NIELS DE WINTER (VUB – DEPARTMENT CHEMISTRY)

Mollusc shells, such as those of clams, oysters, and cockles, are very common as fossils. They serve as "time capsules" of ocean conditions and may even record past weather patterns during warm climate periods. With the support of the FWO Climate Prize, my team and I conducted a growth experiment to test whether cockles could capture extreme weather events in their shells. By exposing live cockles to water with elevated levels of strontium—an element easily incorporated into their shells— for periods of 1 hour to a few days we demonstrated that these molluscs can record rapid environmental changes. This experiment provides the first direct evidence that fossil shells can reveal past weather patterns. Such "paleo-weather" reconstructions are crucial for understanding how global warming affects extreme weather events, which are very dangerous consequences of climate change. Our result also improve climate models by extending weather data beyond historical records, leading to better projections of future climate scenarios.

IMPACT OF FUTURE WARMING

Understanding the link between long-term climate trends and short-term weather fluctuations helps clarify the impact of future warming on extreme weather, particularly in the North Sea region. This research helps us to generate information about and awareness of climate change's local consequences, providing crucial data for optimizing strategies for society to adapt to the climate of the future.

Our findings have formed the basis for two new research proposals which are currently under evaluation. These projects will refine reconstructions of extreme weather events such as storms, heatwaves and downpours from mollusc shells and compare them with high-resolution climate models. Since mollusc fossils date back hundreds of millions of years, this work supported by the FWO Climate Prize lays the groundwork for reconstructing climate and weather variability at unprecedented resolution throughout a large part of Earth's history.

Sustainability was central to both the research aims and its execution. All participating institutes are in the Netherlands and Belgium, and team members travelled between them using low-carbon train transport. The cockles used in our growth experiments were native to the Wadden Sea, where the experiments took place, and collected on local tidal flats, eliminating long transport of live organisms and preventing the introduction of non-native species to this UNESCO World Heritage region. Additionally, our research team was gender-diverse and included BSc and MSc students from diverse backgrounds, providing valuable hands-on learning experiences for the next generation of geochemists and climate scientists. These students are co-authors of the forthcoming scientific publication, marking an important step in their young academic careers.

WIM THIERY (VUB – DEPARTMENT WATER AND CLIMATE)

The grant has made it possible to make the website MyClimateFuture available in six additional languages, alongside English: French, Italian, Dutch, Chinese, German, and Spanish. The website allows users to discover how many more climate extremes they will face over their lifetime compared to a world without climate change. Presented in an approachable and graphical format, the platform aims to disseminate the results of the Science paper by Wim Thiery et al. (2021), "Intergenerational inequities in exposure to climate extremes", to the general public, raising awareness of the impacts of climate change. In the future, the website will be expanded to feature new findings building upon the results of the bclimate group led by Wim Thiery. For example, it will soon display projections of the unprecedented number of climate extremes a person will experience in their lifetime, based on three different socioeconomic pathways for each country worldwide. This update is based on a study that has been accepted for publication in Nature, and the website will be updated accordingly upon the study's release.

Climate scientists are often invited to appear in various media, including live television. The Scientific Award for Climate Research has enabled a dedicated media training program for 12 Belgian climate scientists. During a one-day course in small groups, participants learned how to prepare for specific interview questions, adjust their attitude and tone, tailor their message to different audiences, and communicate key messages effectively.

The training was offered in English, French, and Dutch, covering all main languages used in climate news in Belgium.

RESEARCH FINDINGS

Finally, the grant has been used to cover the travel expenses of five researchers attending a major scientific conference. This allowed them to disseminate their research findings, engage with the latest developments in the field, and strengthen their professional networks within the climate research community. For scientific events and conferences within Europe, the research group adheres to a policy of traveling exclusively by train.

SEBASTIAAN VAN DE VELDE (UANTWERP – DEPARTMENT BIOLOGY)

Ocean alkalinization is a technique that helps fight climate change by increasing the ocean's ability to absorb carbon dioxide (CO_2) from the air. Although it has the potential to play a key role in reducing CO_2 levels, research on this method is still in the early stages. This study explored a new approach to ocean alkalinization that uses waste mussel shells, boost the ocean's ability to absorb CO_2 as they break down. Since alkalinity acts as an 'anti-acid', it also reduces the harmful effects of ocean acidification.

With this grant, we conducted initial experiments to better understand how mussel dissolution could be stimulated in coastal environments. We added cleaned and ground mussel shells to natural seafloor material (sediment) collected from the Belgian part of the North Sea and followed the production of alkalinity over time.

We used the grant in a sustainable by reusing glass vials to avoid plastic waste, used trains for transporting samples to reduce carbon emissions, and made use of mussel shell waste.

PROMISING RESULTS

Our results were promising: the mussel shells dissolved quickly and produced a significant increase in alkalinity. This suggests that adding mussel shells to the ocean could help it absorb more CO_2, making it a useful tool for fighting climate change. This approach could be easily integrated into existing coastal projects, like dredging or other marine activities.

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