

Practical use of risk assessment tools in the field



UC DAVIS
UNIVERSITY OF CALIFORNIA





Abbey Dias

Assistant Diving and Boating Safety
Officer

UC DAVIS
UNIVERSITY OF CALIFORNIA





James Fitzgerald
UC Davis Boating Safety Officer



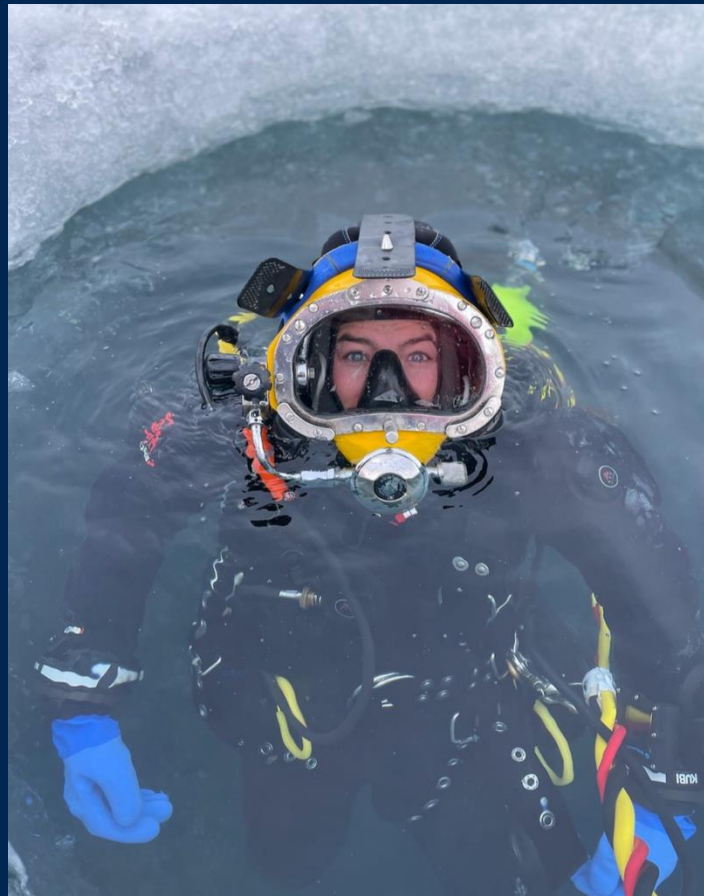
Jason Herum
UC Davis Diving Safety Officer



Greg Flederman
Assistant Diving & Boating Safety Officer

Journey of taking risks...



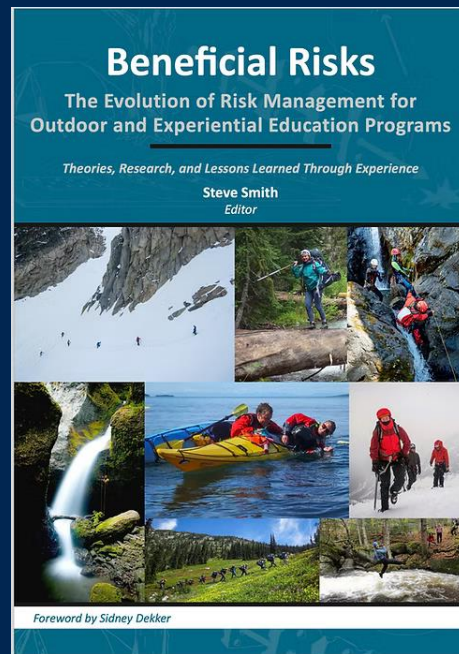


Group question:

What is risk?

Beneficial Risks by Steve Smith

- Risk often talked about as negative thing to be eliminated and avoided
- “Risk is uncertainty, with potential for both loss and gain”



Beneficial Risks by Steve Smith

- Risk often talked about as negative thing to be eliminated and avoided
- “Risk is uncertainty, with potential for both loss and gain”



<https://www.youtube.com/watch?v=A3E7VmDkGRw>

YouTube: Steve Smith, Experiential Consulting, on Safety II & Optimizing for Beneficial Risk (2023)

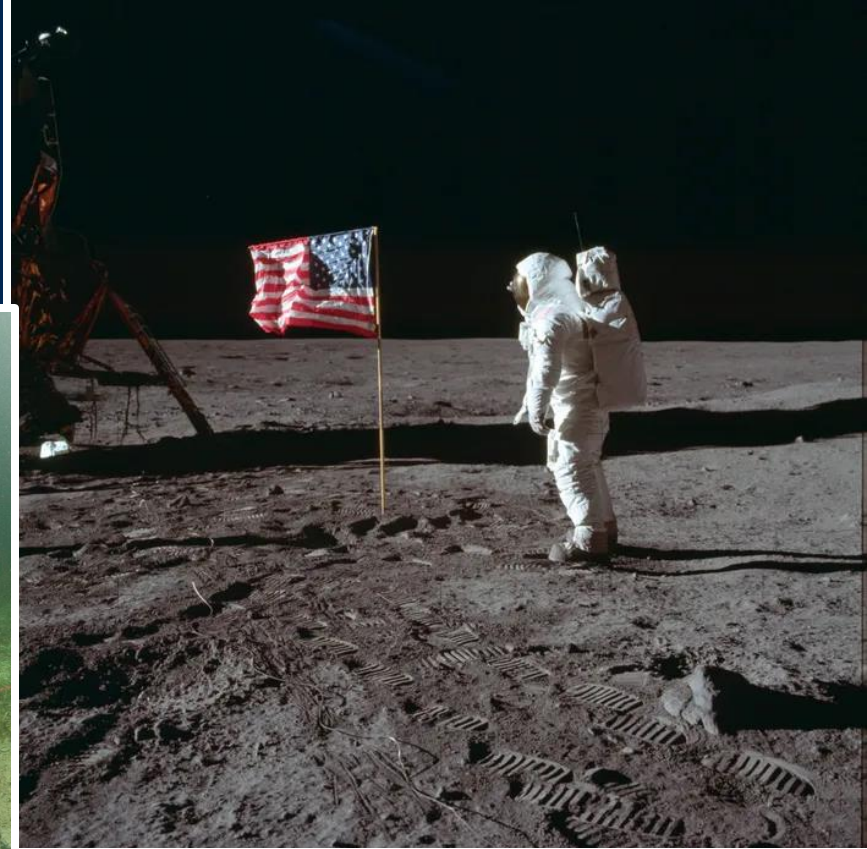
Group question:

What is safety?

“Freedom from the risk of harm”



What does safety mean?







Scientific goal:

Understand how the microbial life persists in this harsh environment and how it responds to changes





Lake Fryxell, McMurdo Dry Valleys Antarctica











KING
JULIAN
JOFFREY
QUEEN CYNTHIA

SUBJECTS

TAYLOR
GABRIEL
PABLO
COOY - '01'

STELLA

GARTH

FREE
GARTH!

U.S. ANTARCTIC
PROGRAM



ALL THE WAY

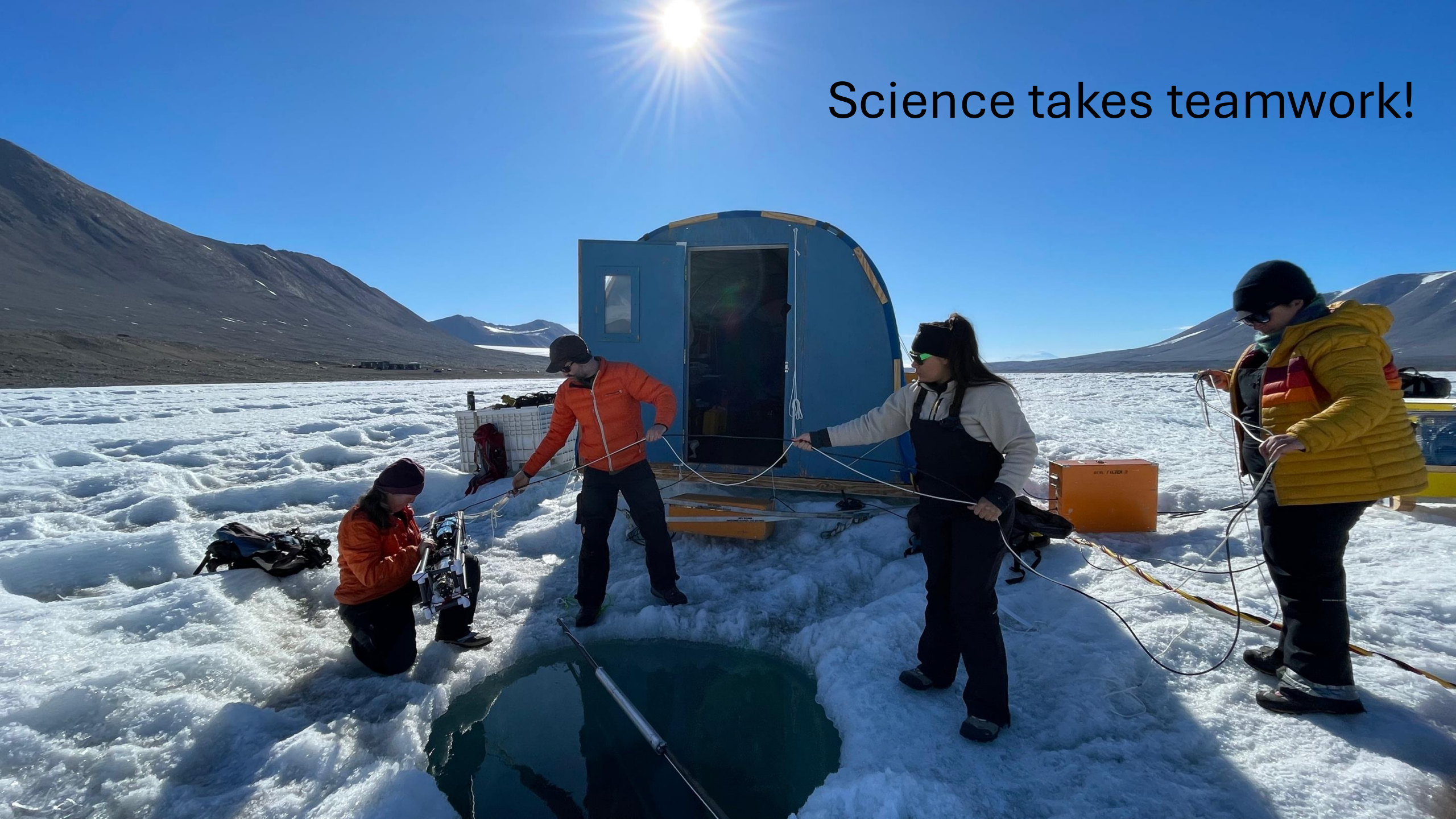
IN!!



PUSH IN!!!



Science takes teamwork!



Group Question:

What are some attributes of a good team?

F 10th E: H₂S spots in, GM Core; A: Shades to trans, GoPro swap, float sampling (+ shade swim)
 T: Shades x 2, ABC placed, 2 box samples

S 11th Tana 2pm: T: 1 shade set, hobo, ^{loop} 6 stakes for RNA, E: Falcon tube, diatom collection
 A: 1 shade set, finger entrapment

S 12th - day off

M 13th E: H₂S spots out; Core of deeper GM ^{loop} 2 porewater cores
 + 2 small cores, syringe
 I: Xmas? collect Hobo stakes
 T: 2 shades, RNA
 A: Hobos + RNA

T 14th E: H₂S gradients + biomass; T: Biomass + porewater cores if time I: Shade locations photos
 J: mark shade + RNA locations
 A: RNA/shades 4x 9.1
 T: porewater + 1/2 + LICOR 4m
 A: 8m biomass + finger core to freeze + box

W 15th E: HC core for O₂ @ 9.6m
 J: mark shade + RNA locations
 T: overwinter @ shades (later)
 Benthic H₂O, sm cores
 A: RNA + shades 4x 9.1
 Tana: Lander + profiles
 I: 9.6
 A: RNA shallow, 4.3 DNA

F 17th E: pm gradient probes GM
 T: post liftoff cores + LICOR RNA
 A: RNA shallow, 4.3 DNA

S 18th E: core for optode profile, biomass ADCP
 + 5 RNA falcon tubes

Water column + ice exp. Planning + deploying

Chuck imaging

Chuck click-click

Hobo DO @ 9.6 different morphs

Hobo DO * - 9.6

Tues 14

A: 8m liftoff DNA; finger core; liftoff box
 T: Biomass + pore water cores if time
 I: Shade location photos, scouting 9-9.1, 9.5-9.6, DRP
 E: H₂S Gradients in, biomass, small cores (Probes, stake, GM Rack)

Wed 15

9am E: HC core @ 9.6m D: make shades
 I: Instr. Shades, flags for shades, 2 stakes for RNA x 2, maybe 3 shades mini DOTS on transect @ 9.6 + 9.1
 3pm T: 1/2 biomass, porewater cores, 4m L-COR-sala flash @ each change
 A: 3 shades + RNA from 9.6m

ADCP Planning

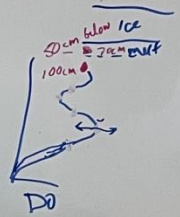
Trash collection

Thu 16

A: RNA @ 9.6, back to DH, ^{Bag on down line} DNA liftoff @ 4.3 = RNA falcon
 E: small cores + biomass + RNA GM
 T: Benthic H₂O, mini cores, mini DOTS, under shades c, f
 I: Lander + Unisense in (5 people) + MINIPAR or L-COR

Fri 17

I: Lander/profiles +3 E
 E: H₂S probes, GM biomass +2A
 A: Bubble photos +2-3 E/I
 T: dirty laundry + arcs +3 I/A
 Sat 18th I: mini DOTS, OFPs, Hobo DO +4 T



Row Click-Click Survey Tube Pattern hunt

Tape side



LAKE FRYXELL DIVE TEAM GAR

Jan 4 2024

PLAN	Specificity/Hazards/Path to Success/Emergency Action Plan	6
RESOURCES	Equipment/Food/Water/Support/Comms/Reb access	4
FITNESS	Physical/Mental/Emotional	4
ENVIRONMENT	Wind/Ice/Temperature/Sun	6
COMPLEXITY	Taskload/Overall Complexity	7
TOTAL RISK SCORE		27

1	15	16	29	30	40
GREEN	AMBER		RED		
(Low Risk)	(CAUTION)		(HIGH RISK)		



GAR Risk Calculation Worksheet

{Green – Amber – Red}

THE GAR IS BASED ON A TEAM DISCUSSION TO UNDERSTAND THE MISSION AND EVALUATE THE RISKS INVOLVED AND HOW THEY WILL BE MANAGED.

ACCURATELY ASSESSING AND MANAGING THE RISKS IS WHAT IS IMPORTANT; NOT THE ABILITY TO ASSIGN NUMBERS AND COLORS, THEY ARE TOOLS TO HELP YOU FACTOR AND QUANTIFY THE RISKS!

Assign a risk code 1 (minimal risk) through 10 (maximum risk) to each of the eight elements below.

The discussion should start with the least experienced member speaking about the perceived risks for each category and should include the opportunity for team members to ask questions.

SUPERVISION: <i>off-site management / field leader(s) / qualifications / experience / communication clarity</i>	
PLANNING: <i>details / clarity / emergency action plan / hazards / transportation / route planning / float plan</i>	
CONTINGENCY RESOURCES: <i>available emergency services / food & water / First Aid / shelter / evacuation</i>	
COMMUNICATIONS: <i>two way radios / cell phone / satellite phone / locator beacons & transponders</i>	
TEAM SELECTION: <i>training / qualifications / experience / aptitude / abilities / functionality / liabilities</i>	
TEAM FITNESS: <i>physical fitness / mental and emotional state / health concerns / rest & fatigue cycles</i>	
ENVIRONMENT: <i>Weather- temperature, wind, visibility, precipitation / terrain / water / remoteness / heights</i>	
EVENT & EVOLUTION COMPLEXITY: <i>details / step-procedures / task load / number of people-agencies</i>	
TOTAL RISK SCORE: <i>Combine the risk score for each element and apply score to GAR evaluation scale.</i>	

If there is a risk score of **8 or higher** in any category, the mission may need to be canceled, rescheduled or delayed until proper resources, personnel and mitigation factors can be employed, consider not mobilizing assets and personnel, or sheltering in place.

GAR Evaluation Scale – Color Coding the Level of Risk

0	15	32	33	40	56	57	60	80
GREEN			AMBER			RED		
(Low Risk)			(Caution)			HIGH RISK		

If the total falls in the **GREEN** zone risk is minimum, avoid becoming complacent.

If the total falls in the **AMBER** zone risk is moderate, adopt procedures and precautions to minimize the risk.

If the total falls in the **RED** zone **avoid activating the mission** until procedures, personnel and resources can be implemented or conditions change that will reduce the risk.

Green – Amber – Red

If the Risk Assessment determines high or unacceptable levels of risk, the control options below may help determine if the risks can be reduced to an acceptable level, or controlled for a period of the mission.

CONTROL OPTIONS

- **Spread-out:** Disperse the risk by increasing the amount of time between events, or by utilizing additional people, resources or assets.
- **Transfer:** If practical locate a better equipped team, asset or location to accommodate the mission.
- **Avoid:** Circumvent the hazard- wait for the risk to subside. (weather change, daylight, increased visibility)
- **Accept:** In some situations the benefit may be to accept the risk. In this situation thresholds need to be reevaluated and the level of risk monitoring and safety observer oversight must also increase.
- **Reduce:** Implement risk reduction. (PPE, additional training, rest and fatigue and stress reduction, remove time constraints or budgetary restrictions)

https://www.youtube.com/watch?v=OW52afLY_Dg&list=PLZeWXr79bI34s63aGvaxqvFxaDabXw_XH&index=2

James Fitzgerald on USCG GAR

GAR Risk Calculation Worksheet

{Green – Amber – Red}

SUPERVISION: *off-site management / field leader(s) / qualifications / experience / communication clarity*

PLANNING: *details / clarity / emergency action plan / hazards / transportation / route planning / float plan*

CONTINGENCY RESOURCES: *available emergency services / food & water / First Aid / shelter / evacuation*

COMMUNICATIONS: *two way radios / cell phone / satellite phone / locator beacons & transponders*

TEAM SELECTION: *training / qualifications / experience / aptitude / abilities / functionality / liabilities*

TEAM FITNESS: *physical fitness / mental and emotional state / health concerns / rest & fatigue cycles*

ENVIRONMENT: *Weather- temperature, wind, visibility, precipitation / terrain / water / remoteness / heights*

EVENT & EVOLUTION COMPLEXITY: *details / step-procedures / task load / number of people-agencies*

TOTAL RISK SCORE: *Combine the risk score for each element and apply score to GAR evaluation scale.*



NEW LAKE FRYXELL DIVE TEAM GAR

DEC 30 2024

PLAN Specificity/Hazards/Risk to science /Emergency Action plan	6
RESOURCES Equipment/food/water/support/ comms/Helo access	4
FITNESS physical /mental /Emotional	5
ENVIRONMENT wind/ice/temperature /sun	6
COMPLEXITY task load /overall complexity	6
TOTAL RISK SCORE	27

1	15	16	29	30	40
GREEN (LOWRISK)		AMBER (CAUTION)		RED (HIGH RISK)	

Group question:

What are unique factors to consider during a risk assessment of your work?



LAKE FRYELL DIVE TEAM GAR

Jan 18 2025

PLAN	specificity/hazards/risk to scenario / Emergency Action Plan	6
RESOURCES	Equipment/food/water/support/Comms/Help access	4
FITNESS	Physical / Mental / Emotional	7
ENVIRONMENT	wind/ice/temperature / sun Dive site cond. / Boat Boat	7
COMPLEXITY	task load / overall complexity	6
TOTAL RISK SCORE		30

1	15	16	29	30	40
GREEN (Low Risk)	AMBER (CAUTION)	RED (HIGH RISK)			

shift roles, accept risk

Jan 18 2025

PLAN	Specificity/Hazards/risk to science /Emergency Action plan	6
RESOURCES	Equipment/food/water/support/ comms/Helo access	4
FITNESS	physical/mental/emotional	7
ENVIRONMENT	wind/ice/temperature/sun Dive Hole cond./Moat Boat	7
COMPLEXITY	task load /overall complexity	6
TOTAL RISK SCORE		30

1	15	16	29	30	40
GREEN (LOW RISK)		AMBER (CAUTION)		RED (HIGH RISK)	

Shift rules

If our goal is to promote inclusion, good science and work, within a positive environment...

Risk assessments alone likely will not produce the desired outcome.

Practically implementing a risk assessment requires building a foundation of shared values with commitment growth and learning.

Group question:

What do you value in a learning/working environment?

SAFE Learning Environment

Supportive - Accepting - Focused - Engaging

https://www.youtube.com/watch?v=--96Mtwzdxi&list=PLZeWXR79bl34s63aGvaxqvFxaDabXw_XH&index=1

**UC Fieldwork Toolkit Webinar (2020):
Safe Learning Environment by Chris Lay**



UC Davis
Boating & Diving Safety Program

“Dedicated to Providing a S.A.F.E. Learning Environment”

Supportive - Accepting - Focused - Engaging

Instructor Pledge:

We dedicate ourselves to delivering excellence and are motivated by learning with our students.

We are accountable for respectable and ethical conduct in the classroom and in the field.

We will conduct ourselves with honesty, integrity and personal responsibility.

We strive to create and maintain an environment that builds meaningful relationships among our students, staff and community partners.

We challenge ourselves to be innovative in our pursuits that will enhance and build a robust and rich learning environment, one that is built on quality communication, diverse experiences, acceptance of new ideas and creative solutions.

We strive to provide an optimal course setting and instructional support to help achieve your personal goals.

Our goal is to provide a S.A.F.E. Learning Environment that invites participation, values each individual's contributions and provides inclusive equity for ALL of our participants while serving their academic and vocational pursuits in spirit with the UC Principles of Community.

Our instructional commitment is to YOU. We value your input and ask that you share your individual needs and expectations to have success in the learning environment.

Please list and share the things you find important and helpful in providing you with a “S.A.F.E. Learning Environment” and which contribute to each participant's success!

James Fitzgerald
Boating Safety Officer
jffitzgerald@ucdavis.edu

Jason Herum
Diving Safety Officer
jsherum@ucdavis.edu

Greg Flederman
Assistant Boating & Diving Safety Officer
gfllederman@ucdavis.edu

Abbey Dias
Assistant Boating & Diving Safety Officer
asdias@ucdavis.edu

Action Items

PIs/Leaders: Develop an agreement

Students: What do you value?

Post/Grad students/Techs: How can you foster this?

**UC Davis
Boating & Diving Safety Program**

"Dedicated to Providing a S.A.F.E. Learning Environment"

Supportive - Accepting - Focused - Engaging

Instructor Pledge:

We dedicate ourselves to delivering excellence and are motivated by learning with our students.

We are accountable for respectable and ethical conduct in the classroom and in the field.

We will conduct ourselves with honesty, integrity and personal responsibility.

We strive to create and maintain an environment that builds meaningful relationships among our students, staff and community partners.

We challenge ourselves to be innovative in our pursuits that will enhance and build a robust and rich learning environment, one that is built on quality communication, diverse experiences, acceptance of new ideas and creative solutions.

We strive to provide an optimal course setting and instructional support to help achieve your personal goals.

Our goal is to provide a S.A.F.E. Learning Environment that invites participation, values each individual's contributions and provides inclusive equity for ALL of our participants while serving their academic and vocational pursuits in spirit with the UC Principles of Community.

Our instructional commitment is to YOU. We value your input and ask that you share your individual needs and expectations to have success in the learning environment.

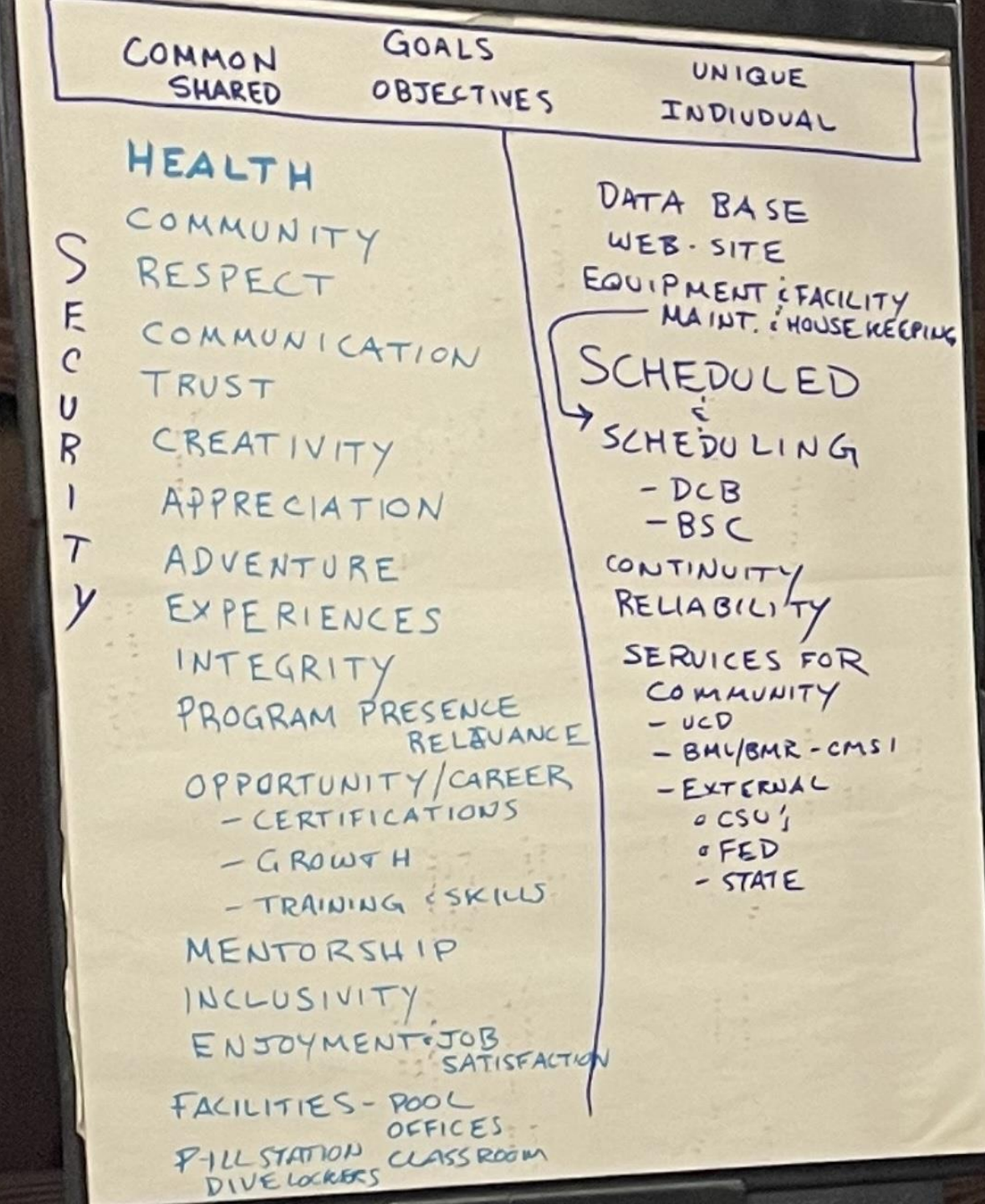
Please list and share the things you find important and helpful in providing you with a "S.A.F.E. Learning Environment" and which contribute to each participant's success!

James Fitzgerald
Boating Safety Officer
jffitzgerald@ucdavis.edu

Jason Herum
Diving Safety Officer
jsherum@ucdavis.edu

Greg Flederman
Assistant Boating & Diving Safety Officer
gflerman@ucdavis.edu

Abbey Dias
Assistant Boating & Diving Safety Officer
asdias@ucdavis.edu



Equipment proficiency



Pls/Leaders: Dedicate time to covering basic safety info/tools, money for training

Students: Ask questions about equipment

Post/Grad students/Techs: Facilitate information transfer

Group question:

What training excites you?



Encourage leadership

PIs/researchers: Encourage students to run risk assessment/briefings/debriefings

Students: Ask for opportunities to learn under supervision

Post/Grad students/Techs: Mentorship in low stakes scenarios

Normalize briefing and debriefing!

Briefings:

Include risk assessment, set expectations, define roles

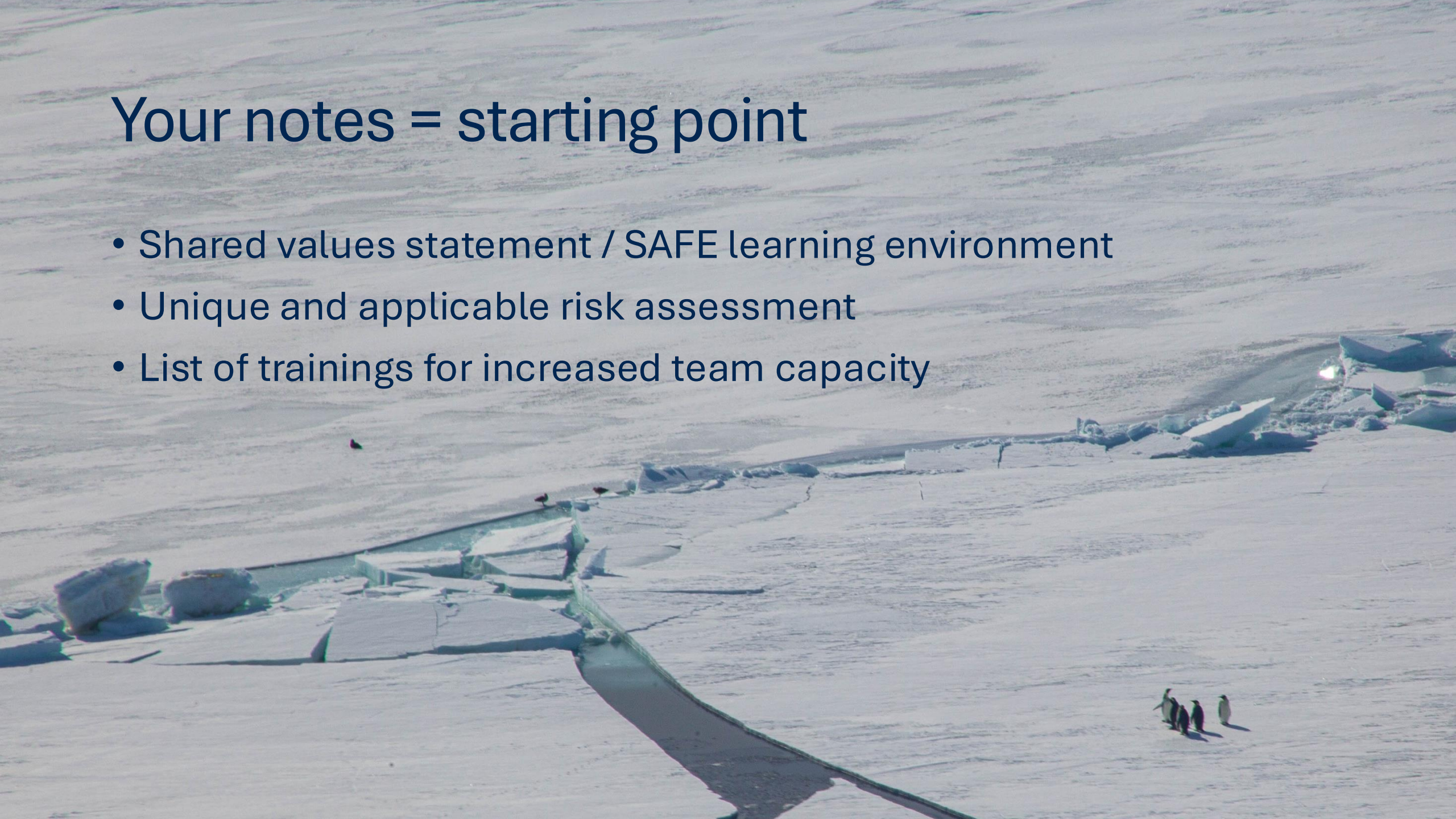
Debriefing:

Timely, specific, non-punishing



Your notes = starting point

- Shared values statement / SAFE learning environment
- Unique and applicable risk assessment
- List of trainings for increased team capacity





Thank you!



UC DAVIS
EARTH AND PLANETARY SCIENCES



A wide-angle landscape photograph of a high-altitude environment. In the foreground, a dark, rocky shoreline leads to a calm lake that perfectly reflects the sky and the surrounding terrain. The middle ground features a long, white glacier flowing across a brown, rocky plain. In the background, several jagged mountain peaks are partially covered in snow under a vibrant blue sky with wispy white clouds. The overall scene is serene and majestic.

Questions?