

Episode 2 – Questions issued on 26/08/20 ; answers due on or before the 04/11/2020 to namazu@geoazur.unice.fr

Part I - Between Mars and the Mediterranean.

The InSight mission celebrates its first Martian year of operations on the Red Planet. November 26, 2020 will mark the second anniversary (on Earth) of InSight's landing on Mars; approximately 711 sols.



Q1. How many Earth days represent 711 Martian sols?

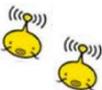
- 711 Earth days because a Martian sol is equivalent to a Earth day
- 730 Earth days because a Martian sol is a little longer than a Earth day
- 694 Earth days because Martian sol is a little shorter than Earth day
- It varies according to the years



Q2. InSight therefore finds the same season on the planet after a Martian year. What is this season?

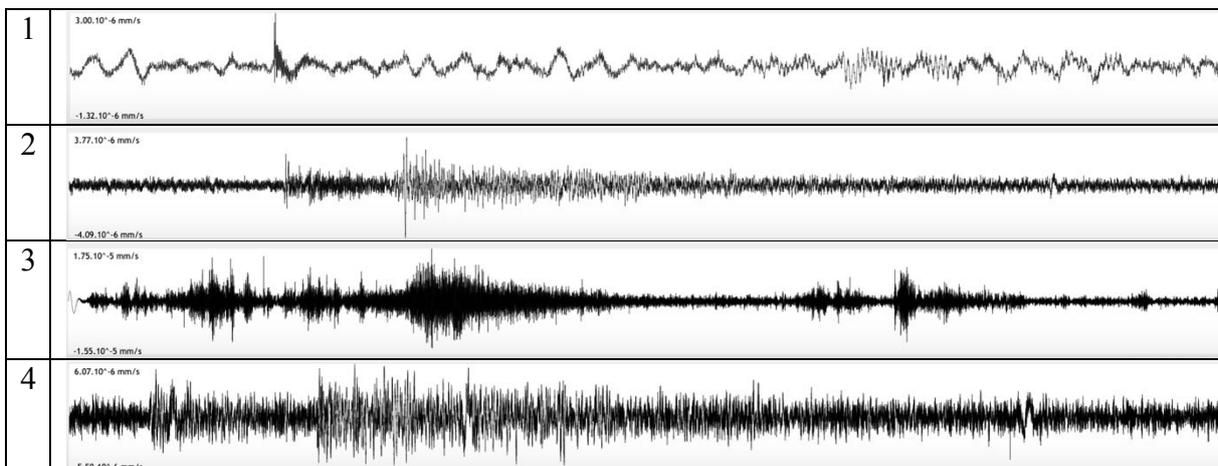
- We are in winter on Mars now
- We are in spring on Mars now
- We are in summer on Mars now
- We are in Autumn on Mars now

Help: [https:// insight.oca.eu/en/news-insight](https://insight.oca.eu/en/news-insight)



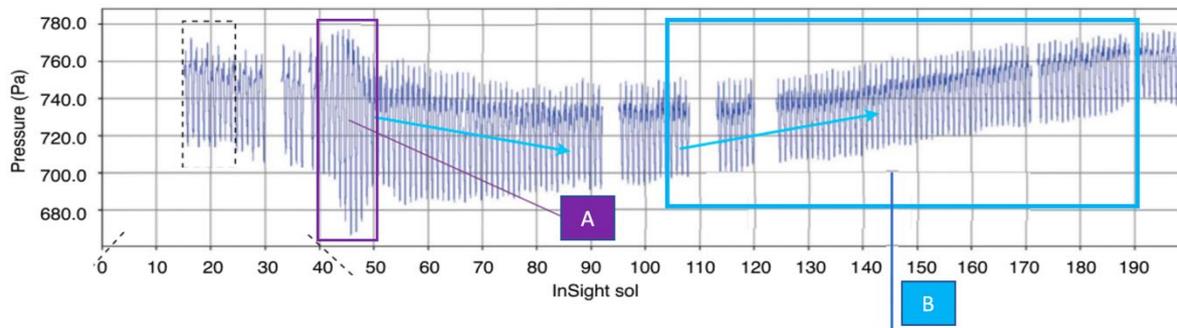
Q3. Historical moment on Mars: The seismometer recorded its first earthquake on 7/04/2019 (sol 128).

What is the seismogram that corresponds to that day?



Help: <http://namazu.unice.fr/marsview>

The InSight weather station has therefore been recording variations in the atmosphere with its sensors for a year. If we look at the data recorded by the barometer, we get the diagram below.



Evolution of atmospheric pressure as a function of time (in Martian sols)

There are two key facts:

A: a significant drop in pressure for ten sols (between sol 40 and sol 50)

B: a slow increase in pressure between sol 100 to sol 200



Q4. Choose the incorrect answer

- The pressure changes with the evolution of the winds on the planet during the year.
- Event A is due to sandstorms on the planet this season
- Evolution B is due to the increase in atmospheric CO₂ in spring
- The barometer was activated from the 15th InSight operations sol



Q5. When InSight landed, scientists were relieved because many Martian missions had failed. Among the Martian failures, there was the mission:

- Phoenix
- Curiosity
- Mars Polar Lander
- Opportunity



Q6. For space agencies, what is the main difficulty to take into account when landing on Mars?

- Lack of communication from the lander during the descent phase
- The hardness of Martian ground
- The fine atmosphere of Mars
- Inappropriate angles when entering the atmosphere



Q7. Before leaving for Mars, the researchers expected to measure around fifty marsquakes per year. What are their results today?

- No marsquake recording
- A number slightly lower than the expected number
- A number slightly higher than the expected number

- A number much higher than the expected number



Q8. Before leaving for Mars, the researchers thought to measure among the recorded marsquakes, about ten marsquakes of magnitude 5.5. What are their results today?

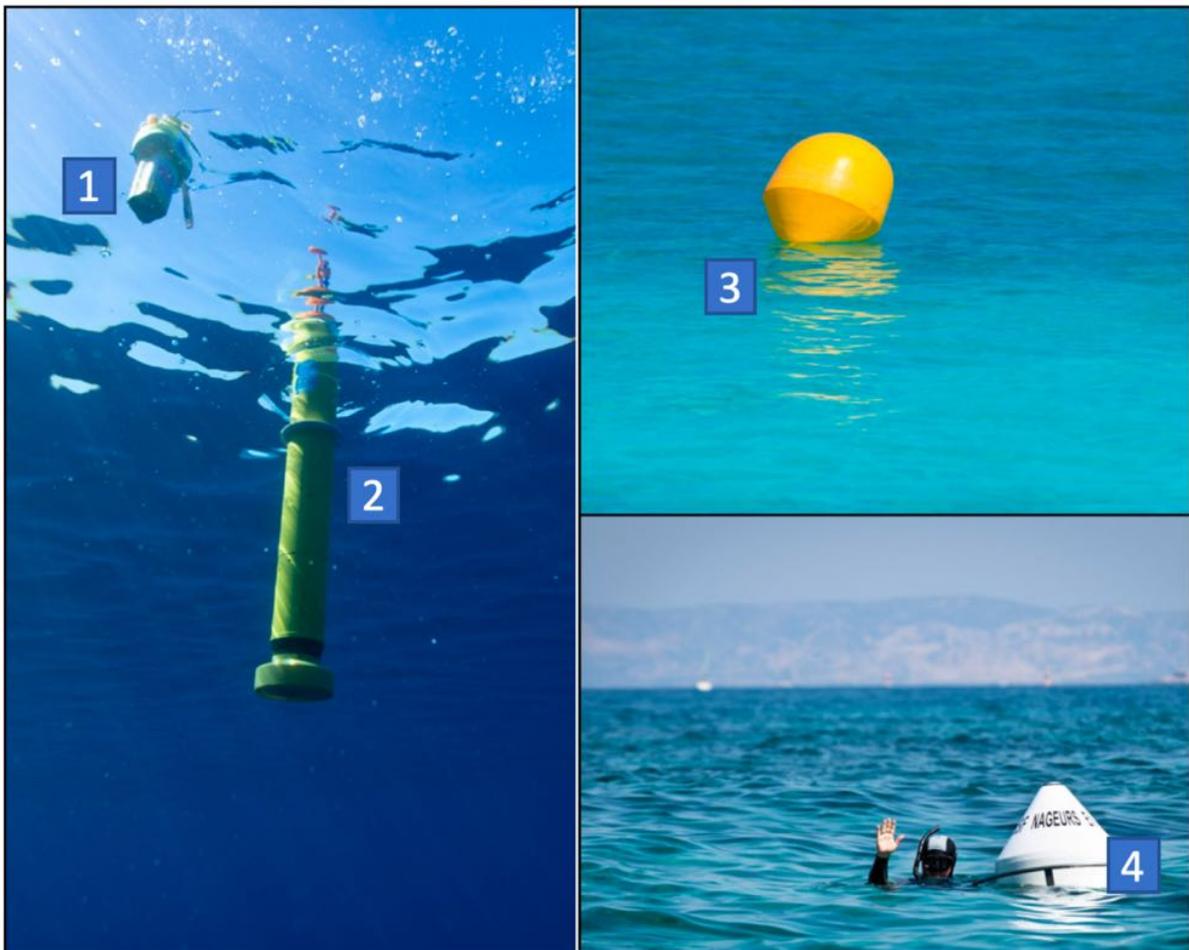
- No marsquake of magnitude 5.5 recorded
- A number slightly lower than the expected number
- A number slightly higher than the expected number
- A number much higher than the expected number

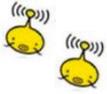
Q9. A few days ago (November 8) the traditional sailing race: the "Vendée Globe" started (www.vendeeglobe.org). Many sailboats will embark on a round-the-world trip lasting several months, choosing the best options (winds, currents, etc.).

The study of sea surface currents is the subject of scientific studies with the help of floating buoys (ARGOS seabeacon buoy) which, once released at sea, move with the currents. Their movement is constantly monitored by GPS ... so depending on the seasons and weather conditions, the beacons show us the movement of the water.

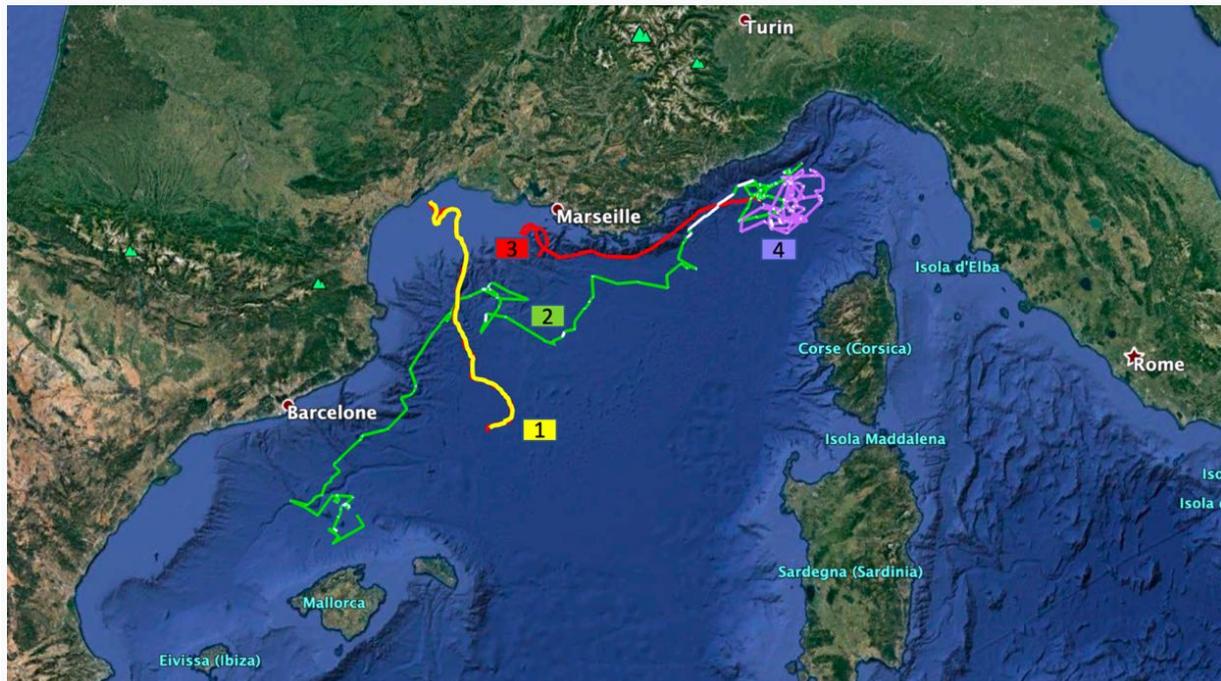
The EduMed observatory recently released a seabeacon that responds to the nickname of CORIS 2 (Data from buoys at sea on <http://edumed.unice.fr/fr/data-center/oceano>)

Which of the following images corresponds to an ARGOS seabeacon buoy





Q10. The image below traces the path of some buoys dropped in recent years in the Mediterranean. Which corresponds to CORIS 2.



Between Corsica and the mainland, the Mediterranean sea is called the 'Ligurian Sea'. In this basin, we know a surface current called the "Ligurian current". According to the previous map, which markers best illustrate this Ligurian current?

- All buoys
- Buoys 4 and 3
- Buoys 2 and 3
- Buoys 1, 2 and 4



Q11. Follow the CORIS 2 seabeacon in the coming weeks. Make a map of your choice showing the position of the seabeacon on a specific date, the weather conditions of the day (surface winds) and the direction and strength of the sea currents there and on that date.

Good luck to all the sailors of the Vendée Globe, who will closely follow all the information transmitted, in particular by the beacons of the ARGOS network!

PART II - Where do we place Mars?



Question 1.



What if we made a giant model of the solar system ...

If the Sun was placed in a Géoazur laboratory (250 Rue Albert Einstein, 06560 Valbonne, France) and if Venus was placed at the Paris Observatory (5 Place Jules Janssen, 92190 Meudon, France), in which city would Mars be located?

Question 2.

Using whatever scales you want for the diameters and distances of the planets from the Sun, make a model of the solar system in your school. You will have to place the Sun and the 8 planets of the solar system there.

*The answer of this question should be accompanied by one or more photographs.
For classes that would be in lockdown, you can build the model at home.*

Part III - Mars2020.

Question 1.

Find the mystery object ... a video made by a researcher ... a mystery object to discover ...
With the lockdown, the video has a bit of delay but it is coming very soon and will be available on the page:

<https://mars2020.oca.eu/en/mars2020-namazu-contest>



Question 2.

This question will allow you to better understand the Mars2020 mission and will allow you to talk to a man or a woman who worked on the mission.

Send an email to Namazu (namazu@geoazur.unice.fr) so that they can put you in touch with a member of the mission team. You will have to interview him/her by phone, email or video and make an identity sheet of the person (university background, his job, his role in the mission, his passions, a work anecdote...)

Part IV – Let's Scratch!

Create a game based on Mars.
Your response will be your game file.

1. Prepare yourself

Download the Mars surface image and the rover sprite image, and save them to a computer. On the [Scratch website](#), click Create to start a new project. (Log in or create an account, if you want to save your work so you can revisit or redesign your game in the future.)

Create a new background by moving the mouse over "Choose background" in the Scene window and selecting "Import background". Choose the image of the surface of Mars. The Scene area of the screen should now display the selected background image.

Create a new sprite by moving the mouse over "Choose Sprite" in the Sprite window and selecting "Import Sprite". Choose the rover sprite image. There should now be a rover placed over your background image with the original cat sprite.

Delete the existing cat sprite by clicking on it in the Sprite window and clicking the "x" in the corner.

With the rover sprite selected, you are ready to create the code that runs the game and controls the rover!

2. Drive the rover

NASA explores Mars with orbiters that travel around the planet, stationary landers on the ground, and rovers that can travel many kilometers on the surface. Astronauts have also explored the Moon with a car-like rover - and may again in the future. For rovers to explore Mars, they must be able to drive. Rovers on Mars are not controlled with joysticks or keyboards. But in the future, astronauts orbiting Mars or on the planet's surface could use remote controls to drive the rovers.

Your game is to use the keyboard keys to drive the rover.

Tasks

Raise the river up, down, left and right on the screen using four different keys on the keyboard.

Tip: Go to the "Events" section to find blocks that will help you.

Specify the distance traveled by the mobile each time one of these keys is pressed.

Select a distance that makes mobile movement smoother when the key is held down.

Tip: Go to the "Movements" section to find blocks that will help you.

Rotate the rover so that it points in the direction of travel.

For experts: move the rover diagonally using keys other than those already assigned.

3. Add "scientific targets" to achieve

NASA sends rovers to Mars to collect data and conduct scientific studies. "Scientific targets" are places and objects on which studies are conducted.

You need to create science targets to provide destinations for your mobile.

By studying the background image, you can identify areas that look interesting and that you think scientists may want to investigate.

Tasks

Add three or more "science targets" to visit during the game by placing additional sprites representing the targets on the background image.

Disappear the science target sprites when they are visited by the rover.

Tip: Go to the "Control" section to find blocks that will help you.

Reappear science target sprites when players click the green flag to restart the game.

For experts:

4. Add a countdown

NASA missions to Mars and other destinations have an expected life expectancy. Some missions, including all Martian rovers to date, have been extended and operated beyond their intended life expectancy, while others are experiencing issues that shorten their mission. You can create a timer that counts down to the end of the mission and ends the game. Your timer

should not be too short for the game to be unplayable or impossible to win, but it should not be too long so that there is a challenge. As an added bonus, you can create code to extend or shorten the scheduled mission time.

Tasks

Create a timer that counts from a set time to zero.

Tip: create a "time" variable and program to change it.

Stop the game when the stopwatch reaches zero.

Display a message "Mission completed" when the stopwatch reaches zero.

Restart the timer when a player clicks the green flag to restart the game.