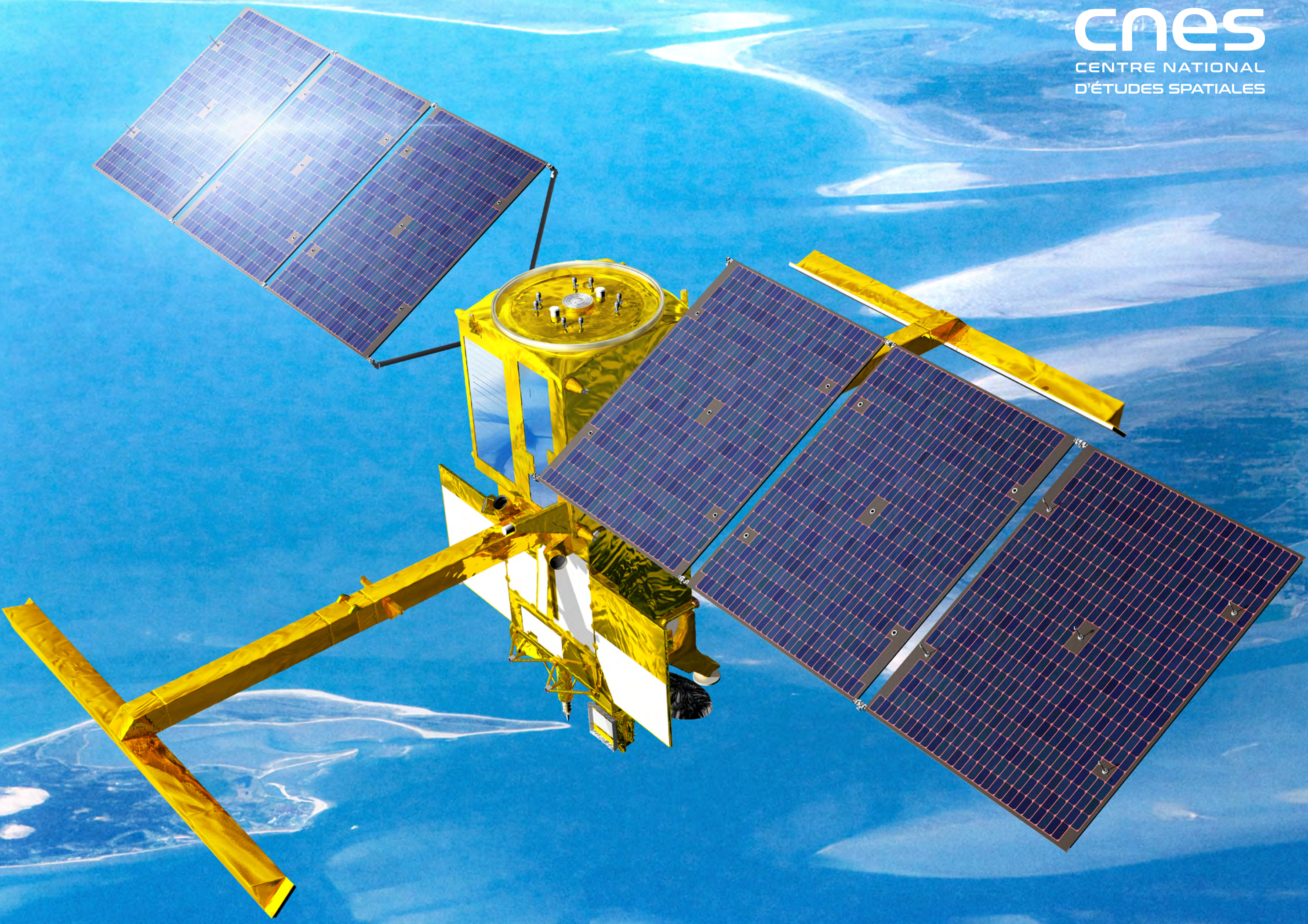


SWOT

A FRESH LOOK AT WATER

Paper model for assembly

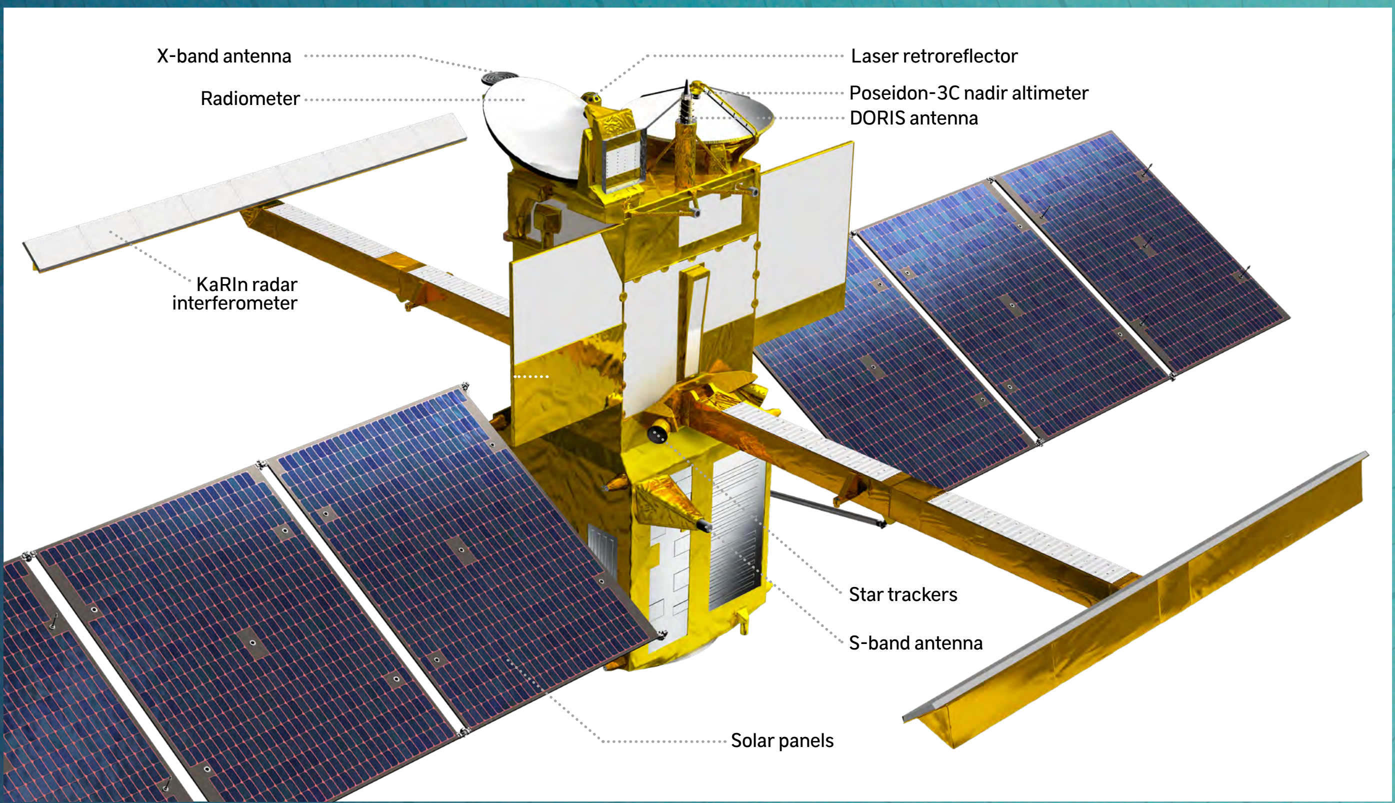
The SWOT mission is monitoring the elevation of inland waters and ocean topography around the globe with great precision. The innovative payload of this 2-tonne French-American satellite is providing us with a better understanding of the water cycle, climate change, small-scale ocean currents, fishing zones, etc.

Twenty-one days are needed for the Surface Water and Ocean Topography (SWOT) satellite to fully measure the Earth's surface water. It can survey a swath 120 km wide, thanks to KaRIn, the new radar interferometer. This technological innovation provides researchers around the world with a two-dimensional image of the height of our planet's waters, taken from an altitude of more than 890 km. SWOT acquires measurements of fresh and salt water on over 90% of the Earth's surface.

The scientific community working on the data obtained by the satellite has given SWOT three main assignments: hydrology, oceanography and coastal observation.

In the field of hydrology, it measures several million lakes as well as rivers over 100 metres wide. It is improving our understanding of the water cycle and enabling us to observe climate change in greater detail by examining seasonal variations in the Earth's freshwater reserves.

For oceanography, it measures marine eddies a few tens of kilometres wide throughout the year.



As they move, these eddies carry warmer water, nutrients and CO_2, and interact with the atmosphere. They therefore have a major impact on the regional and global climate.

At the coastal level, SWOT can distinguish coastal currents that were previously inaccessible to conventional altimetry missions. By compiling satellite data on eddies and coastal currents, we can analyse their interactions with estuaries, flood-prone areas and the coastline.

Lastly, SWOT provides public policy-makers with new and more accurate information for coastal development strategies or for managing fishing zones more sustainably and optimising maritime and river transport routes.

France, a major player alongside the United States

The French space agency is a major player in the SWOT mission alongside NASA, the US space agency. CNES has supplied many of the instruments (the payload), including DORIS and Poseidon 3-C. It also provided NASA with the satellite platform and the core module of KaRIn, the main instrument designed by the US space agency. The French teams based at the Toulouse space centre have been tasked with control and station-keeping, for the entire duration of the SWOT mission. Every day, CNES's centre for expertise processes 8 terabytes of data (i.e. 4000 hours of high-definition video) before making it available to the scientific community free of charge.

SWOT characteristics

Mass : 2000 kg

Dimensions : 10,50 x 14,80 x 5,00 metres

Altitude : 891 km

Circular orbit with an inclination of 78°

Swath width : 120 km

Lifespan : 3 years

Partners : NASA, JPL, CSA, UKSA

Launch date: 16 December 2022

Find out more about SWOT :
https://swot.cnes.fr/en/SWOT/index.htm

Instructions for assembly

Numbering of the parts: the first digit in the part number indicates the sheet on which it is printed, while the letter denotes the part itself. Thus part 3a is part «a» on sheet 3.

You should print out parts on photo-quality paper (170 to 200 g/m2), preferably with a matte or satin finish. Carefully cut and separate the parts from their backing.

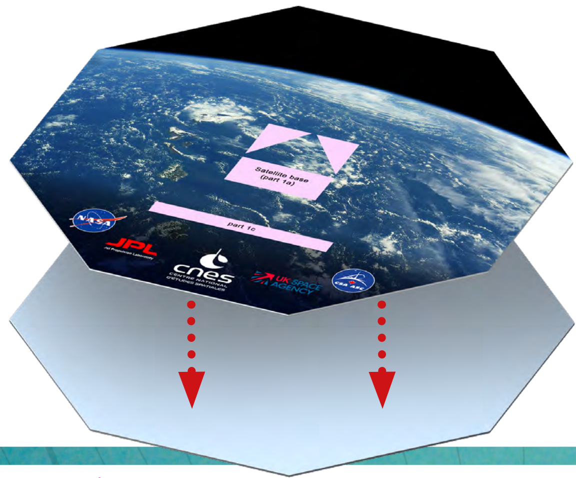
For a more realistic result, use a felt-tip pen to colour the edge of the paper in a shade similar to that of the part. This should be done before assembling and gluing the SWOT satellite components.

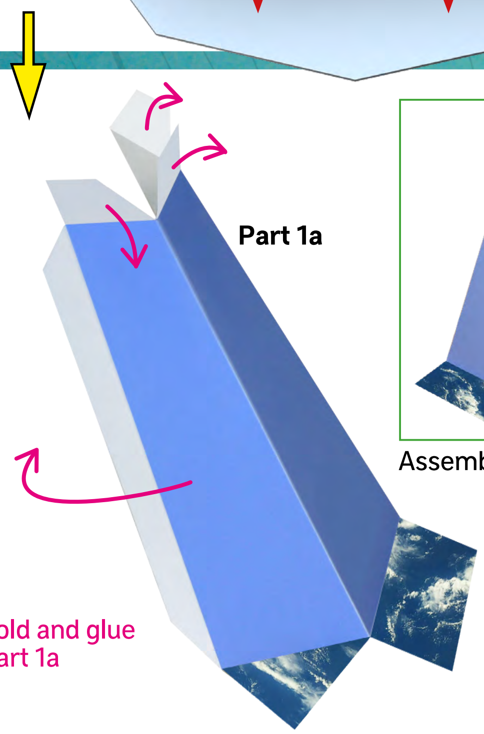
Reinforcements: the base (part 1b) can be glued onto strong cardboard to prevent it from deforming over time.

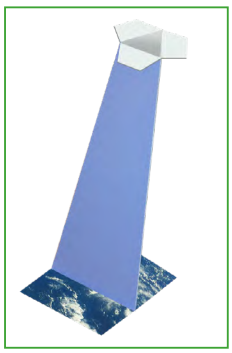
1 Assembling the base

Glue the base 1b to a rigid cardboard base

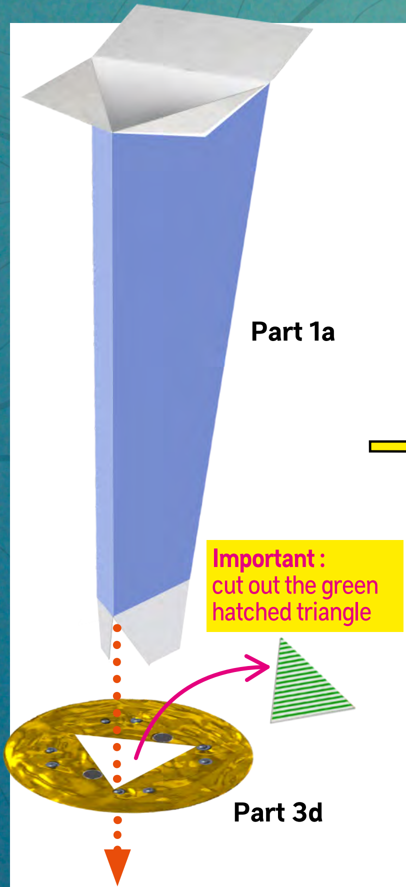
Part 1b



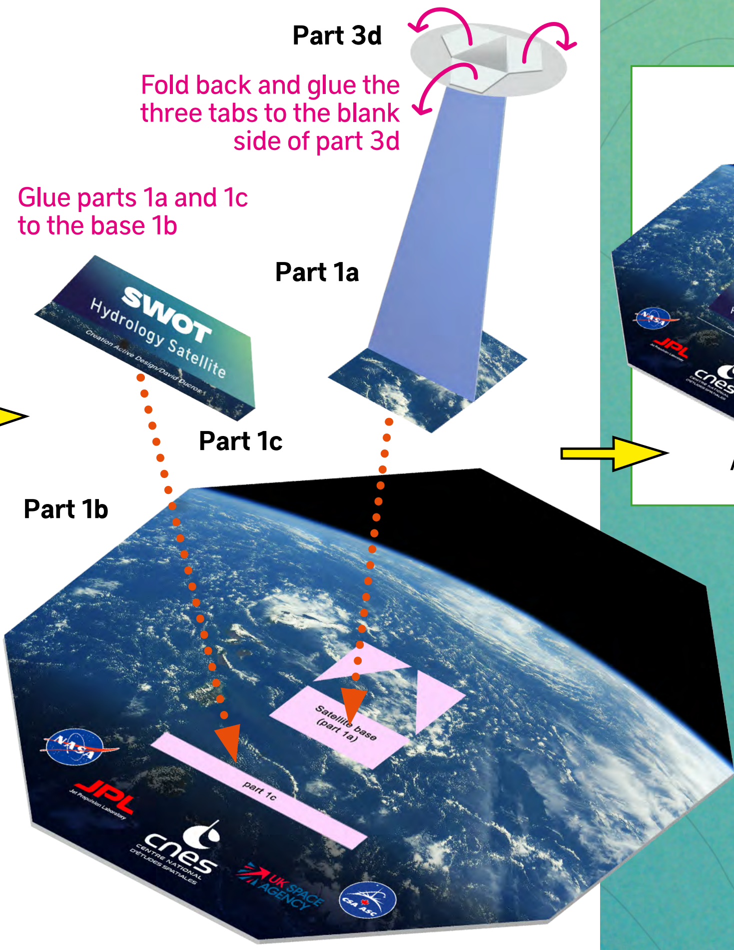


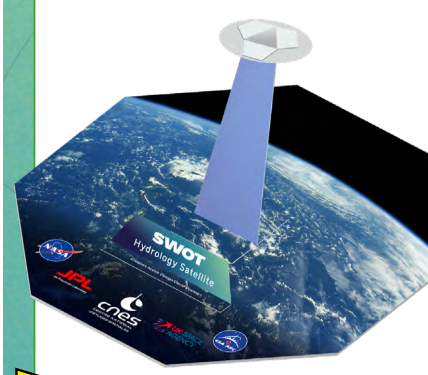


Assembled base



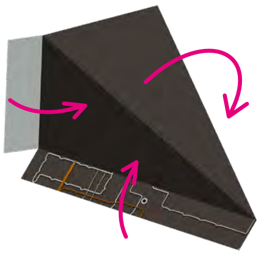
Insert the three tabs of part 1a into the hole of part 3d



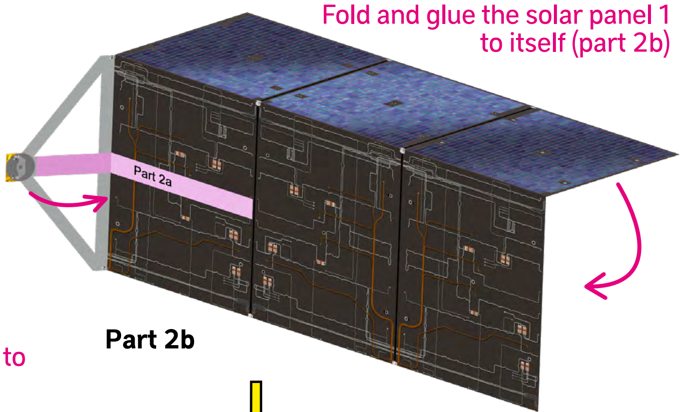


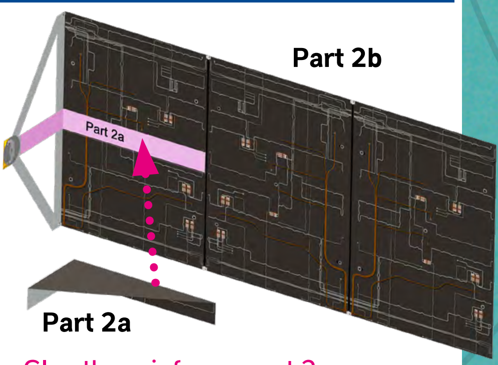
Assembled stand

2 Assembling solar panels

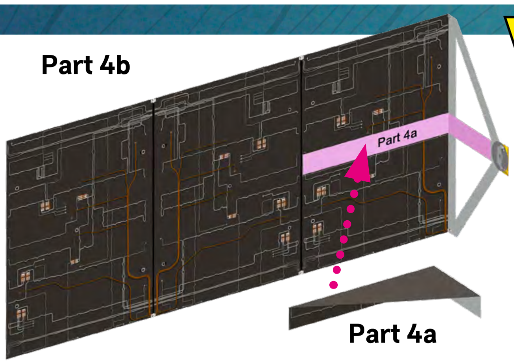


Fold the reinforcement 2a and glue the triangle to itself



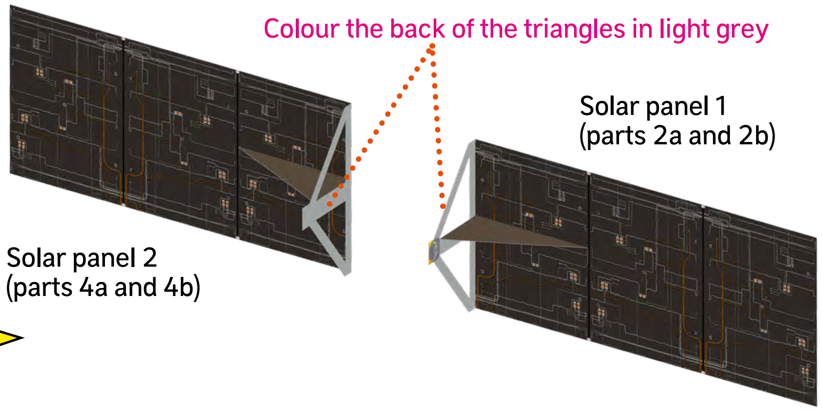


Glue the reinforcement 2a to the part 2b



Proceed in the same way for the solar panel 2 (part 4b) :

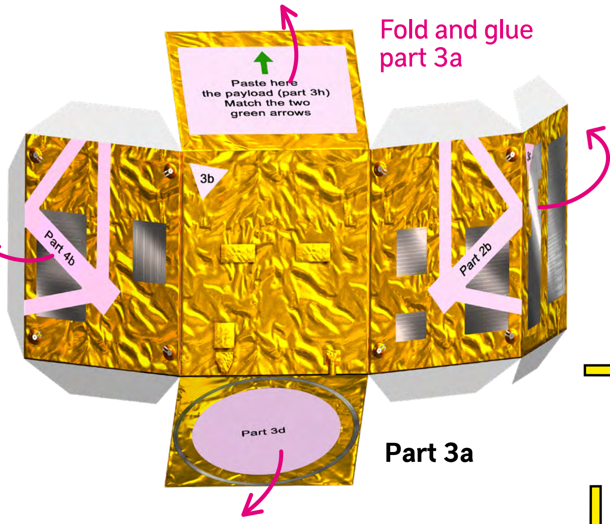
1/ Fold and glue the triangle 4a to itself
2/ Fold and glue the panel 4b to itself
3/ Assemble the two parts 4a and 4b



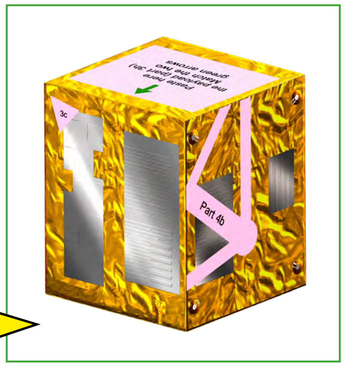
The two assembled solar panels

3 Assembling the resource platform

Fold and glue part 3a

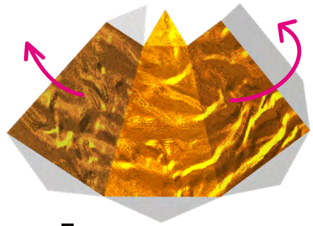


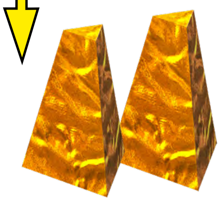
Part 3a



Assembled resource platform

Fold and glue the two parts 3b and 3c

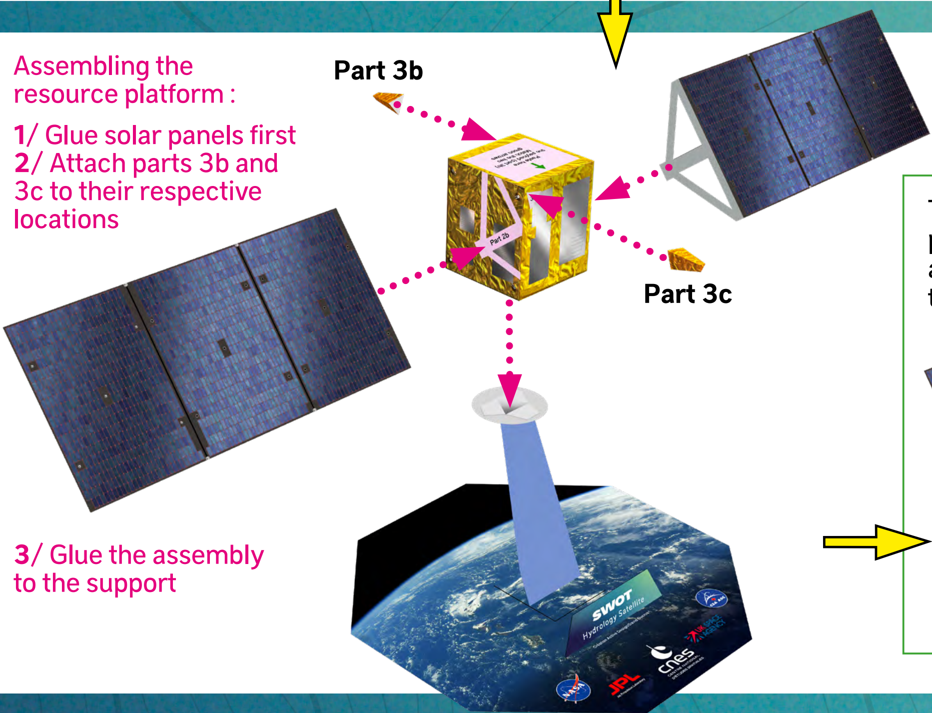




Parts 3b and 3c

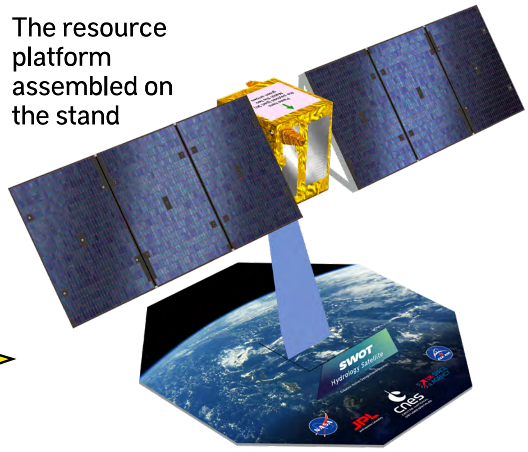
Assembling the resource platform :

1/ Glue solar panels first
2/ Attach parts 3b and 3c to their respective locations



3/ Glue the assembly to the support

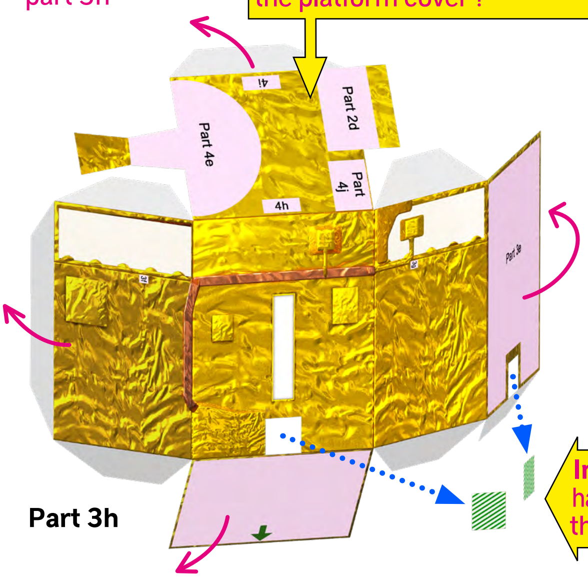
The resource platform assembled on the stand



4 Assembling the payload platform

Fold and glue part 3h

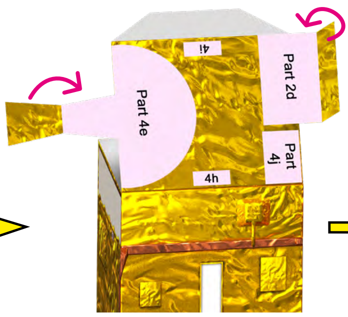
Important : DO NOT GLUE the platform cover !

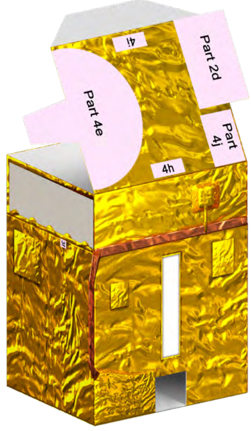


Part 3h

Important : cut out the green hatched triangle <u>before</u> assembling the payload platform

Fold and glue these two parts to their opposite sides



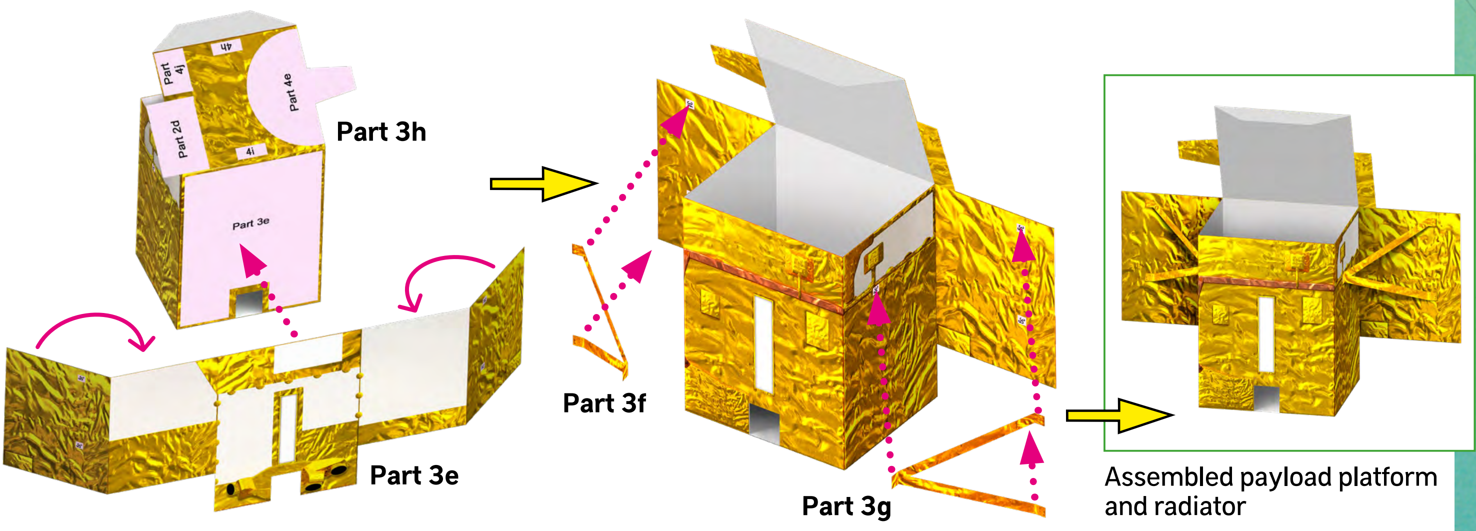


Assembled payload platform

5 Assembling the radiator

Fold and glue the flaps of part 3e and glue the part 3e to the 3h platform

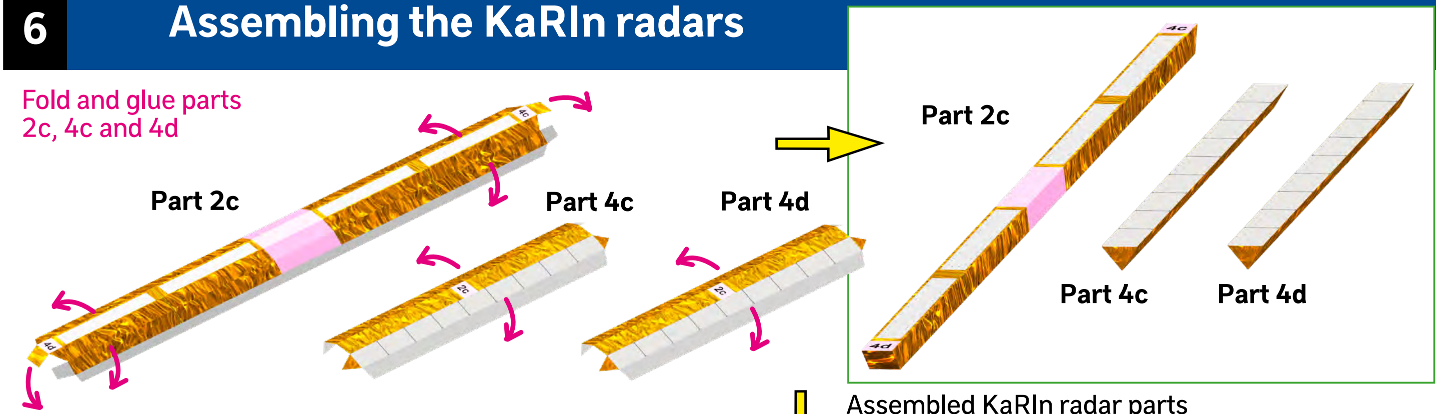
Fold and glue parts 3f and 3g to their respective locations on parts 3e (radiator) and 3h (platform)



Assembled payload platform and radiator

6 Assembling the KaRIn radars

Fold and glue parts 2c, 4c and 4d

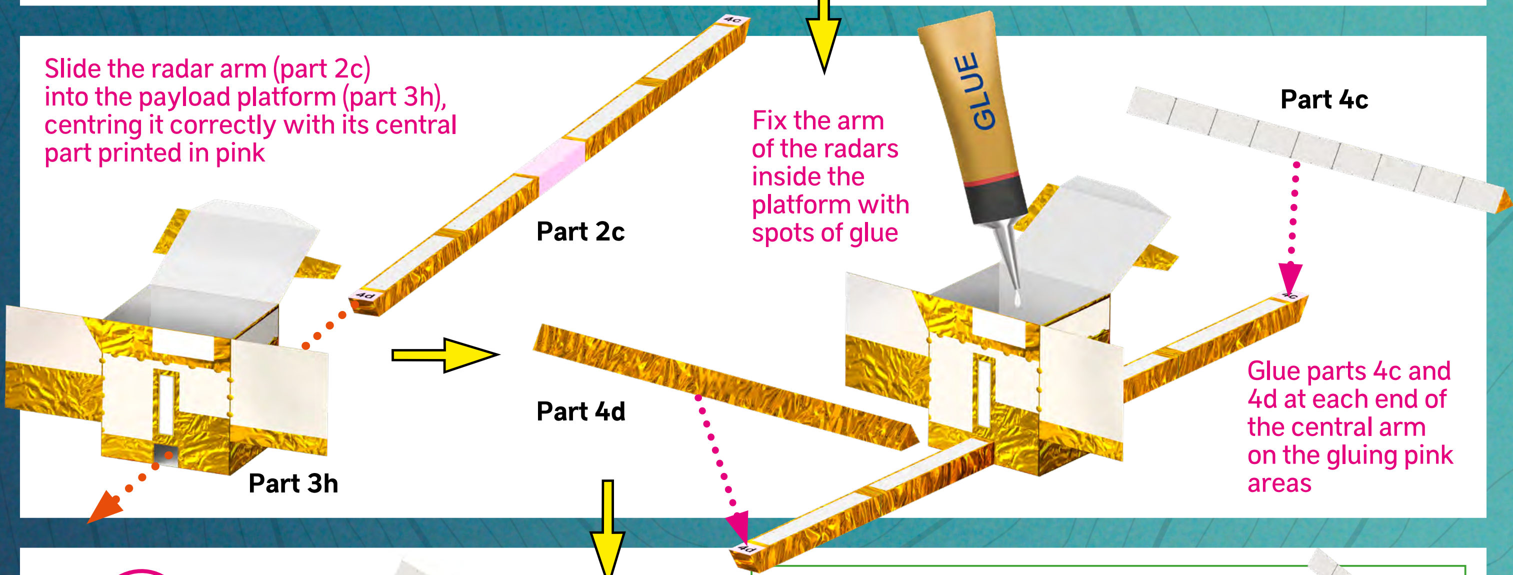


Assembled KaRIn radar parts

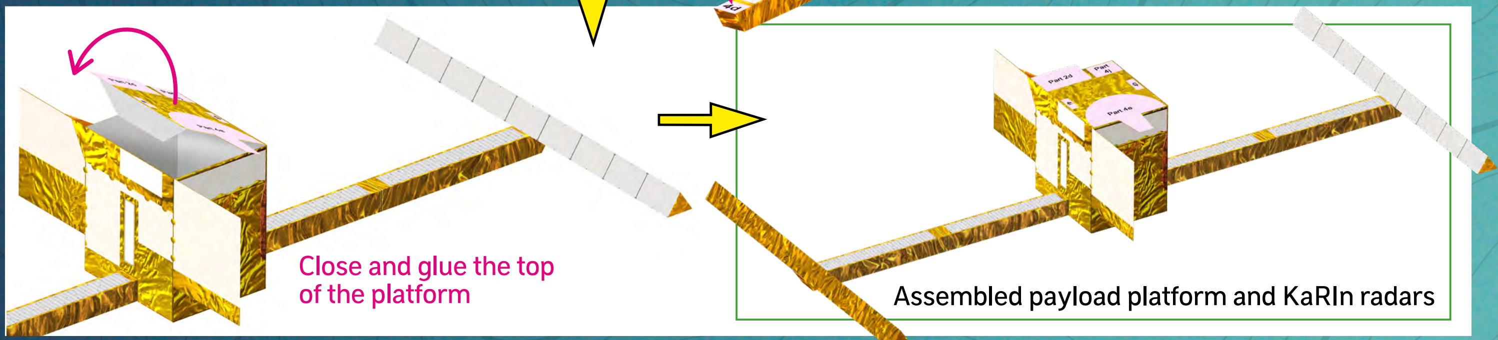
Slide the radar arm (part 2c) into the payload platform (part 3h), centring it correctly with its central part printed in pink

Fix the arm of the radars inside the platform with spots of glue

Glue parts 4c and 4d at each end of the central arm on the gluing pink areas



Close and glue the top of the platform



Assembled payload platform and KaRIn radars

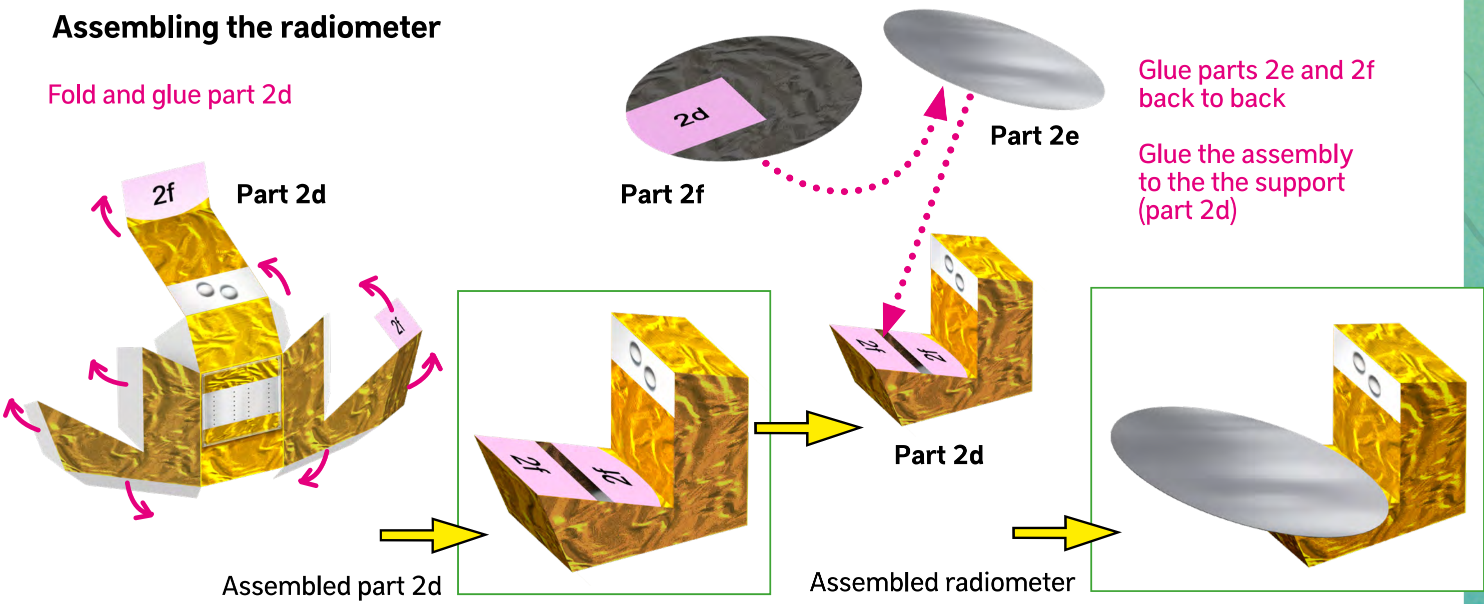
7 Assembling the scientific instruments

Assembling the radiometer

Fold and glue part 2d

Glue parts 2e and 2f back to back

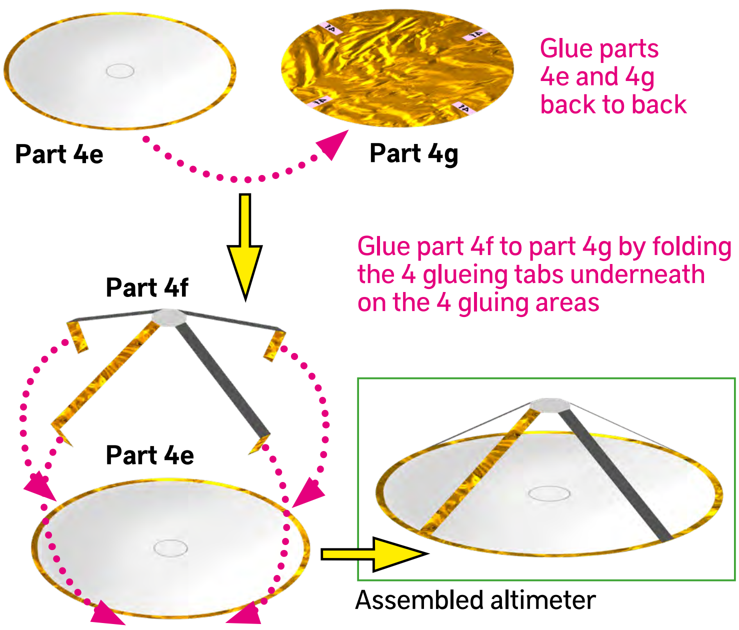
Glue the assembly to the the support (part 2d)



Assembling the altimeter

Glue parts 4e and 4g back to back

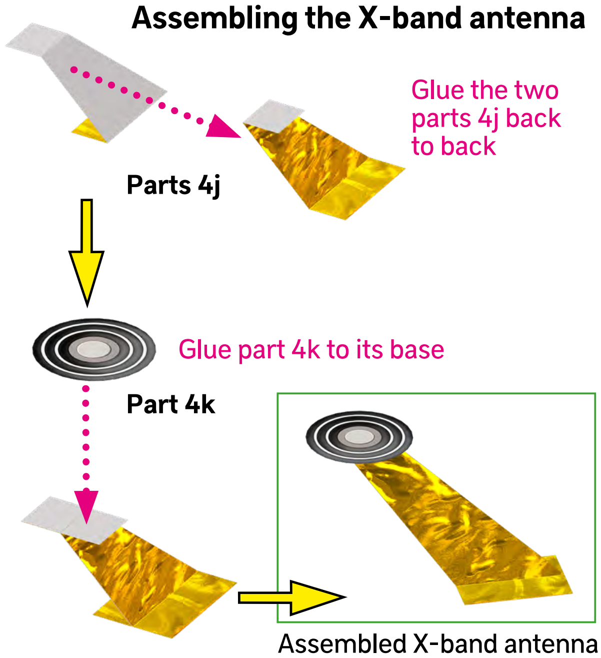
Glue part 4f to part 4g by folding the 4 glueing tabs underneath on the 4 gluing areas



Assembling the X-band antenna

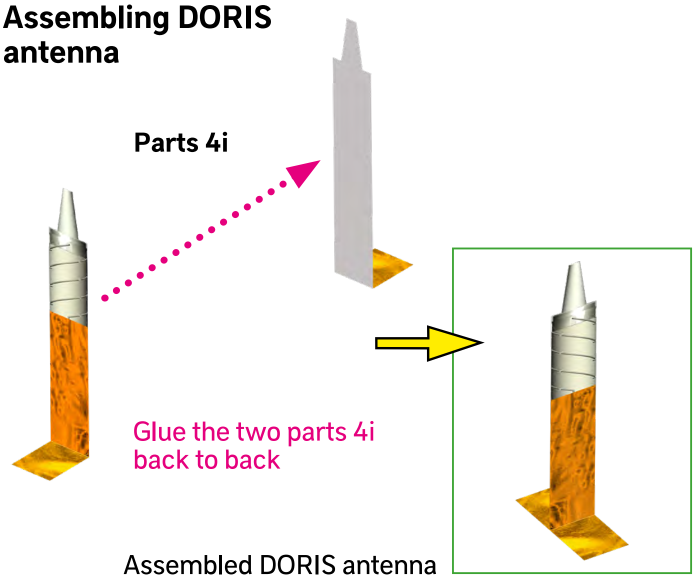
Glue the two parts 4j back to back

Glue part 4k to its base



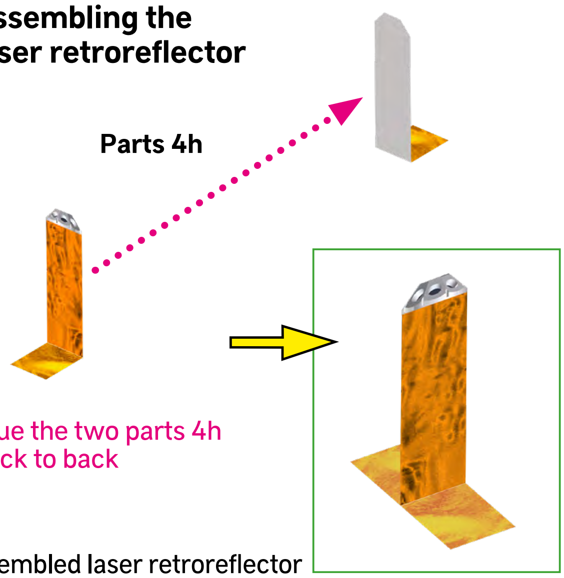
Assembling DORIS antenna

Glue the two parts 4i back to back



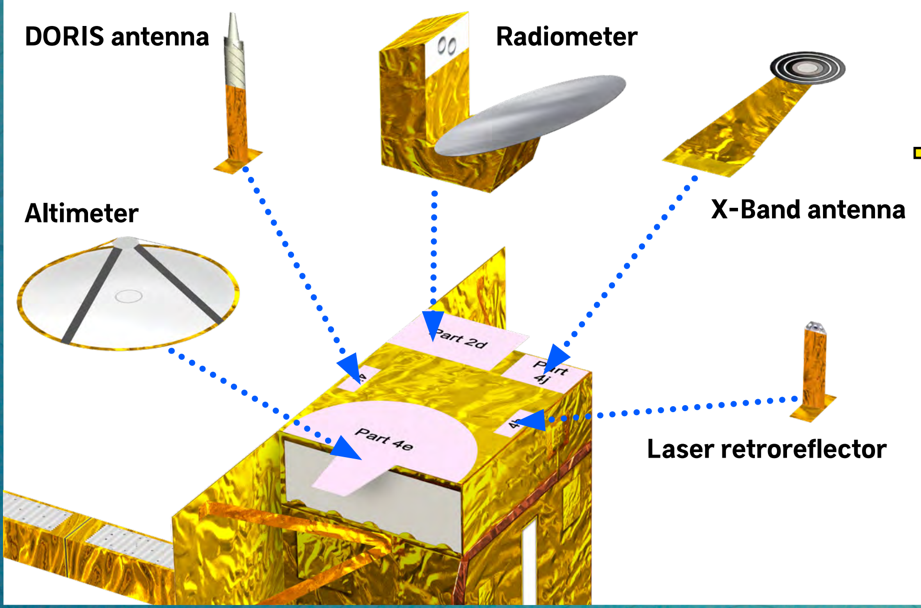
Assembling the laser retroreflector

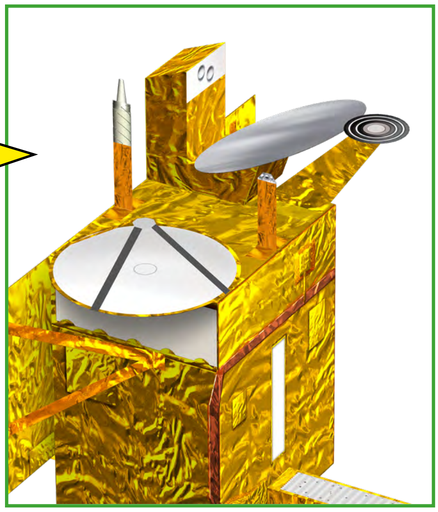
Glue the two parts 4h back to back



8 Mounting the scientific instruments

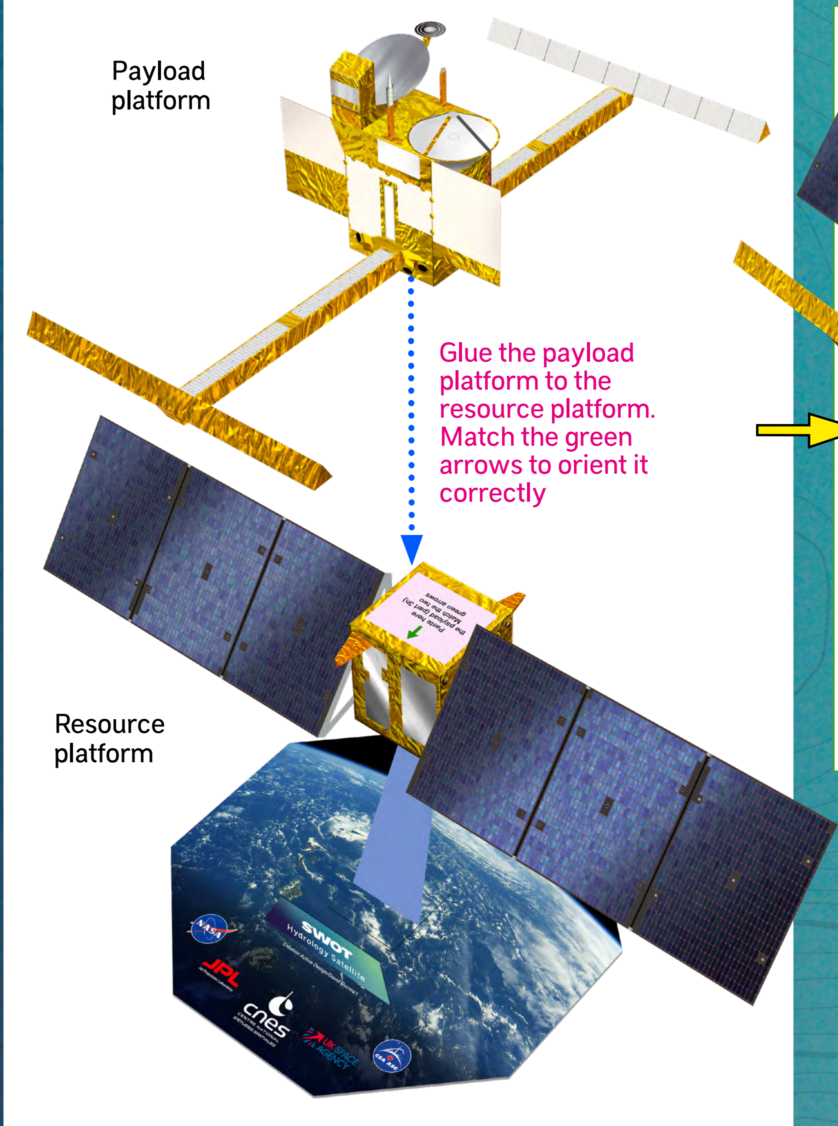
Glue the 5 instruments to their respective locations

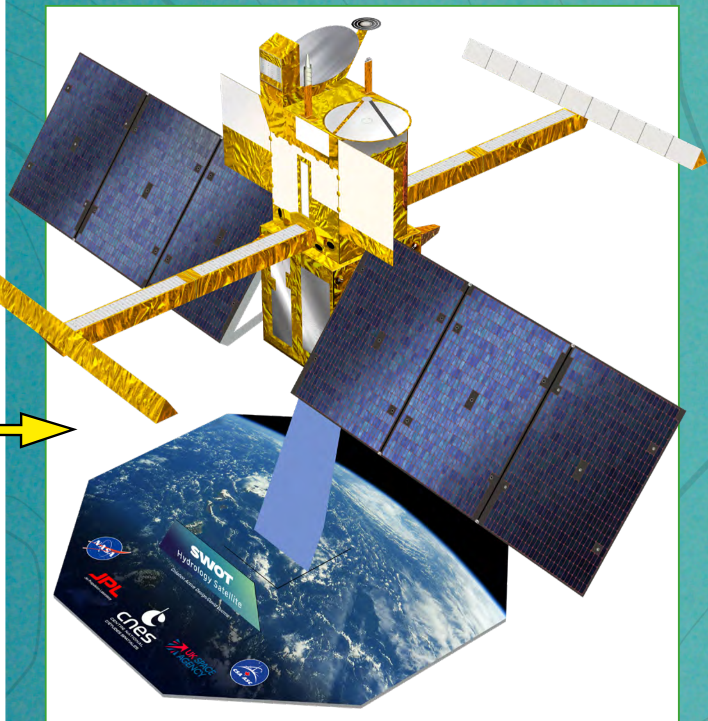




Assembled payload platform

9 Final assembly





SWOT satellite paper model completed

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