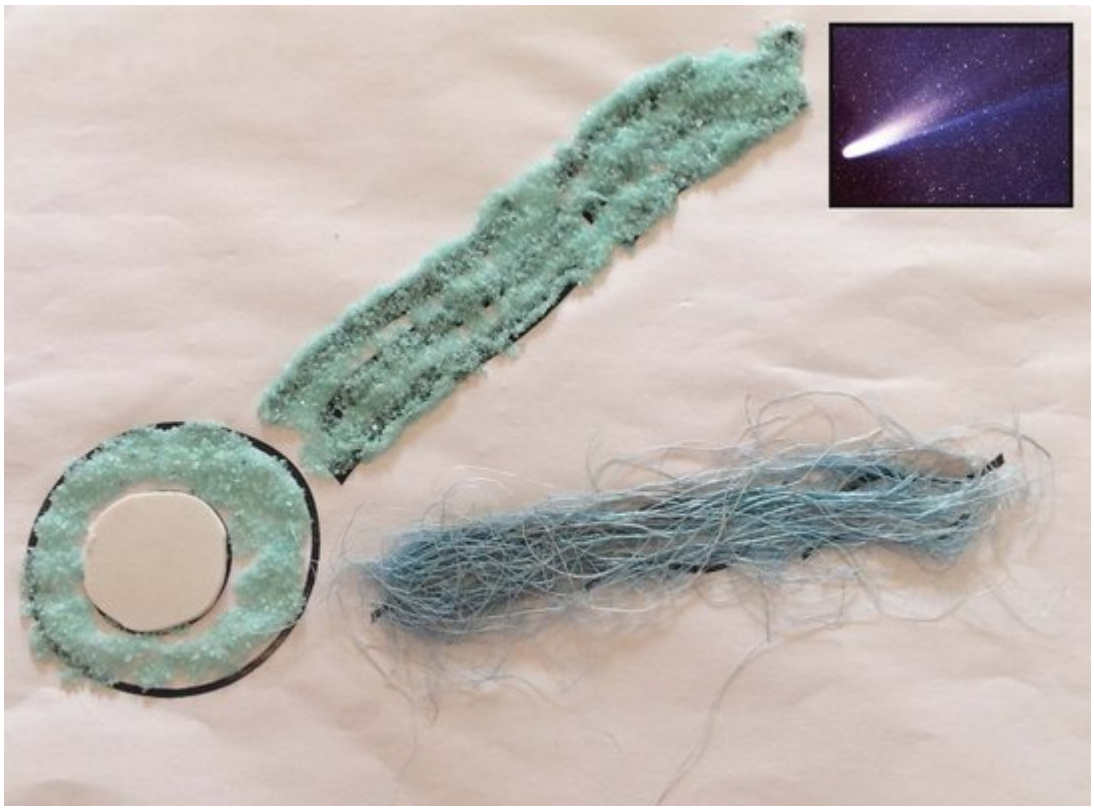
ASTROEDU

Peer-reviewed Astronomy Education Activities

Meet our neighbours: Comet Halley

Let’s build a tactile model of Halley’s Comet, the icy visitor that returns every 76 years.

Author:
Lina Canas



KEYWORDS

comet, model, tactile, tail, visually impaired

CATEGORY

Earth The Solar System

AGE

6 - 12

LEVEL

Primary

TIME

1h

GROUP

Group

SUPERVISED

Yes

COST

Low Cost

SKILLS

Analysing and interpreting data Developing and using models

TYPE OF LEARNING

Fun activity Modelling

MATERIALS

For each group bulding a tactile comet:

- Copies of the attached PDF files (Tactile_Comet.pdf and Tactile_Comet_Mold.pdf)
- Sand;
- Straws;
- Thick fabric;
- Glue and scissors

NOTE: These materials are only suggestions; all textures can be replaced by other local, easy to find, low-cost materials.

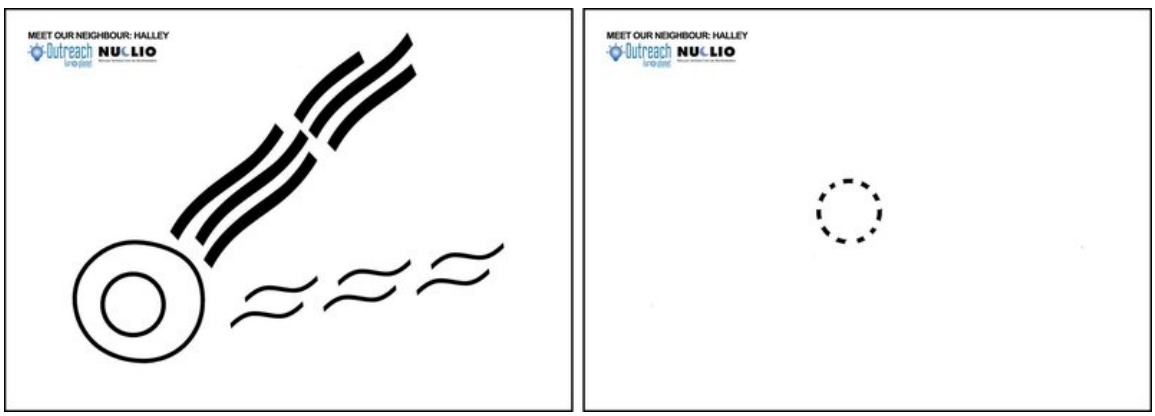


Image: The two files to download

GOALS

To explore Comet Halley through a tactile hands-on experience for visually impaired students and their non-visually impaired peers.

LEARNING OBJECTIVES

Students will explore and learn the characteristics of Comet Halley (and other comets): the nucleus, the coma and the 2 tails.

BACKGROUND

General information

Comets are small objects that orbit the Sun at very large distances, hundreds to thousands of times the Sun-Earth distance. They are believed to form a huge cloud, called the “Oort cloud”, around the solar system. Some of these comets may be dislodged from their distant location by the gravitational influence of Jupiter, and their new orbits take them on a long journey across the solar system.

Most of the comets that enter the solar system never come back for a second visit, but some become periodic comets, with periods that vary from less than 200 years (short-period comets) to thousands of years (long-period comets). In the case of Halley’s comet, it’s very elongated orbit takes it as far as 5250 million kilometres and as close as 87 million kilometres from the Sun over a period of 75.3 years.

A Comet seen from close

Physically, a comet nucleus is a solid body made of dust and ice . When it gets close to the Sun, the ice that makes up most of the nucleus begins to ‘vaporize’ and forms a “coma” (from the Latin word for “hair”) . Even closer to the Sun, solar radiation pushes gas and dust particles out of the coma; these particles form a dust tail that can extend millions of kilometres into space. This tail is often curved because it takes the shape of the comet’s orbit. The gas can also be ionized by solar radiation, and the charged molecules and atoms then develop an “ion tail” that is straighter than the dust tail and always directed in the direction opposite to the Sun.

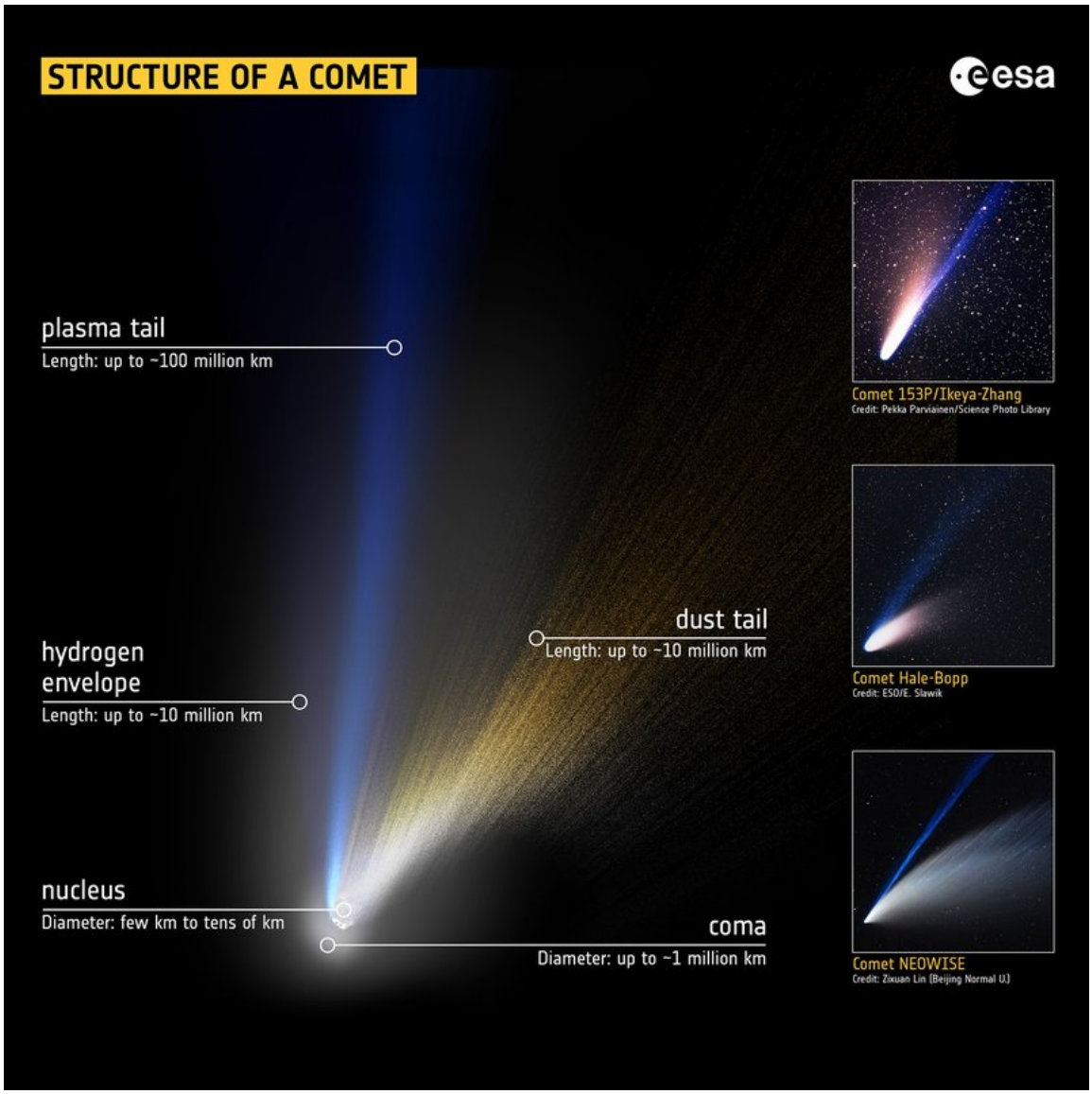


Image: the different parts of a comet. Credits: ESA

Why are comets important?

Comets are leftovers from the formation of the Solar System, about 4.6 billion years ago. They have spent most of their lives far from the Sun, so their ices and dust have changed very little. Studying them is like opening a time capsule: they tell us what the Solar System was made of when the planets were born. Comets may also have helped bring water and organic molecules to the young Earth, although scientists are still debating how much. Finally, comets leave trails of dust along their orbits. When Earth crosses these trails, we see meteor showers. Halley's Comet is the parent of two of them: the Eta Aquariids in May and the Orionids in October.

Halley's Comet story

Halley is the most famous comet: its passages have been recorded by astronomers since at least 240 BC, but they were not recognized as periodic visits by the same object. It was only in 1705 that the British astronomer Edmond Halley determined that the orbit of a comet that appeared in 1682 was the same as the orbit of two earlier comets that were observed in 1531 and 1607. He was the first to realize that these three comets were, in fact, three successive passages of the same comet, with a periodicity of about 76 years. He then predicted the return of the comet in 1758, a prediction that proved correct when the comet passed near the Sun in March 1759. In recognition of his work, the comet was given his name. Halley's

Comet last passed close to the Sun in February 1986. Its next return is expected in July 2061. In December 2023 it reached the farthest point of its orbit, beyond Neptune, and it is now on its way back towards us.



Image: Comet 1P/Halley as taken March 8, 1986 by W. Liller, Easter Island, part of the International Halley Watch (IHW) Large Scale Phenomena Network.

FULL DESCRIPTION

Prior to the activity

- Print two copies of Tactile_Comet.pdf and one copy of Tactile_Comet_mold.pdf for each group, and prepare the materials listed above.
- Ask students what they know about comets, introducing them. Tell students they will be making models of a very famous comet, named Halley's comet to investigate its different features.

During the activity

- Gather the children in groups of 5 elements – visually impaired and non-visually impaired (ideally three non-visually impaired to 2 visually impaired);
- Distribute materials accordingly;
- Close supervision is important. Follow each group and explain each of the tactile elements and their correspondence to each object feature.
- Understand the different needs of each group of students to promote interaction between the students during the building of the tactile image –

visually impaired students need to be familiarized with the different materials involved.
- Give enough time to follow instructions and build the tactile image.

Building the tactile comet

Step 1
Cut the section on Tactile_Comet_Mold and with a pen outline the cut section on in the thick fabric;

Step 2
Cut the thick fabric accordingly to the area outlined;

Step 3
Place abundant glue on the area that correspond to the inner side of the comet's surface on the Tactile_comet file and place the fabric on top of the glue;

Step 4
Place the thick fabric on top of the glue;

WAIT FOR THE IMAGE TO DRY.

Step 5
Place glue in the curved areas around the thick fabric and place sand on top of the glue;

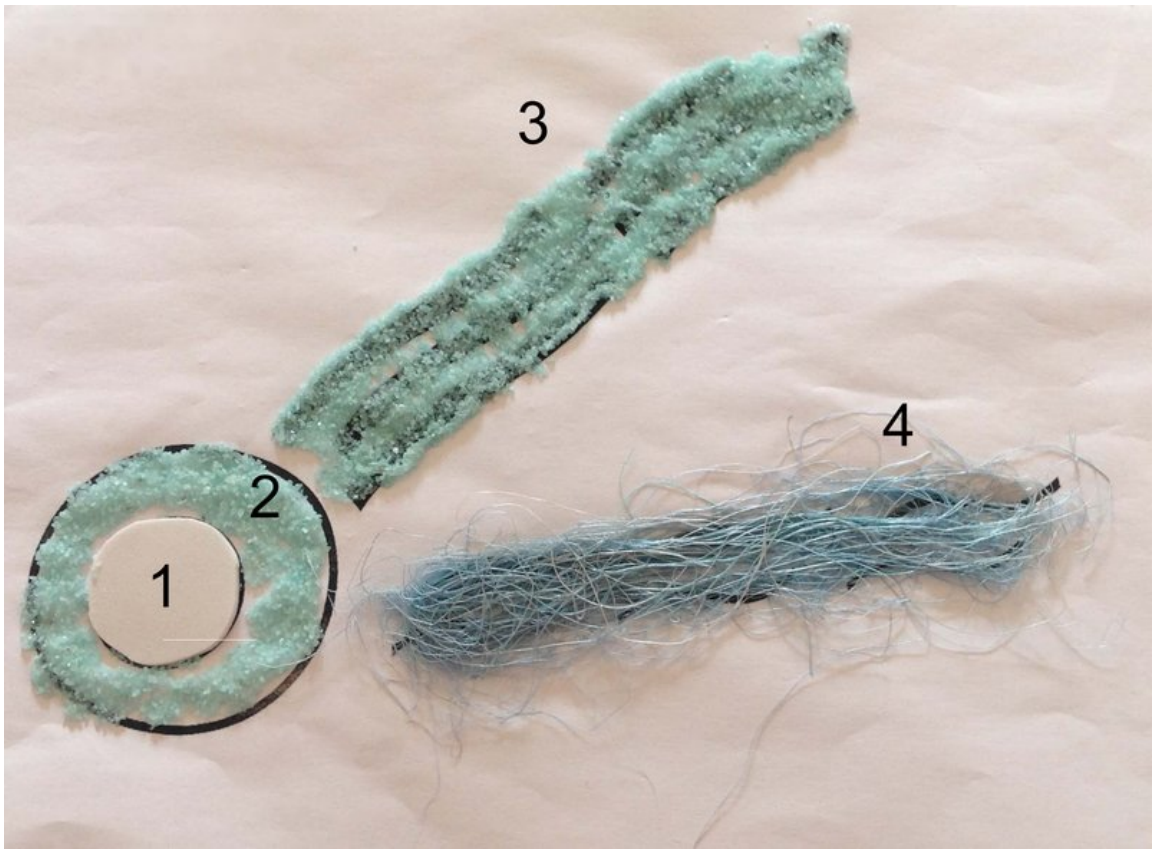
Step 6
Place glue in the thick wavy areas correspondent of the upper tail and place sand on top of the glue;

Step 7
Place glue in the thin wavy area corresponding to the lower tail and place sand on top of the glue;

WAIT FOR THE IMAGE TO DRY. IT MIGHT TAKE A WHILE BEFORE YOU CAN EXPLORE THE IMAGE.

Exploring the tactile Comet

There are several ways in which you can explore the scientific content of the tactile schematic images. If you're presenting the final tactile image to the students, first let them explore and feel the different textures. Questions will arise as the students explore; encourage them to write their questions down and share them with the other groups. Read "Background Information" to understand the different features present in the Comet schematic tactile image, and share with the students as they ask about them, or (if you have more time), prompt each group to choose a feature to learn more about and then have them present to the other groups in the class.



In the image above, you can identify the following features:

(1) Halley's comet nucleus materialized by the round patch of fabric on the tactile image
(2) the coma: when the comet gets close to the Sun, the ice that makes up most of the nucleus begins to 'vaporize' and forms it. It is materialized by glued-on sand on the tactile image
(3) the dust tail materialized by glued-on sand extending from the coma. It forms even closer to the Sun, when solar radiation pushes gas and dust particles out of the coma. This tail is often curved because it takes the shape of the comet's orbit.
(4) The gas can also be ionized by solar radiation, and the charged molecules and atoms then develop an "ion tail" materialized by the straw on the tactile image that is straighter than the dust tail and always directed in the direction opposite to the Sun.

EVALUATION

Call out a feature of the comet (the nucleus, the tails or the coma). For each feature give a brief description. e.g. - This forms when this object gets near the Sun (Answer: the Great Red spot).

Ask the class to suggest how Comets are important for Humankind and why.

ADDITIONAL INFORMATION

Find the original project "Meet Our Neighbours" at https://ark.nuclio.org/astroneighbours/

CITATION

Canas, L., 2026, *Meet our neighbours: Comet Halley*, astroEDU, 2611

ACKNOWLEDGEMENT

Europlanet Outreach, Núcleo Interactivo de Astronomia