

Biodiversity and isolation of bacteria and viruses in contrasted regions from the Southern Ocean

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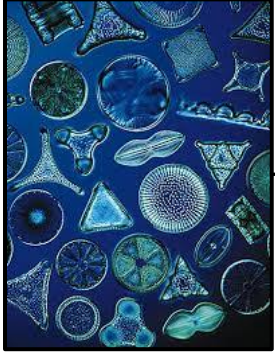
Dr. Simon Roux – Ohio State University (USA)





Key microbiological players of the Southern Ocean

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Phytoplankton

- By photosynthesis, they fix atmospheric **CO₂** and produce **O₂**
- Their role on climate has been established (biological carbon pump)

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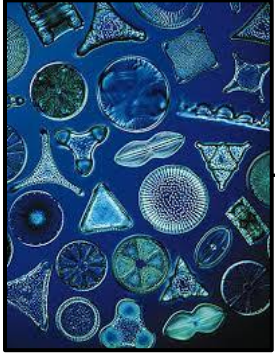
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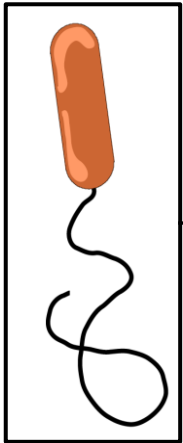
Key microbiological players of the Southern Ocean

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Phytoplankton

- By photosynthesis, they fix atmospheric CO_2 and produce O_2
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Marine bacteria

- Important for the production and recycling of organic compounds
- Their role on climate has been recently described (microbial pump)

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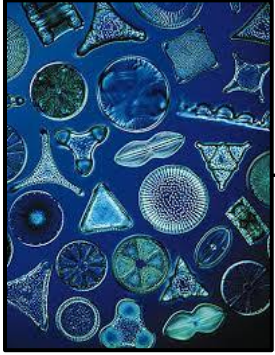
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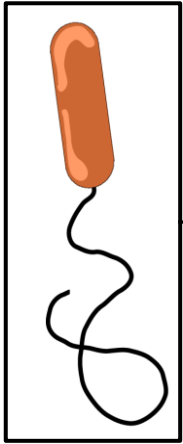
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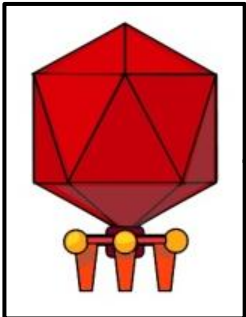
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- **Viruses** are intracellular parasites
- Their number in 1 liter of seawater exceeds the entire human population
- They can degrade organic matter and affect bacteria life cycle
- Probably the major evolutive force of the biosphere but role and distribution are still poorly understood

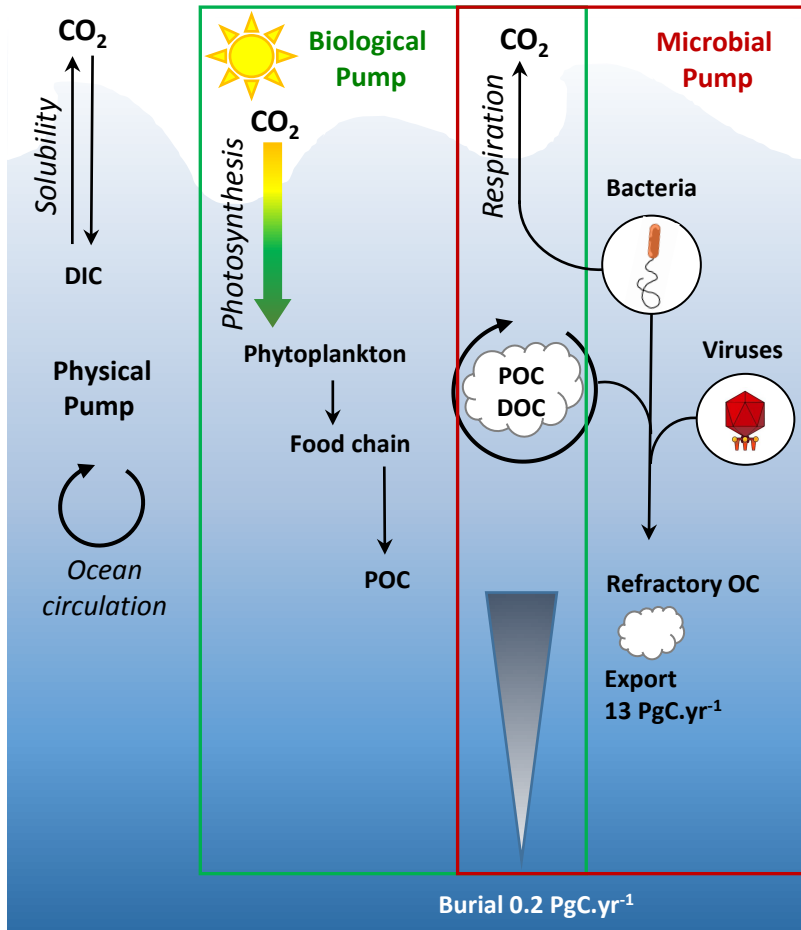
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The Southern Ocean – a critical player for carbon cycling and climate



The carbon pump mediated by microorganisms is important for carbon sequestration and hence the regulation of our climate

It involves interactions between the key microbiological players and organic compounds

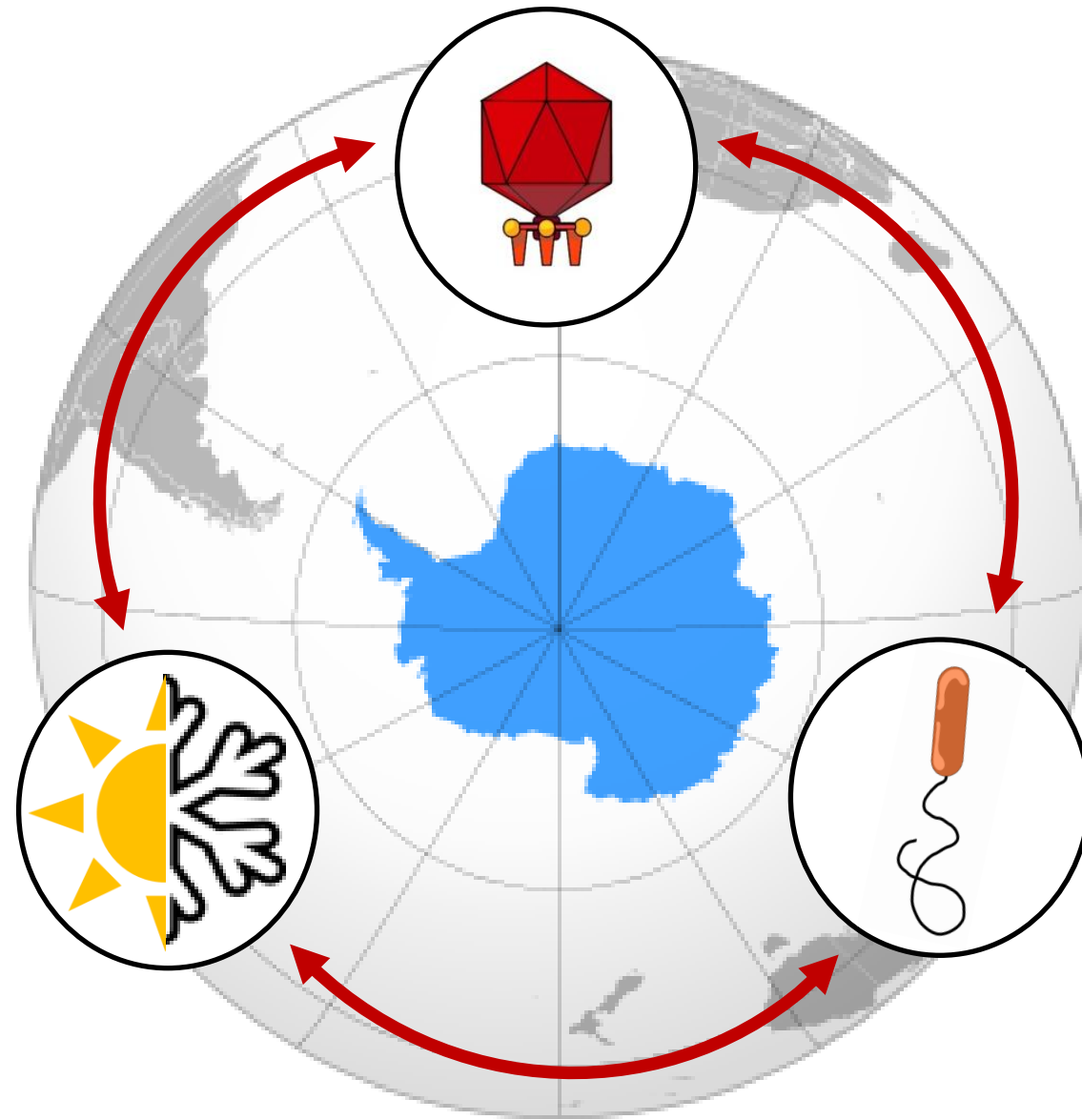
In the Southern Ocean, the carbon pump is sub-optimal. It is mainly limited by the lack of iron - an essential element for life

Our projet has multiple synergies with a study on the «Cycling of trace elements in the Southern Ocean» (PI Ellwood, Jaccard and Hassler):

Together, they will:

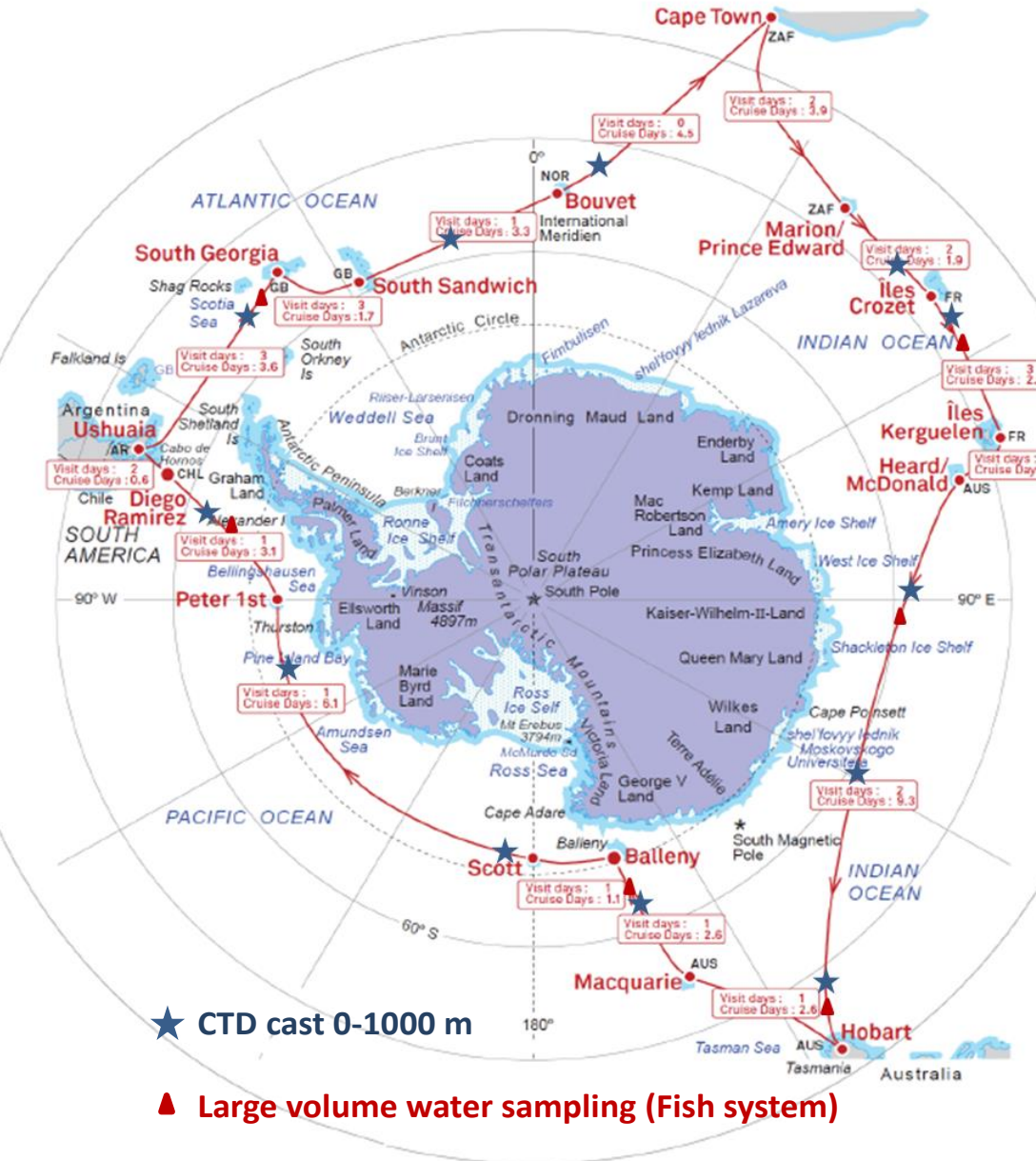
- Connect the biological and the microbial carbon pumps
- Shed light on the links between carbon and iron biogeochemistry
- Provide upmost needed data to improve biogeochemical modeling

Our project explores the connections between Antarctic bacteria, viruses, biogeochemistry and climate





Planned work at sea



- **Sampling** of contrasted regions to illustrate the diversity found around the South Pole
- **Characterization** of the bacterial and viral communities in surface water and at depth
 - Conventional techniques*
 - Metavirome analysis*
- **Incubation** experiments to determine viral activity
- **Isolation** of cold-adapted viruses and bacteria

From work at sea



Scientific goals

- Identifying viral and bacterial biodiversity
- Exploring the link with physical, chemical and biological oceanography

From work at sea



Back on shore



❄ Scientific goals

- Identifying viral and bacterial biodiversity
- Exploring the link with physical, chemical and biological oceanography
- Selecting bacteria producing organic compounds
- Playing with bacterial organic compounds and asses their sensitivity to viral degradation, revisiting the impact of viruses on carbon and iron biogeochemistry
- A collection of Antarctic bacteria and viruses freely accessible to further stimulate research

Thank you

