Outreach in Novara – Program of the Event

Where: Liceo Classico "Carlo Alberto", Novara, Italy
When: Feb 22nd, 2024
Involved DCs:

- Ajmar Marco (DC7) - German Research Centre for Geosciences, Potsdam, Germany
- Cuzzeri Alessandro (DC1) – University of Innsbruck, Austria

Audience: ~ 40 5th grade high school students
Language: italian
Event Title: "Glacial Ecosystems and Climate Change: today's situation and future perspectives"

Abstract: The two-hour presentation focused on three main themes: firstly, a scientific introduction to glacial systems, including the macro and microscopic communities they host and the diversity of habitats characterizing such systems, before moving on to their functionality and importance (DC1). The second part mainly addressed climate change, explaining what it is, how the IPCC operates, the most critical consequences of glacier melting, and the concept of sustainability (DC7). The third and final part was about orientation: discussing our university paths, offering some important advice, explaining what it means to work in our field, and outlining the job prospects in our sector overall (joint DC1+DC7).

Detailed Program:
Part 1 – Glacial Ecosystems, scientific basis (DC1)

- Glacial Ecosystems, definition of "Cryosphere" (EARTh Archive)
- Biodiversity hosted by glacial habitats, from the photogenic mammals and birds to the actual dominating life forms: microorganisms. Introduction on invertebrates (Tardigrades, and their peculiar toughness), bacteria and algae. "50 Shades of Snow": importance of algae on large scale processes. Definition and formation process of cryoconite holes.
- Glacial habitat biodiversity: importance of atmospheric deposition, snow and snow algae, cryoconite holes, peculiarities of englacial and subglacial habitats, sea ice and the scales associated to these habitats.
- The cryosphere in numbers: how many microorganisms are estimated to populate the habitats just mentioned. Focus on cryoconite holes activity, comparison to soils. Amount of yearly carbon fixation to highlight how these microhabitats cannot be simply ignored.
- Microorganisms as "ecosystem engineers": why are we so interested in them? Focus on their high activity, wide occurrence, organization (concept of "biofilm"), how they can adapt the environment to their needs, their importance for the trophic network and ability to process many different types of substrates.
- "The true Omnivores": energy and carbon sources. Brief explanation of inorganic and organic energy/carbon sources, link to the concepts of "bioavailability" and "nutrient cycle". Examples of organic compounds: plastic polymers and pesticides.
- Introduction to LRAT (Long-Range Atmospheric Transport) in simple terms, related to the two examples of organic compounds just mentioned, to understand how the consequences of human activities aren't limited to the areas of emission, but globally spread. Concept of cryospheric habitats as "cold condensers". Bio/technological relevance of the ice-dwelling microorganisms able to degrade plastic and organic compounds.
- How do we know? Brief introduction to the ICEBIO doctoral network, and the roles of DC1 and DC7. The students were also shown an ice corer and how it works, and a video about fieldwork in Greenland.

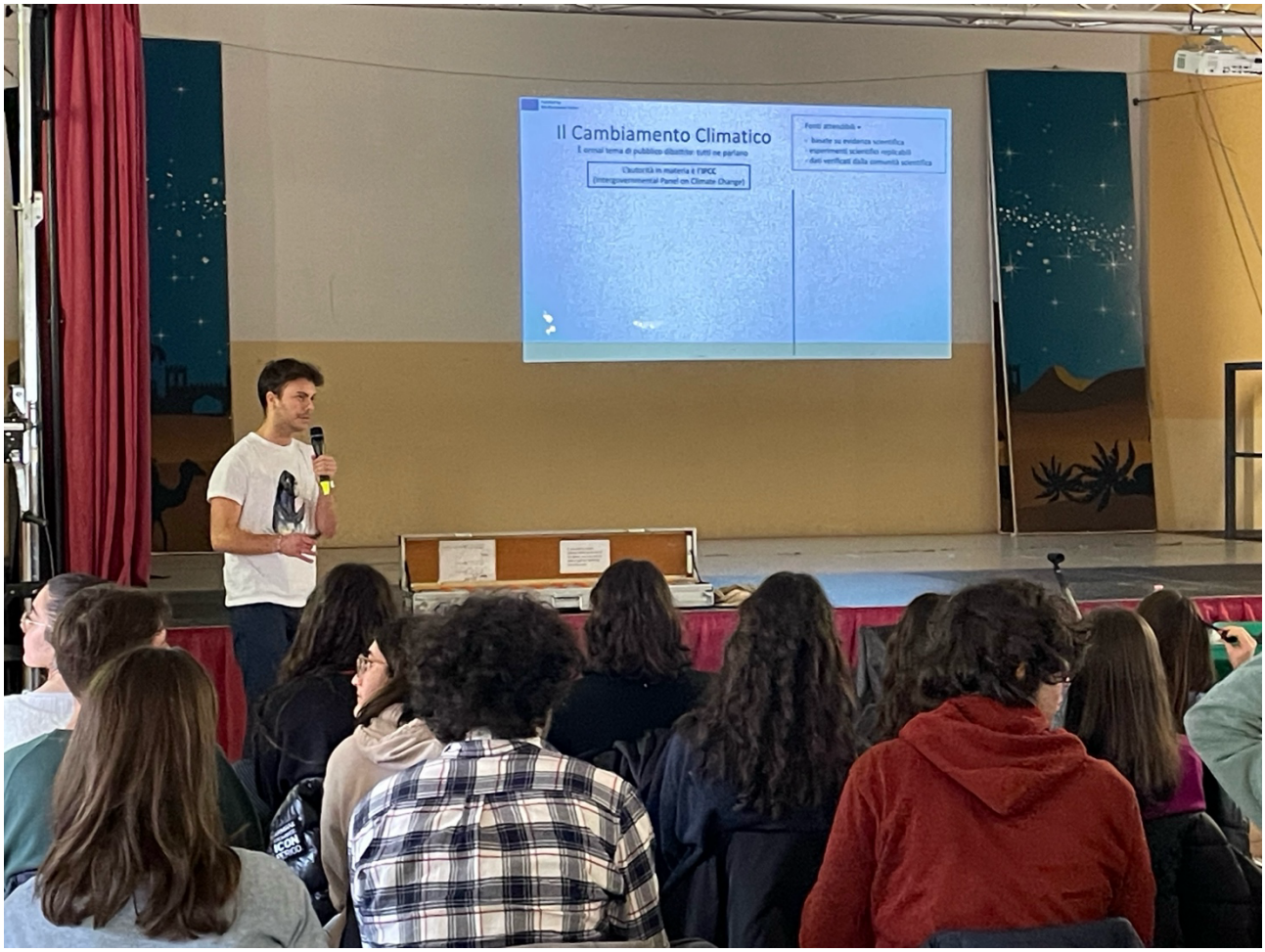
- Link to the second part: reflection on what we are losing due to a changing climate (sink and filter ecosystems). Verticality of alpine systems, and how everything that melts away influences each and every downstream ecosystem.

Part 2 – Climate Change and Sustainability (DC7)

- Introduction on Climate Change: what is the IPCC, an Assessment Report, its structure ("Physical Science Basis", "Impacts, Adaptations and Vulnerability", "Mitigation") and how it's put together. Importance of verifying information sources, trustable vs un-trustable ones.
- Concept of "Scenario" as in Shared Socioeconomic Pathways, how they are "calculated".
- Glaciers as critical players, timelapse of 2022 Jamtalferner melting season as a self-explaining situation.
- Atmospheric CO_2 trends linked to global warming, pre-industrial vs today's levels.
- Link to previous part: algae as drivers of large-scale melting, the Greenland "dark zone" with video.
- Consequences: directly and indirectly interested population estimates. Droughts, sea level rise, global oceanic circulation alteration.
- Our role/what can we do? Mitigation and sustainability. Industrial decarbonization won't suffice to stay below the 1.5°C threshold: society can have a very important role (example and data taken from a recently published paper, which was given to the students to have a feeling of what scientists work with). Natural systems often take long times to respond to our actions, which should be effective, multi-sector encompassing and sustainable.
- % Contribution of various sectors to current and future emissions, to highlight which roles society can/should play, and how they can change through policy implementation.
- Focus on personal choices vs policy choices, importance of voting as a mean to change the direction we are going.
- Concept of sustainability: what it means, its three "pillars" (environmental, economic, social). Importance of balancing interests while evaluating choices and decisions.
- Some case studies to think together: use of geotextiles to preserve alpine glaciers from melting, immediate ban of meat from "traditional" livestock, immediate ban of DDT in developing countries. Highlight how environmental-only sustainable decisions could be socially devastating and vice-versa.

Part 3 – University Orientation (joint DC1, DC7)

- Our careers as an example
- Some suggestions to soon-to-be freshmen, before, during and after university.
- What it means to pursue a career in science
- Perspectives outside science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