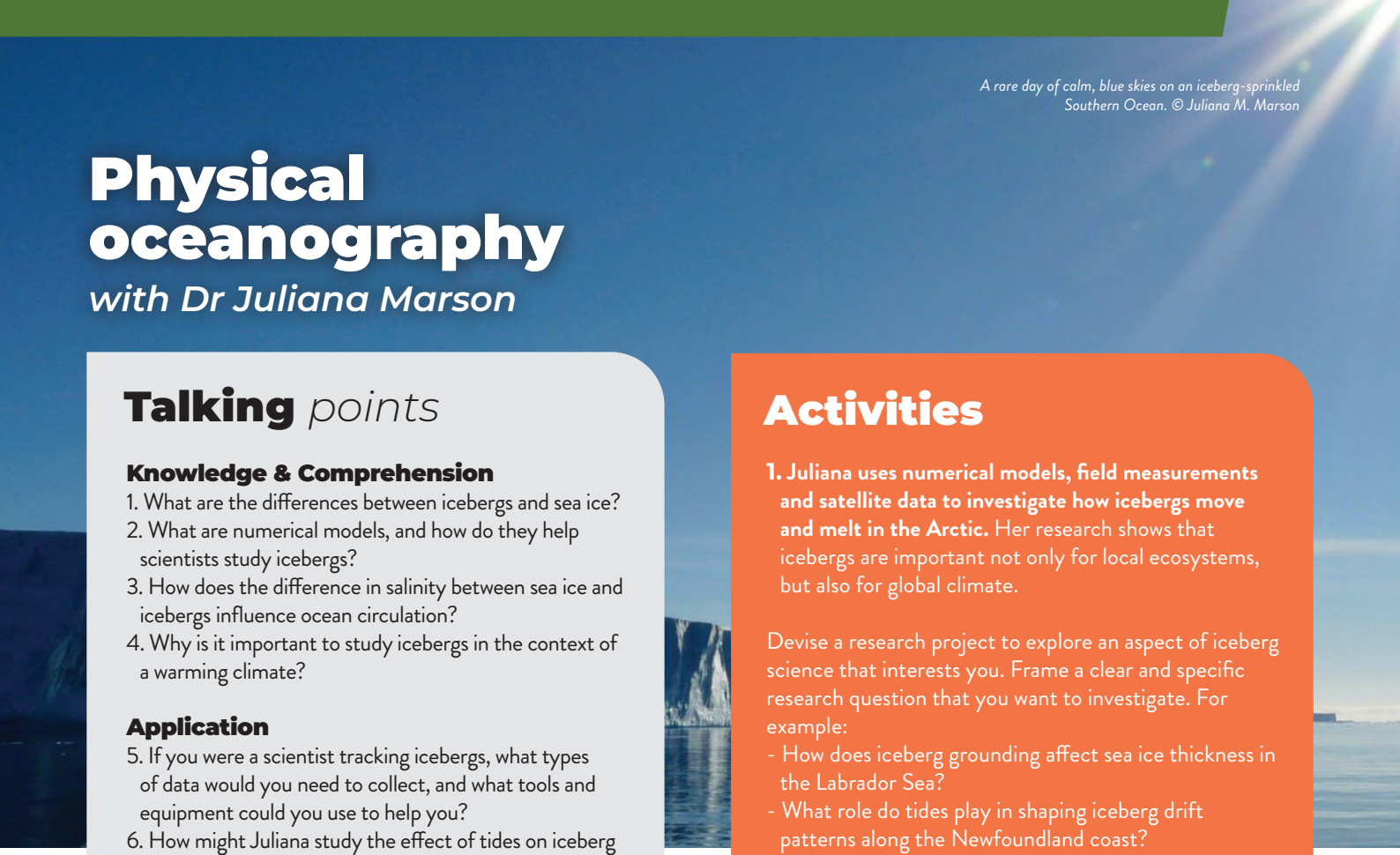

A rare day of calm, blue skies on an iceberg-sprinkled Southern Ocean. © Juliana M. Marson

Physical oceanography

with Dr Juliana Marson

Talking *points*

Knowledge & Comprehension

1. What are the differences between icebergs and sea ice?
2. What are numerical models, and how do they help scientists study icebergs?
3. How does the difference in salinity between sea ice and icebergs influence ocean circulation?
4. Why is it important to study icebergs in the context of a warming climate?

Application

5. If you were a scientist tracking icebergs, what types of data would you need to collect, and what tools and equipment could you use to help you?
6. How might Juliana study the effect of tides on iceberg movements?

Analysis

7. In what ways are numerical models of iceberg distributions similar to the models used for weather forecasting?
8. Why is predicting the exact path of an iceberg so challenging, and what factors make the task uncertain?

Evaluation

9. To what extent should those working in the Arctic and North Atlantic Oceans rely on numerical models of iceberg movements? What safeguards, additional data sources or stakeholder inputs could supplement these models?
10. Physical oceanographers can study the oceans using fieldwork or computer models. Which type of research appeals to you most? Which type of research are your skills most suited to?

More *resources*

- Read this article written by Juliana on how melting glaciers can affect the oceans and climate: **batepapocomnetuno.com/post/how-the-melting-of-glaciers-can-affect-the-oceans-and-climate**
- Read this interview to learn more about Juliana and her research: **news.umanitoba.ca/meet-dr-juliana-marini-marson-assistant-professor-in-the-department-of-environment-and-geography**
- Read this National Geographic article about Iceberg hunting in Newfoundland: **nationalgeographic.com/travel/article/newfoundland-coast-iceberg-alley**

Activities

1. Juliana uses numerical models, field measurements and satellite data to investigate how icebergs move and melt in the Arctic. Her research shows that icebergs are important not only for local ecosystems, but also for global climate.

Devise a research project to explore an aspect of iceberg science that interests you. Frame a clear and specific research question that you want to investigate. For example:

- How does iceberg grounding affect sea ice thickness in the Labrador Sea?
- What role do tides play in shaping iceberg drift patterns along the Newfoundland coast?
- How does iceberg meltwater spread differently compared with glacier meltwater, and what impact does this have on marine ecosystems?

Think about how you would collect data to answer your question. For example, consider different tools and approaches:

- **Fieldwork**: Would you place tracking beacons on icebergs, use drones to record their shape or measure nearby ocean properties with sensors?
- **Remote sensing**: Could you use satellite images to track iceberg paths or estimate melting?
- **Numerical models**: How might computer simulations help predict movements or melting patterns?

Consider the risks and difficulties of studying icebergs. How might these affect your project, and how could you overcome them? Suggest what you might find if you carried out your research. How would your results help scientists and communities?

2. Fill an ice cube tray with water and food colouring. When your ice cubes are frozen, fill two cups with water. Mix 4 tablespoons of salt into one of the cups. Place a couple of ice cubes in each cup and watch what happens.

Reflection questions

- How does the meltwater behave in each of the cups?
- Why does the meltwater behave in the way that it does?
- Which ice cubes melted first, and why?
- What are the implications of this experiment for the Arctic Ocean, icebergs and global climate patterns?