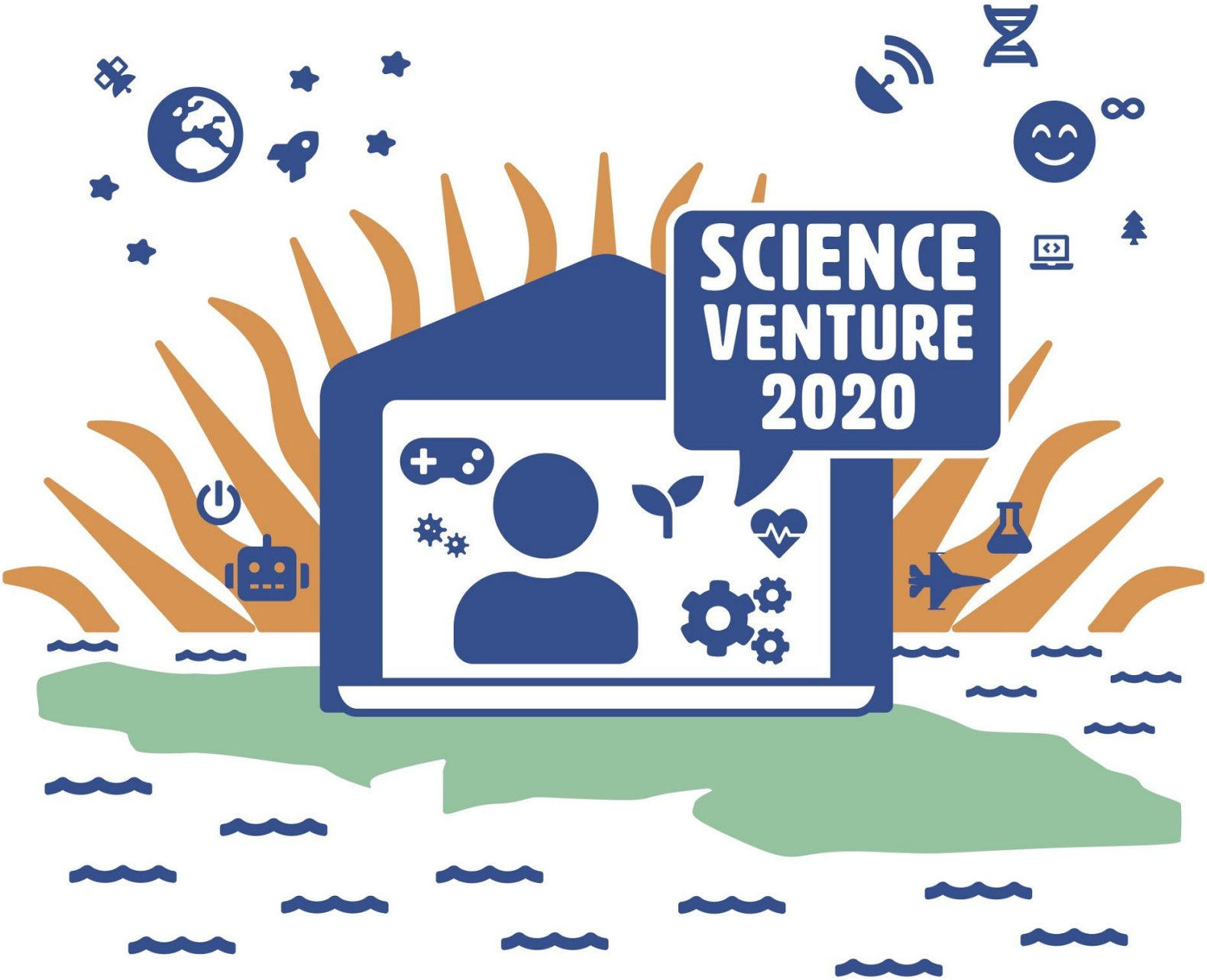

Oceanography

High Tide Low Tide

Students will experiment with high tides and low tides by creating their own ocean and landscape. Students will be able to investigate what happens when sea levels rise and what the consequences of this are

Materials

- Foil container
- Sand/rocks
- Water
- Icecubes

Safety Considerations

- Students would benefit from setting up a waterproof tarp or tablecloth underneath their container in case of water dripping

Keywords & Concepts

Tides are the rise and fall of sea levels caused by the combined effects of the gravitational forces exerted by the Moon and the Sun and the rotation of the Earth.

- High tide is when the sea level is at its highest level
- Low tide is when the sea level is at its lowest level

Sea level is the base level for measuring elevation and depth on Earth.

- Since the ocean is one continuous body of water, its surface tends to seek the same level throughout the world. However winds, currents, river discharges and variations in gravity and temperature prevent the sea surface from being level.
- **Rising sea level** is an increase in the level of the world's oceans due to the effects of global warming.
- **Glacial melt** occurs when ice melts more quickly than firn, granular snow that has yet to be compressed, can accumulate. This melting contributes to rising sea levels.

Coastal environments are areas where the land masses meet the seas.

High Tide Low Tide

Procedure

Create your ocean and coastal environment

1) In your foil container, with sand and rocks, create your ocean floor on a slant. Add enough sand so that the slope goes from the top of the bin to the bottom of the container on the other side

Create your landscape

- Who lives by the ocean? What buildings might you see?
- Brainstorm and assess where buildings should be placed on the coast. Where should they be relative to the ocean and the water? Why? Once you place them you cannot move them (just like in real life)!
    - What happens if the sea levels rise, will the buildings be damaged?
    - What about storms, etc? What buildings are required on coastal land (lighthouses...etc)?

Create ocean

1) Add water to create your ocean. Do this by filling up your container until it has almost reached the top of your container.
2) Using a ruler, measure the water level of the ocean (no tides yet) and record it in your ***water level chart.***
3) In addition, using a ruler, measure the water level and the distance from the buildings to the ocean's waterline (no tides yet). Record this in your **water level chart**

Simulating tides

1) Gently tilt your container from side to side to create mini waves
2) Tilt your container so that the water 'piles up' on the sloped side. During a high tide event, this is what happens.
    a) This happens because the moon is facing this side of the earth that the water it 'piled up' against. This is why we experience high tides, as the gravitational pull of the moon pulls it slowly up this way.
3) Now, tilt your container the other way so the water is gathered on the opposite, ocean side. This is what happens during a low tide event. The water moves back down and retreats back towards the ocean.

High Tide Low Tide

Procedure

Simulating glacial melt

1) What happens when glaciers melt into the ocean?
    a) The water levels rise!
2) Add ice cubes to the top of your slope, a floating object in the middle of your ocean, or in the ocean itself. These ice cubes represent ice sheets, glaciers, icebergs and land ice. Watch them as they melt.
    a) What happens as they melt?
3) Measure your sea level now that they are all melted. How different are the levels compared to what they were before? Record them in your water level chart.

Simulating high tide with glacial melt

1) Gently tilt the container towards the land to create high tide again. What does it look like? Higher or lower than it was before?
2) What are the impacts of rising sea levels on coastal environments?

Simulating coastal storms

1) With the water level rising, storms can add more destruction to coasts. Simulate this by rocking the container back and forth harder and create more action within the container. Where is the water going?
    a) How safe is your coastal landscape? Are your buildings protected still, or have some of them fallen apart?
    b) What does your coastal land look like, has it eroded or is it still in place?

High Tide Low Tide

Water Level Chart

	Ocean (cm)	High tide (cm)	Low tide (cm)
Water Level			
Glacial melt			
Distance from buildings to coast			

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Want to share your project or results with us?

Email or tag us @ScienceVenture

Have a question?

Reach us at svcamp@engr.uvic.ca