Build Your Own PACE!

The **Plankton, Aerosol, Cloud, ocean Ecosystem (PACE)** spacecraft is designed to provide new insight into Earth's ocean and atmosphere. PACE will provide the first-ever global measurements to identify communities of microscopic algae that float in our ocean: phytoplankton. This will help us understand Earth's changing marine ecosystems, manage natural resources such as fisheries, and detect harmful algal blooms. Its atmospheric data will be used to study key issues such as air quality.

It usually takes years to build a satellite that can survive the extremes of space. This paper model replica of PACE has five parts plus an optional "Hinge." Just like NASA, you will create the final spacecraft model by assembling the parts together...but in a tiny fraction of the time!

Materials

- Scissors
- Glue
- Metal ruler to make sharp folds
- *Optional: Hole punch (3/8 inch is best)*

Patterns

Dashed line

- - - - - - - - - - - -

Mountain fold
Fold so that the printed pattern faces out.

Dotted line

. . . .

Valley fold
Fold so that the printed pattern faces in.
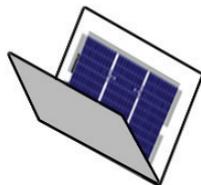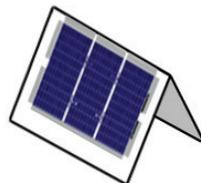
Solid line

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Cut parts out along this line.
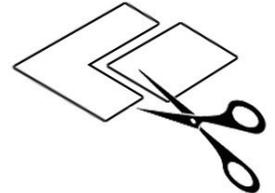
Solid red line

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Cut a notch along this line.
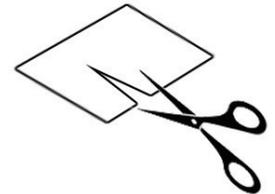
Diagonal red lines
Cut these areas out.
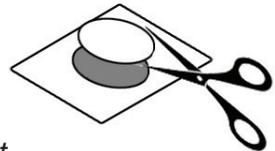
Green dots
Glue tabs to another place on that .

Check out the PACE model build videos:
https://pace.oceansciences.org/paper_model.htm

BUS

The central part of PACE is called a "bus." It serves as the hub for the spacecraft, providing places to mount science instruments, solar array, communications equipment, etc. It also houses electronic systems that distribute power and information needed to operate the spacecraft.

DIRECTIONS
- Cut solid lines, including red circle and two small red notches.
- Cut out the "Bus End Piece" and save until later.
- Fold along all dashed lines, creating a cube shape.
- Glue tabs marked "1" to corresponding inner walls of the Bus, leaving the top open until the **Beam** and **Solar Array** are built.

BEAM

*An array of solar panels are needed to power PACE. Before launch, the solar array is folded and then unfurls in orbit. For this model, the **Beam** is a single piece that connects the **Solar Array** to the **Bus**.*

SOLAR ARRAY

DIRECTIONS
- Cut out the **Beam**. *(If using thin paper, shorten or omit red notches.)*
- Fold along the *long* dashed lines. Leave ends unfolded.
- Glue along the green dots to form a rectangular piece.
- Cut out the **Solar Array** and its "End Piece." Fold along all lines.
- Glue tabs marked "1" to long edge of the **Solar Array**.
- Following directions printed on the **Beam**, place it in the **Solar Array**.
- Glue **Solar Array** tabs marked "2."
- Fold back the ends of the **Beam** oriented *away* from the **Bus**.
- Glue the "Solar Array End Piece" over the **Beam's** folded end.
- Insert the **Beam's** other end in the hole in the **Bus**. Fold back its ends.
- With the **Beam** sitting in the notch, glue the top of the **Bus** closed.
- Glue the "Bus End Piece" on top of the **Beam's** folded end.

RADIATOR SHIELD

*A **Radiator Shield** blocks out nearly 80% of Earth's energy.*

DIRECTIONS
- Note the direction of red arrows and cut out the **Radiator Shield**.
- Fold along all lines. There is one dotted line ("valley fold").
- Glue tabs marked "1" to short sides of triangles (per red arrows).
- Push folded paper into the **Radiator Shield**, over the tab marked "2."
- Glue the tab marked "2" to the bottom of the folded paper.

OCI

*The **Ocean Color Instrument (OCI)** is designed to measure light at finer wavelength resolution than previous NASA sensors. Its spectrographs will split light down to 5 nanometers (5 one-billionths of a meter)!*

DIRECTIONS
- Cut out the **OCI**. Make all folds, including valley above spectrographs.
- Glue areas marked "1" to form rectangular solar calibration assembly. Glue tabs marked "2" to form the back of the **OCI**.
- Glue tabs marked "3" to form the data, control & interface units.
- Glue tabs marked "4." Each tab can be pinched closed separately. Be careful to maintain the angle along the edge of the spectrographs.
- Glue tabs marked "5" to finish the front side of the **OCI**.
- Glue areas marked "6" to finish the bottom and the port side (i.e., side facing left when looking along PACE's flight direction).
- Finish your PACE paper model by doing the following:
  - Glue **Radiator Shield** to **OCI**. Be sure to align the two white boxes.
  - Glue **OCI/Radiator Shield** to **Bus** (or optional "Hinge," see below).
  - Slightly bend down the **Beam** (see image at top left).

Estimated completion time of 90 minutes.

**NASA's OCI will tilt up and down... want your paper model to do that? Build the options "Hinge"!
Instructions available at https://pace.oceansciences.org/paper_model.htm**