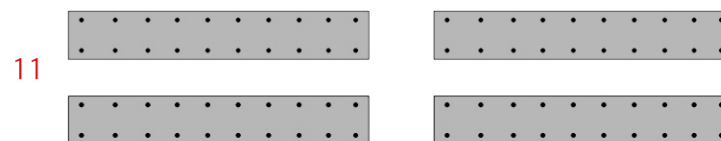
Glue to thick cardstock,  
color edges grey



Color backside grey  
Drill small hole on the  
white circle



Color back Black, roll to a ring



Glue to cardstock, color edges grey

**Axial and Radial Booms** - Spacecraft has 2 Axial Booms and 4 Radial Booms.

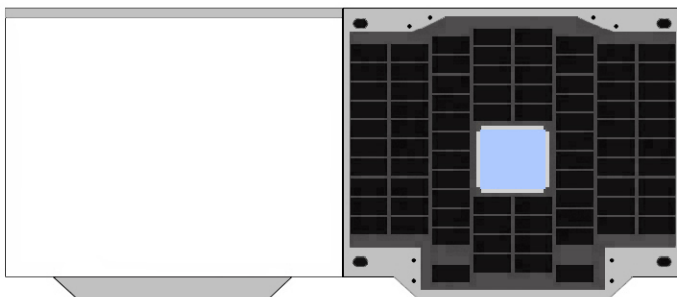
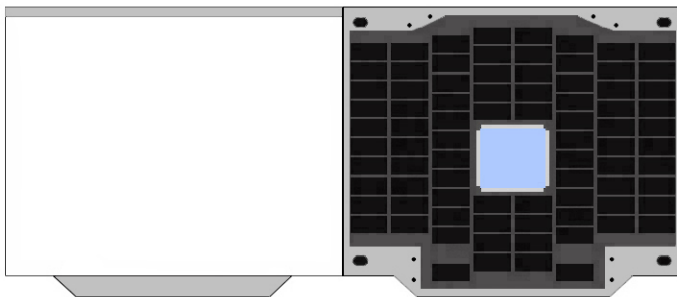
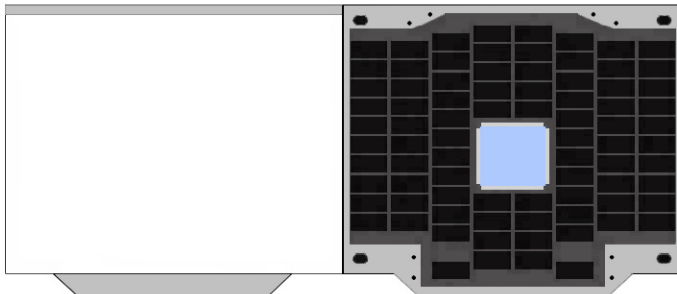
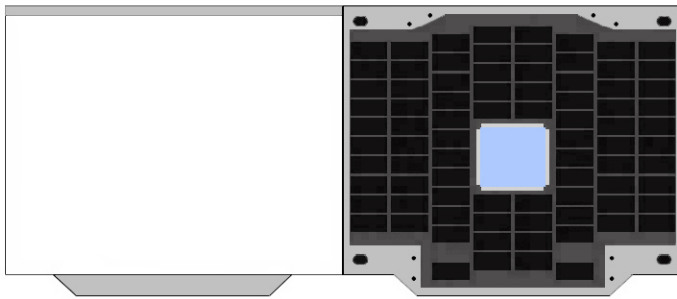
**Spacecraft:** Axial Booms are 16.4 ft (5 meters) long each. Radial Booms are 65.6 ft (20 meters) long each.

**Model:** 1/15 scale - Axial Booms would be 13.1 inches each. Radial Booms would be 52.5 inches each.

Can use Plastic broom straws or long stiff wires for Radial Booms - Long 1.8mm dia skewers, 1/16 (1.6mm) acrylic rods or other materials for the Axial Booms. May want to cut these Booms shorter to save space.

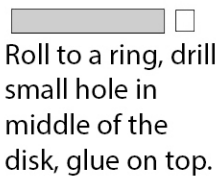
# THEMIS, the Time History of Events and Macroscale Interactions during Substorms

12



Score-fold in half with graphics outside.  
Cut out the light blue square.

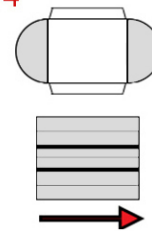
13



Roll to a ring, drill  
small hole in  
middle of the  
disk, glue on top.

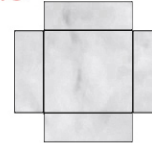


14

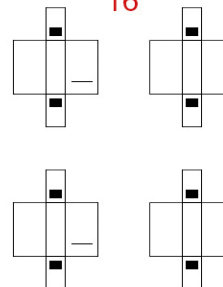


Curve this way

15



16



Glue this to cardstock

17



18

19

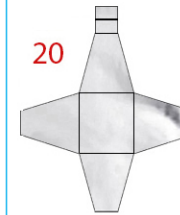


Score at the blue lines, fold the  
small tabs UP, fold in half, and glue.

SCM

FGM

20



25



26

23a

22



23



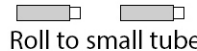
24



21



27



Roll to small tubes

Glue both Parts 22 to cardstock, glue back -to-  
back for graphics on both sides.

Glue 23 to cardstock, but not the tabs with the  
black dot. Glue 23a on top of match graphics for  
strength. Drill the holes and cut out. Glue  
back-to-back for graphics on both sides. tabs  
should have a gap between them and acts as a  
hinge for Part 24.

Glue one of Part 24 to cardstock, glue the other  
for graphics on both sides.

Drill small holes for hinges on the small black dots  
before cutting the parts from the parts sheet.

