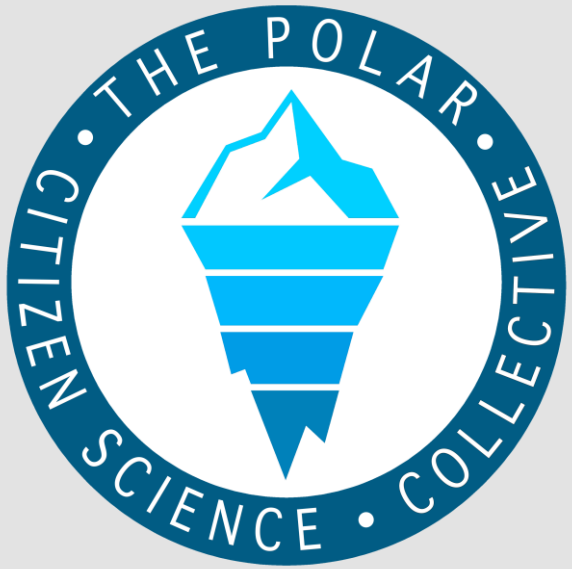
Using citizen science projects for monitoring – experiences from practical examples

Dr. Annette Bombosch – The Polar Citizen Science Collective

11. October 2023



Outline

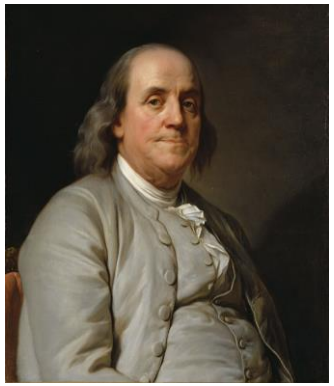
- Citizen Science explained
- Citizen Science in Antarctic Tourism
- 3 Case Studies
- Limitations & Opportunities

Citizen Science explained

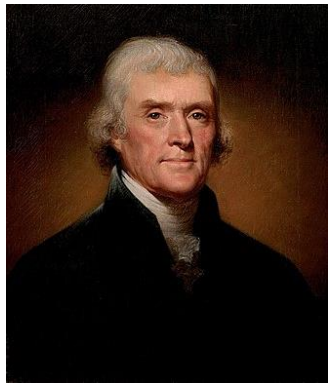
- Citizen Science = involvement of public in scientific research
  - Community science, crowd-sourced science, public participation in scientific research
- Involvement at various stages
  - Project design
  - Data collection
  - Data analysis
- Participation
  - Contribute to scientific research
  - Increases educational learning & scientific literacy

History of Citizen Science - Then

- Long history to at least middle of 18th century



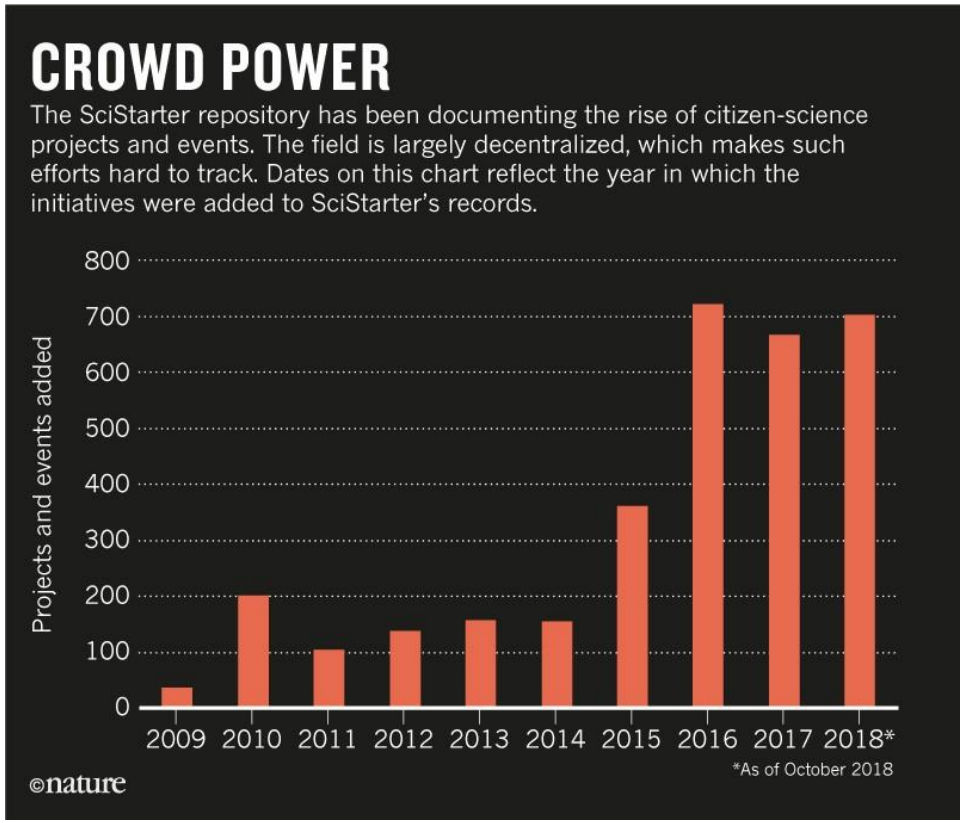
Benjamin Franklin
1706-1790



Thomas Jefferson
1743-1826

Florence Nightingale
1820 -1910

History of Citizen Science - Now



1900: 27 observers

2022: 76,880 observers

Citizen Science in Antarctic Tourism

- Beginnings ~2006/07
- Projects communicated via IAATO & IAATO FOM

The Polar Citizen Science Collective

Dr. Annette Bombosch
Expedition Guide
Science

Dr. Alex Cowan
Expedition Guide
Science

Lauren Farmer
Expedition Guide

Ted Cheeseman
Expedition Guide
Science

Bob Gilmore
Expedition Guide

Challenges:

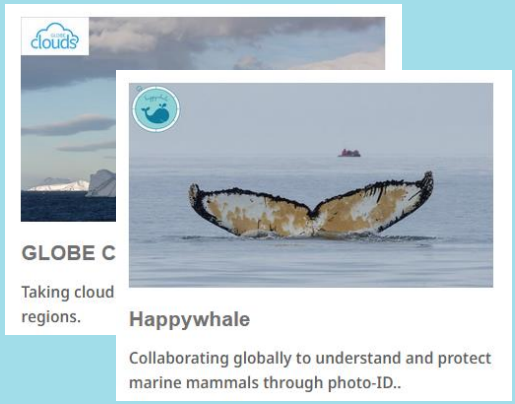
- Polar regions are remote
- Research time is limited
- Geographic coverage is limited
- Research is expensive

Opportunities:

- Utilize expedition cruise vessels as unique platforms of opportunity for research via Citizen Science
  - Increased spatial & temporal coverage
  - Reduced costs
  - Increased science outreach
- Contribute to informed management decisions & policy change

Stakeholders:

Scientists



Operators & Field Staff

POLAR LATITUDES
aurora expeditions
HURTIGRUTEN EXPEDITIONS
SWAN HELLENIC
Intrepid
PONANT
Bark Europa

Travellers

Partners:

IAATO

INTERNATIONAL ASSOCIATION ANTARCTICA TOUR OPERATORS
IAATO

SOOS

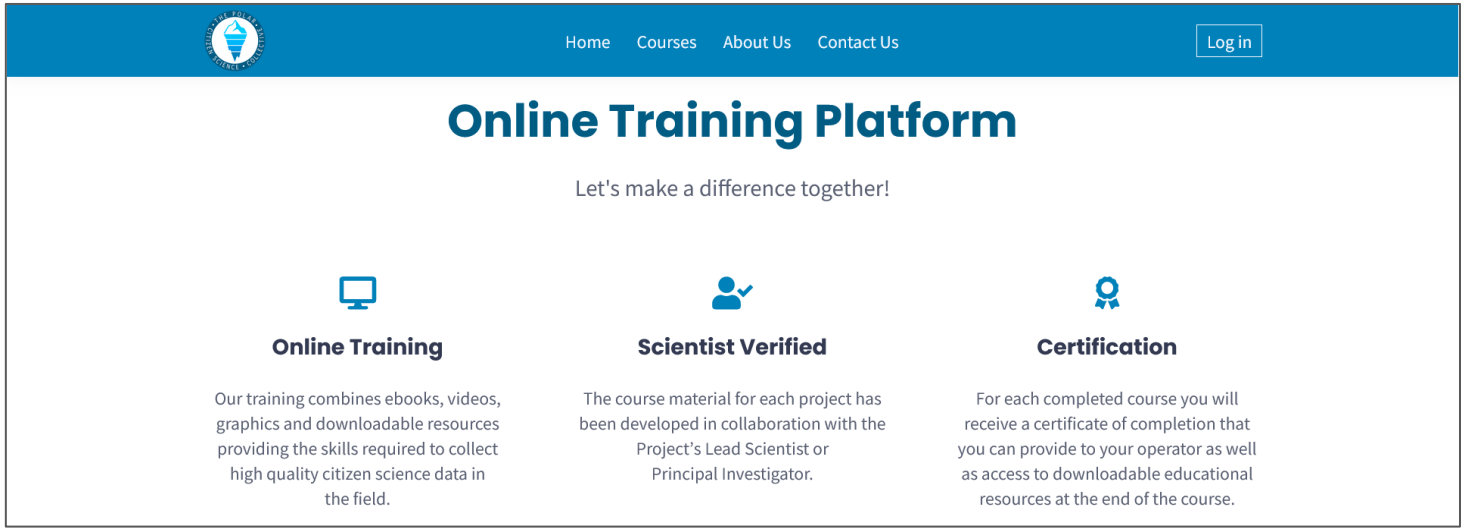
SOOS
SOUTHERN OCEAN OBSERVING SYSTEM

Scientists

- Collaborate to establish successful Citizen Science projects suited to polar tourism
- Vetting process
  - Relevance to polar science
  - Logistic feasibility
  - Educational component
  - Feedback
- Project training

Operators

- Collaborate for committed and successful Citizen Science Programme
  - Citizen Science on Antarctic voyages
  - Project selection
  - Project updates
- Training Platform



Travellers

- Science outreach
  - Education
  - Learning opportunities
- Scientific literacy
- Enriched travel experience

Case Study 1: Happywhale

Case Study 1: Happywhale

Case Study 1: Happywhale

1 Set

Set your camera to the local date and time. Turn on GPS if you've got it!

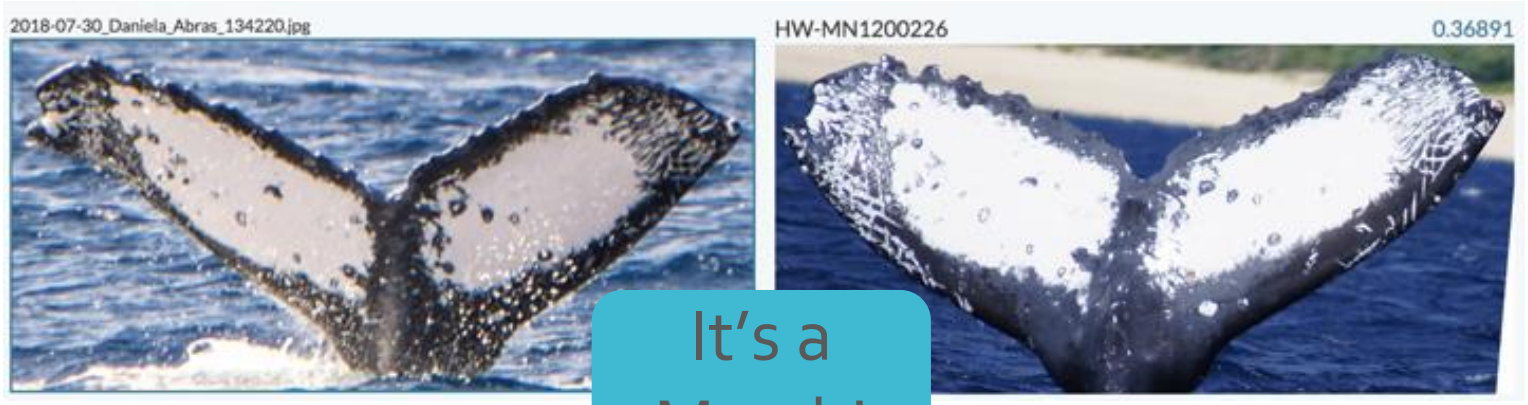
2 Photograph

Capture as many photos as you can clearly showing the ID features of the subject

3 Submit

Go to happywhale.com and upload **all** photos for each animal. For new users, an account will auto-generate.

Case Study 1: Happywhale
- Feedback



It's a Match!

Happywhale Notification Digest

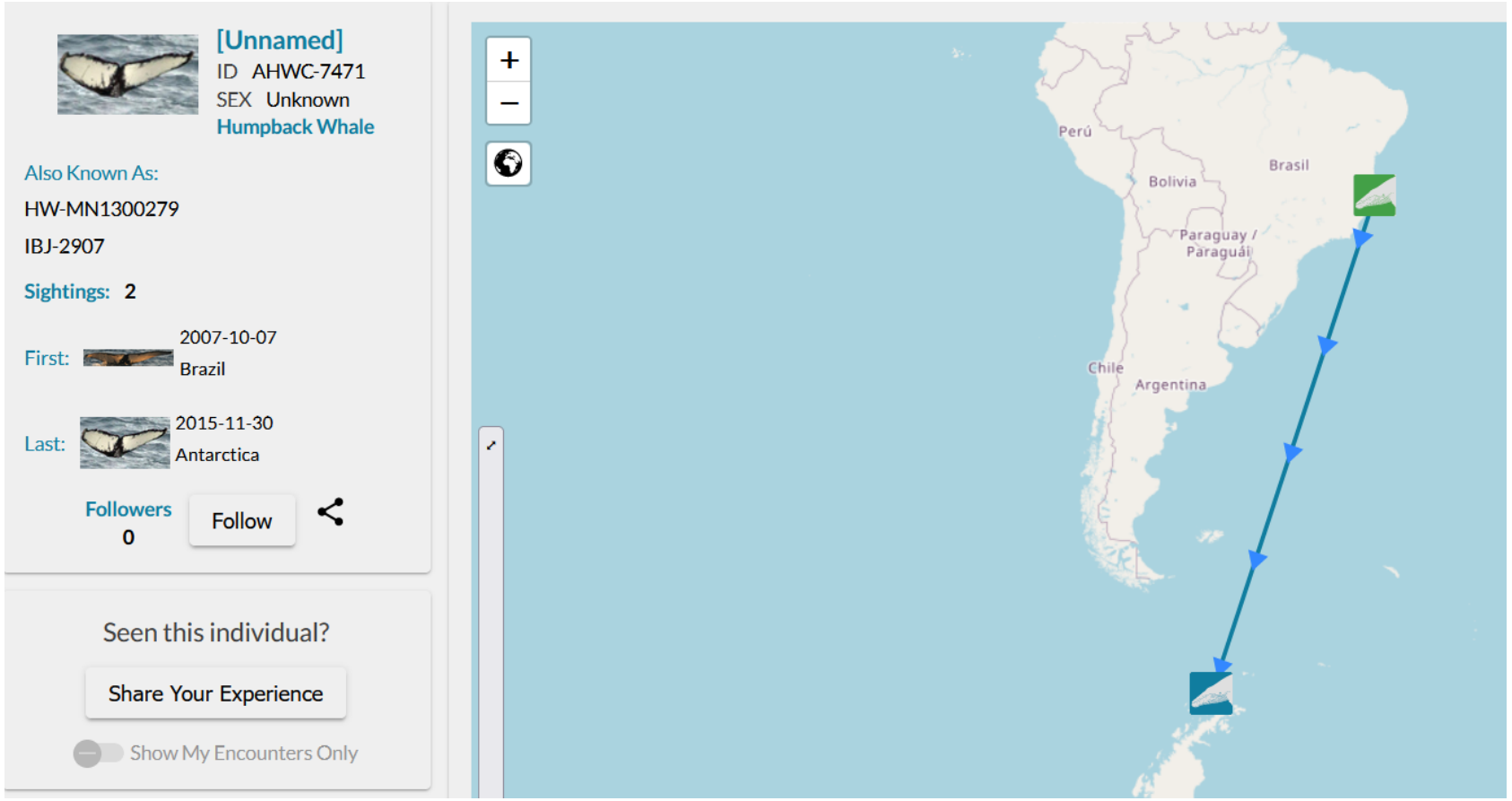
Humpback Whale HW-MN1304747 was identified in an encounter on Sunday December 25, 2022 in Antarctica! You last encountered this individual on Tuesday December 07, 2021 in Antarctica with Polar Latitudes.

THURSDAY OCTOBER 05, 2023 VIEW

POLAR LATITUDES

Case Study 1: Happywhale
- Feedback

- Meaningful wildlife experiences



Case Study 1: Happywhale
- Feedback

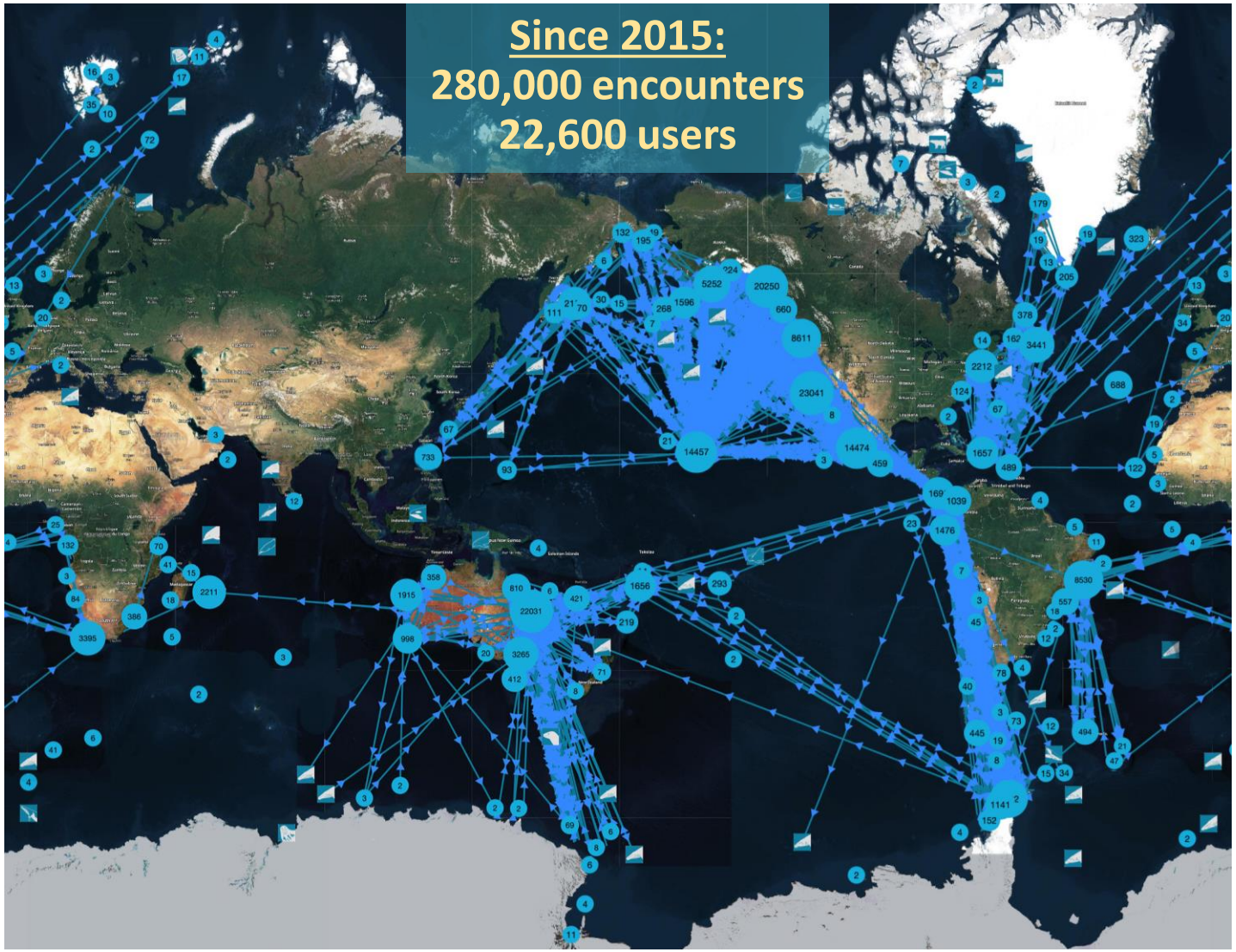
Alba - HW-MN1300329
https://happywhale.com/individual/6504?view=map

Raven - HW-MN1300482
https://happywhale.com/individual/6377?view=map

Oreo - HW-MN1300481
https://happywhale.com/individual/6376?view=map

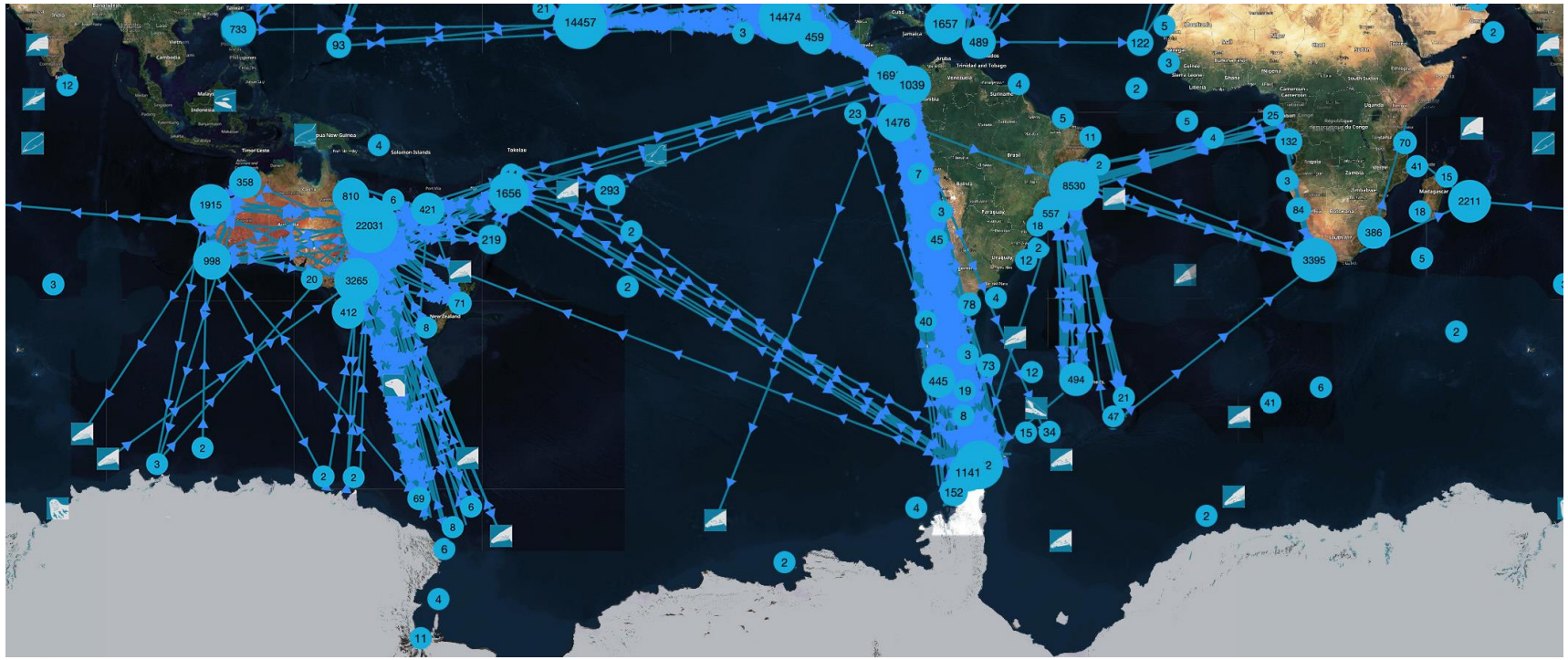
Nick - HW-MN1300327
https://happywhale.com/individual/6092?view=map

Case Study 1: Happywhale



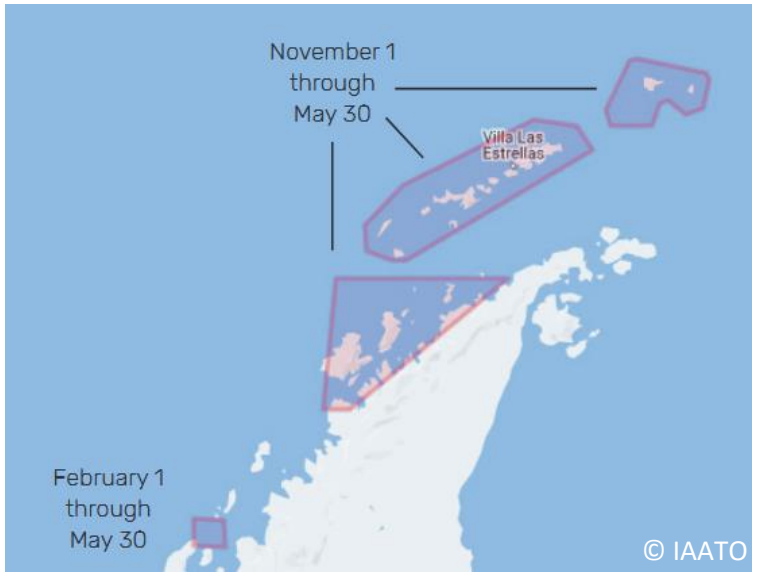
Case Study 1: Happywhale

- Antarctic Humpback whale catalogue
  - 2015: 700 individuals
  - 2022: > 6000 individuals



Case Study 1: Happywhale

- Contribution to science & management
  - > 30 papers published
  - Whale Slow Down Zones to avoid ship-strikes



Antarctic Peninsula

Case Study 2: GLOBE Clouds

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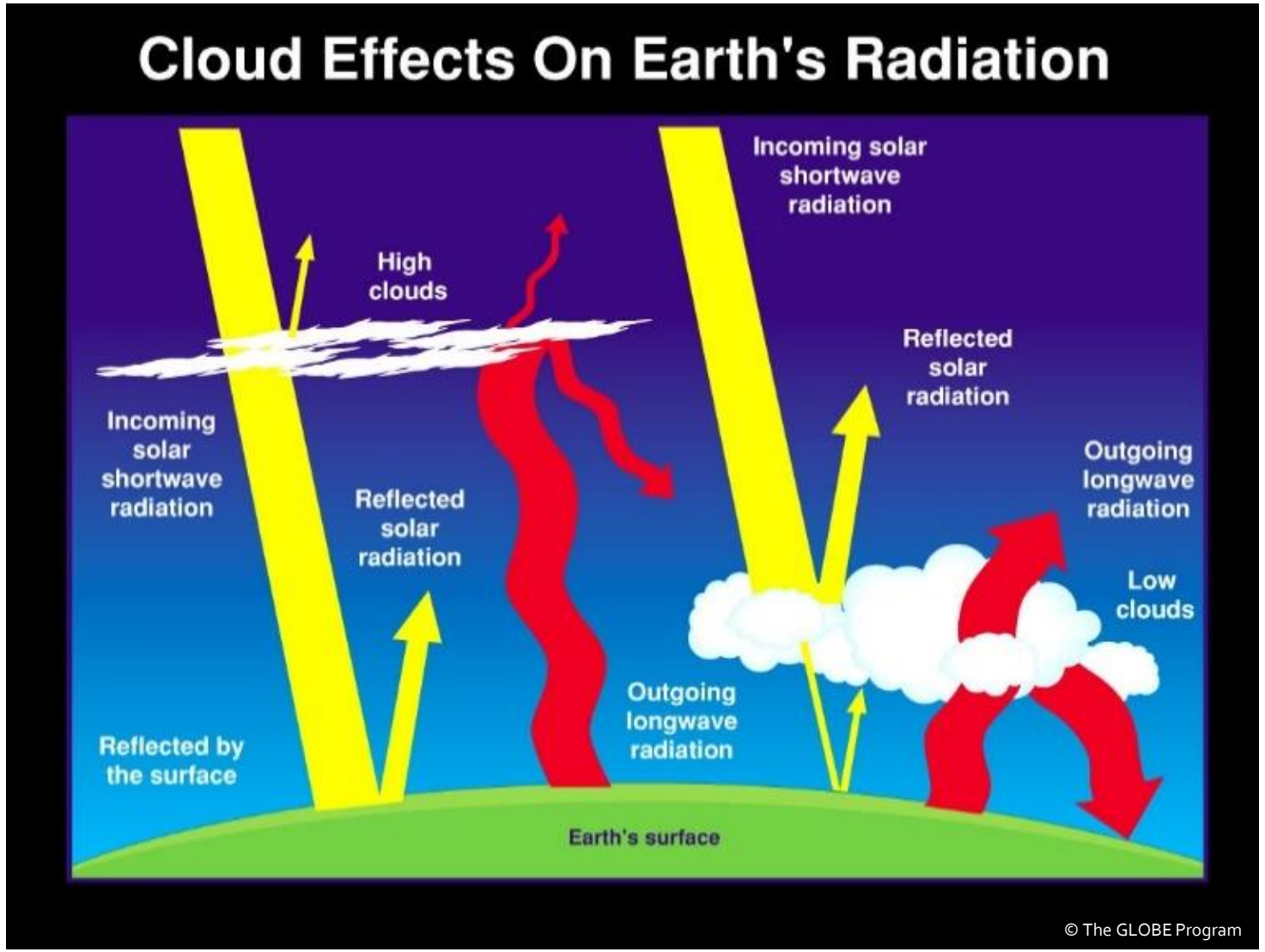

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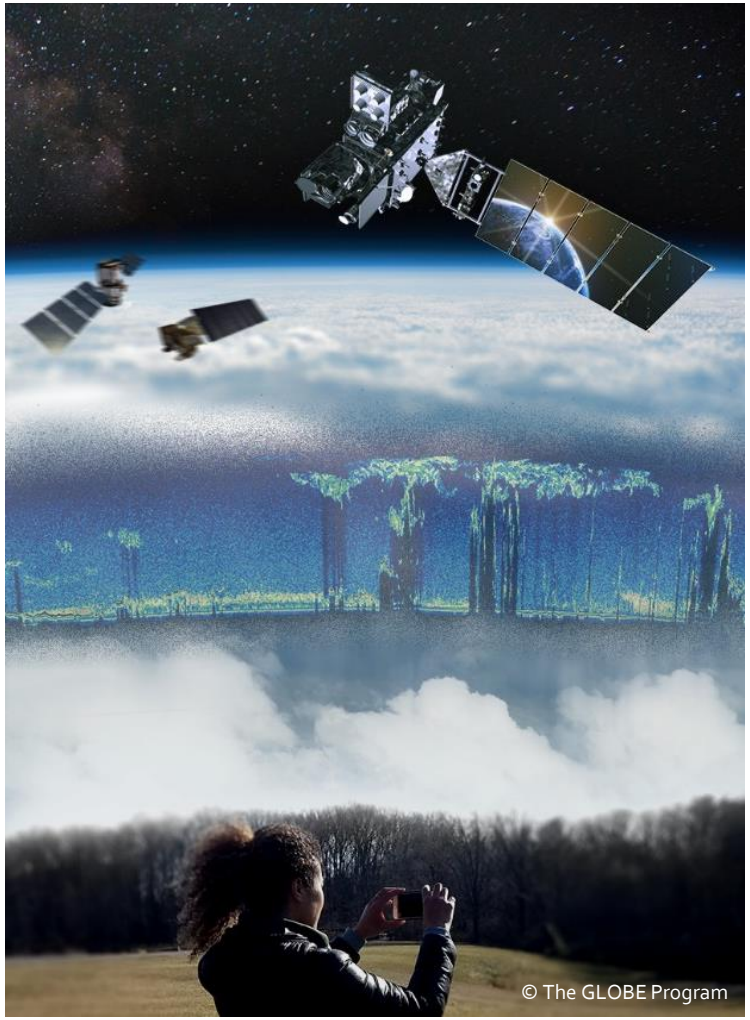
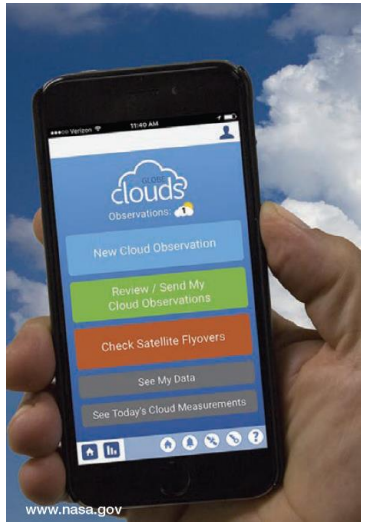
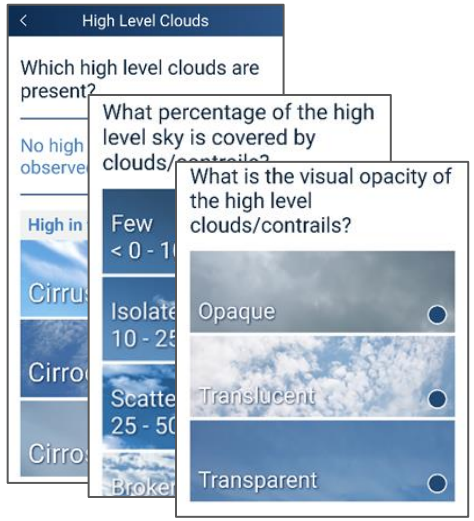
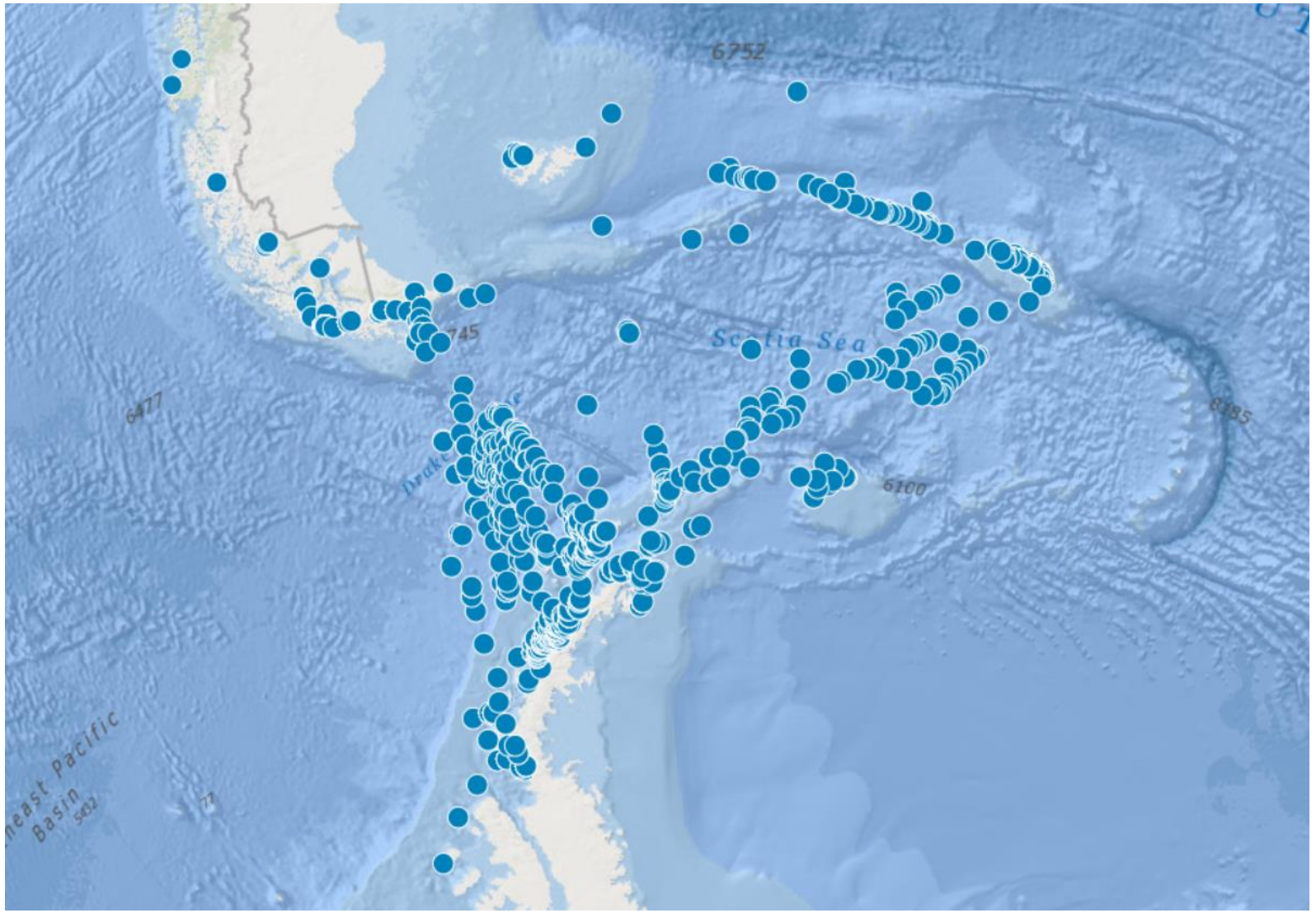






Case Study 2: GLOBE Clouds



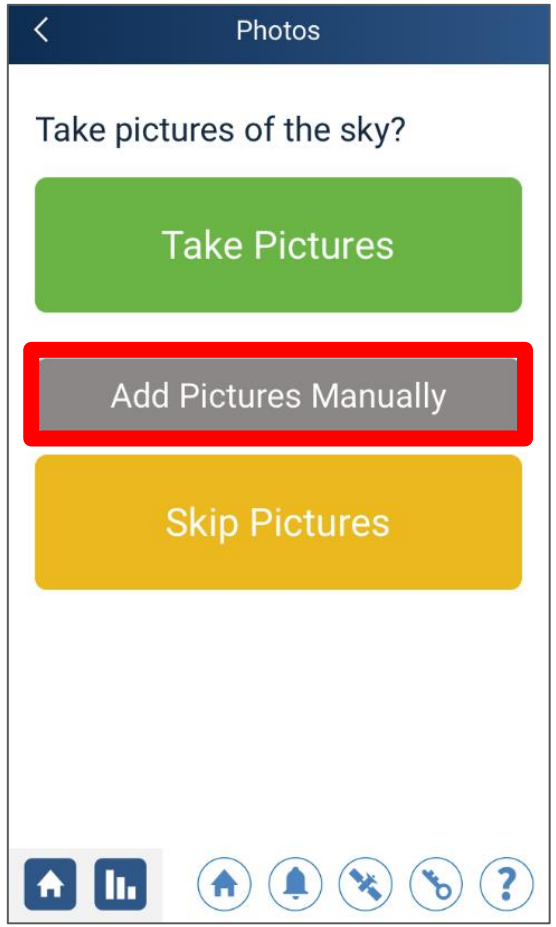
Case Study 2: GLOBE Clouds
- Feedback

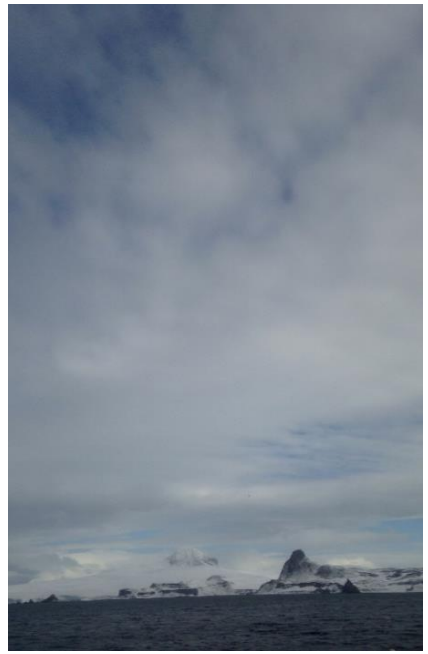
NASA Cloud Observation and Satellite Match

		Satellite (Understanding the Satellite Match)	**Terra**	**NOAA20**	**Your Observation**
Universal Date/Time 2023-09-10			20:15	20:17	20:14
Latitude Range Longitude Range			68.14 to 68.94 -111.26 to -110.46	68.09 to 68.89 -111.47 to -110.67	**Latitude 68.485400** **Longitude -110.985300**
Total Cloud Cover			Overcast 100.00%	Overcast 98.40%	**Overcast (>90%)**
HIGH	Cloud Cover Cloud Altitude Cloud Phase Cloud Opacity		Overcast 96.27% 6.95 (km) Mixed 244.61 (K) Transparent	Broken 79.61% 6.81 (km) Mixed 245.88 (K) Translucent	Cirrus Cirrocumulus Cirrostratus Overcast (>90%) Transparent
MID	Cloud Cover Cloud Altitude Cloud Phase Cloud Opacity		Few (3.73%) 4.03 (km) Water 261.02 (K) Translucent	Isolated 18.79% 4 (km) Mixed 261.06 (K) Translucent	
LOW	Cloud Cover Cloud Altitude Cloud Phase Cloud Opacity				
Corresponding NASA Satellite Images. Click to view image --->			***MODIS Terra*** Rapid Response Worldview	***VIIRS NOAA20*** Worldview	Sky Visibility : no report Sky Color : no report North East South West Up Down

Case Study 2: GLOBE Clouds

- Changes to methodology of data collection





Stratus

Fog

Case Study 3: Beetles vs Stones

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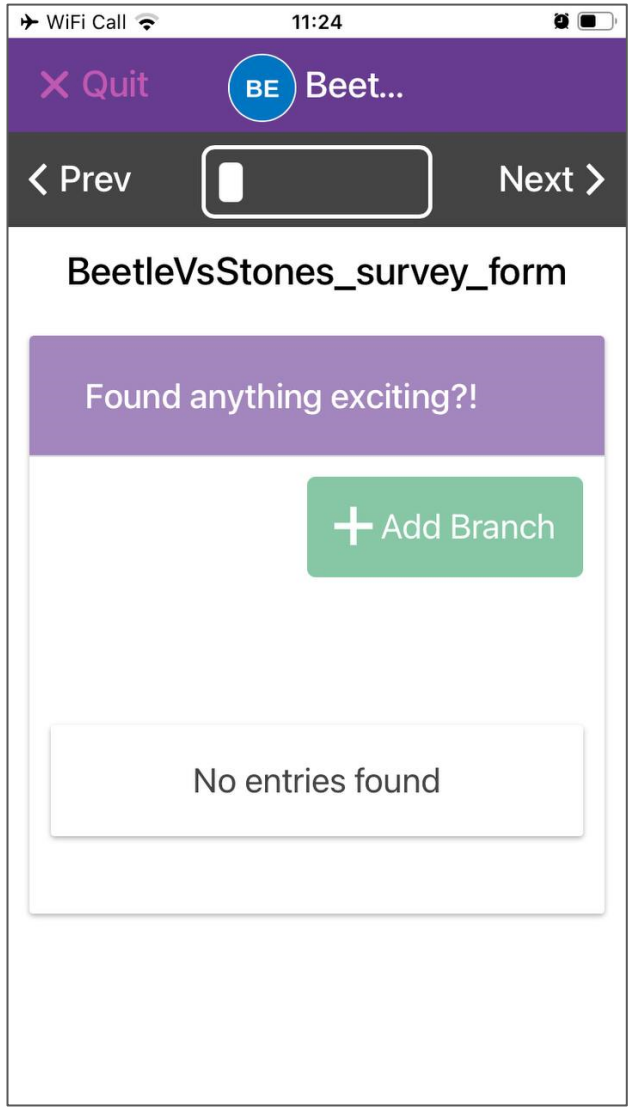
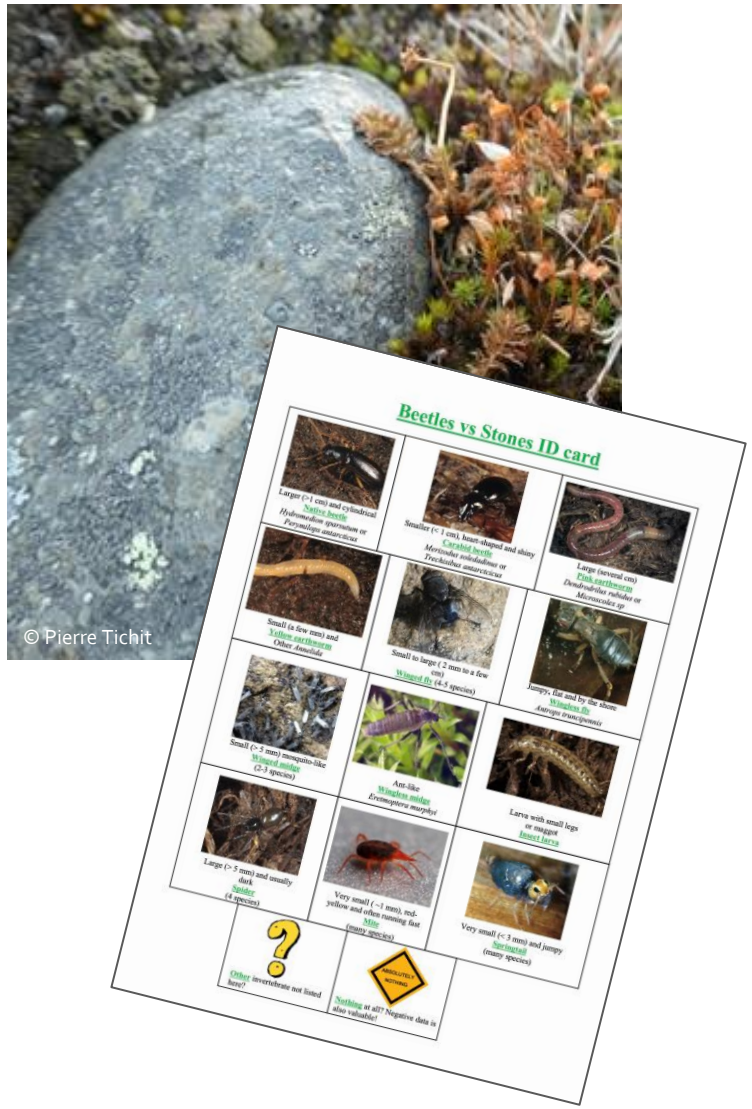
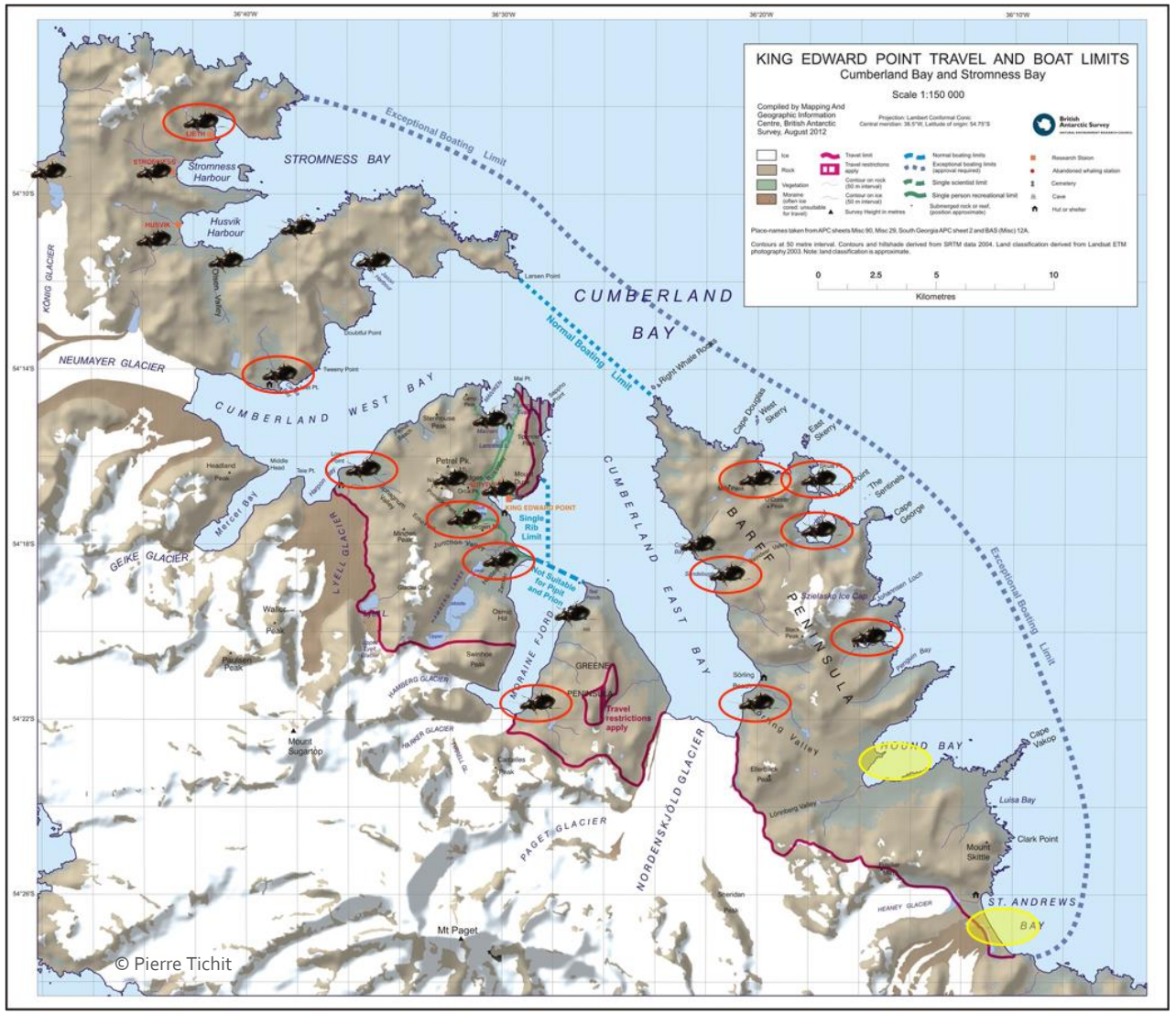




Case Study 3: Beetles vs Stones



Invasive beetles:

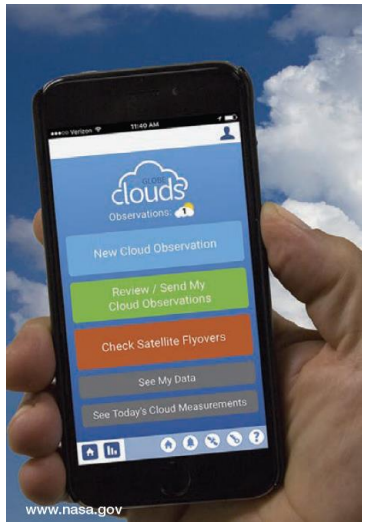
Present before 2022

Present 2022-2023

Absent 2022-2023

Success story

- Simple
  - Easy & robust data protocol
  - Easy to use & affordable equipment
- Education & learning opportunities
- Feedback
- Advance scientific knowledge

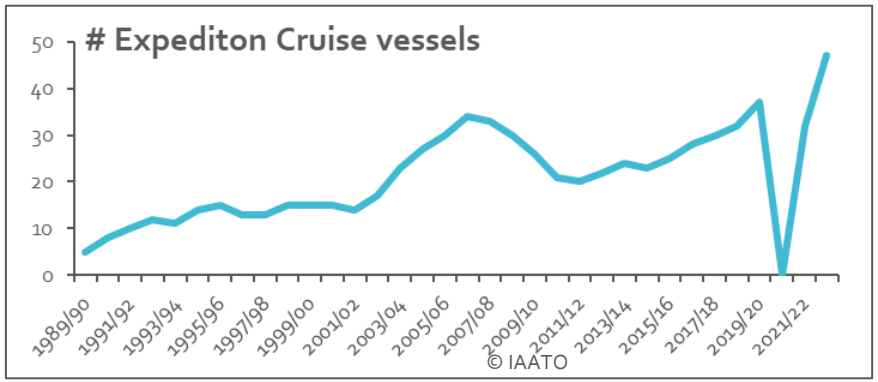


Limitations

- Project complexity
  - Specialized data protocols
  - Extended time for data collection
  - Extensive/delicate equipment
- Not suitable for all project topics
- Only visited sites are surveyed

Opportunities

- Unique platforms of opportunity
  - Large amount of data collection possible
  - Extended spatial & temporal coverage
  - Reduced costs
- General willingness of operators, guides and travellers to make positive impact
- Contribute to protection of Antarctica together



THANK YOU - Questions?