

November 2022 Updates

# Coastal Pollution Toolbox

## Newsletter

Welcome to the second *Coastal Pollution Toolbox* (CPT)–Newsletter! We are happy to provide you with the latest updates of our objective to develop a toolbox that supports action and optimisation of scientific concepts to investigate pollution in the land-to-sea continuum.

Our website is available via

<https://www.coastalpollutiontoolbox.org>

## Latest Tools

Recently available **Synthesis Tools** provide interested scientists and users with expert knowledge. These tools address challenges of global environmental change as well as of societal concern. They are information-rich products based on consolidated data of different types and origin.

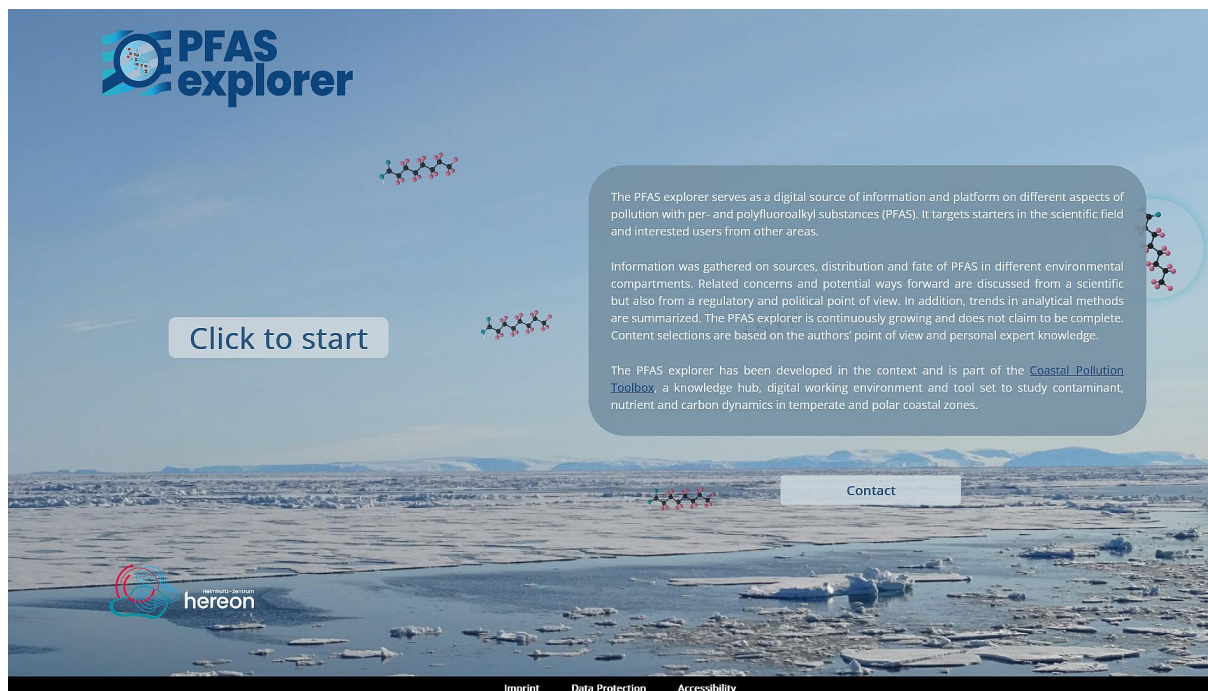
Selection of *Synthesis Tools*:

### **PFAS explorer**

Please access via

<https://pfas-explorer.coastalpollutiontoolbox.org>

The PFAS explorer serves as digital source of information and platform on different aspects of pollution with per- and polyfluoralkyl substances (PFAS). It targets starters in the scientific field and interested users from other areas.



## Review

### Nitrogen release and permafrost dynamics in a changing climate

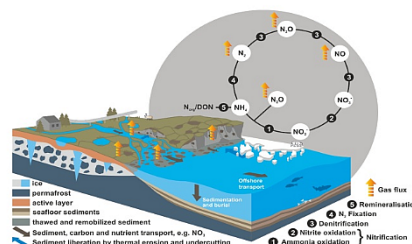
Please access via

<https://www.coastalpollutiontoolbox.org/106845/index.php.en>

This review is a synthesis of recent research dedicated to the Nitrogen cycling in the Arctic region under a pressure of climate change and global warming.

## Nitrogen release and permafrost dynamics in a changing climate (Review)

The Arctic is warming four times faster than the rest of the planet. Thawing permafrost releases huge amounts of organic carbon to water bodies and increases emissions of the greenhouse gases carbon dioxide (CO<sub>2</sub>) and methane (CH<sub>4</sub>). The permafrost affected soils also stores a similarly large proportion of nitrogen and other nutrients, which are also released by thawing permafrost. This review synthesises recent research dedicated to the nitrogen cycling in the Arctic region under a pressure of climate change and global warming.



Potential response of nearshore environments (land, river, delta, and ocean) to climate change, and potential impacts to ecosystem processes and coastal biogeochemistry (adapted from Mann et al. 2022 by J. Strauss)

Strauss, J., C. Biasi, T. Sanders, B.W. Abbott, T.S.v. Deimling, C. Voigt, M. Winkel, M.E. Marushchak, M. Fuchs, M.A. Horn, L.L. Jongejans, S. Liebner, J. Nitzbon, L. Schirrmeister, K.W. Anthony, Y. Yang, S. Zubrzycki, S. Laboor, C. Treat, and G. Grosse. (2022): A globally-relevant stock of soil nitrogen in the Yedoma permafrost domain. *Nature Communications* (2022).

Sanders, T., C. Fiencke, M. Fuchs, C. Haugk, B. Juhls, G. Mollenhauer, O. Ogneva, P. Overduin, J. Palmtag, V. Povazhniy, J. Strauss, R. Tuerena, N. Zell, and K. Dähnke (2022): Seasonal nitrogen fluxes of the Lena River Delta. *Ambio* 51: 423–438.

Tuerena, R.E., C. Mahaffey, S.F. Henley, C. de la Vega, L. Norman, T. Brand, T. Sanders, M. Debyser, K. Dähnke, J. Braun, and C. März (2022): Nutrient pathways and their susceptibility to past and future change in the Eurasian Arctic Ocean. *Ambio* 51: 355–369.

Fiencke, C., M.E. Marushchak, T. Sanders, R. Wegner, and C. Beer (2022): Microbiogeochemical Traits to Identify Nitrogen Hotspots in Permafrost Regions. *Nitrogen* 3: 458–503.

[Access the Review on Nitrogen release and permafrost dynamics in a changing climate](#)

**Management Tools** provide usable information and options for action. Ready-to-use tools (i.e. web-applications or smartphone apps) grounded on evidence-based science, are available to those involved in planning and management of coastal and marine challenges.

*Recent Management Tool:*

### urban Air Quality Forecast (AQF) Tool

Predicted air quality data for the City of Hamburg in Germany

Please access via

<https://urbanaqforecast.coastalpollutiontoolbox.org>

Urban air pollution is a major concern throughout the world in both developed and developing countries. This tool, only published recently, has already attracted

some attention. The urban AQF Tool presents a 24-hour forecast of air pollutant concentration and air quality index (AQI) for Hamburg in Northern Germany based on complex atmospheric modelling. The tool provides information on various gaseous and particulate pollutants on 100-meter spatial resolution in an urban area with intense harbour activities.

An ESRI StoryMap presents detailed information on air pollutants and urban pollution sources, on AQI for reporting daily air quality and gives guidance for navigating the tool.

Please access the StoryMap via

<https://hub.hereon.de/portal/apps/storymaps/stories/9983fc54af1c42baa24b66fd239c6667>



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With a selection of **Science Tools** we provide expert users with information on new methods, approaches or indicators for baseline assessments or for the re-evaluation of complex environmental problems in the land-to-sea continuum.

*Selection of Science Tools:*

- Combining FerryBox observations and CPT DriftApp simulations explain coastal ocean biogeochemical variability
- A biogeochemical tool to improve our understanding of the coastal ocean CO<sub>2</sub> sink
- A novel technique to estimate in situ diatom growth rates by using the silica deposition fluorescent probe PDMPO
- Baseline concentrations of technology-critical elements (TCEs) in North Sea sediments
- Combining modelling approaches and modern stable isotope measurements: A tool to determine terrestrial nutrient inputs to support environmental planning in heavily populated coastal areas
- Suspect screening: A powerful complementary tool to shed light on “dark matter” of per- and polyfluoroalkyl substances (PFAS)

A **science & infotainment slideshow** has been developed to highlight the essences of the suspect screening approach.

Please access via

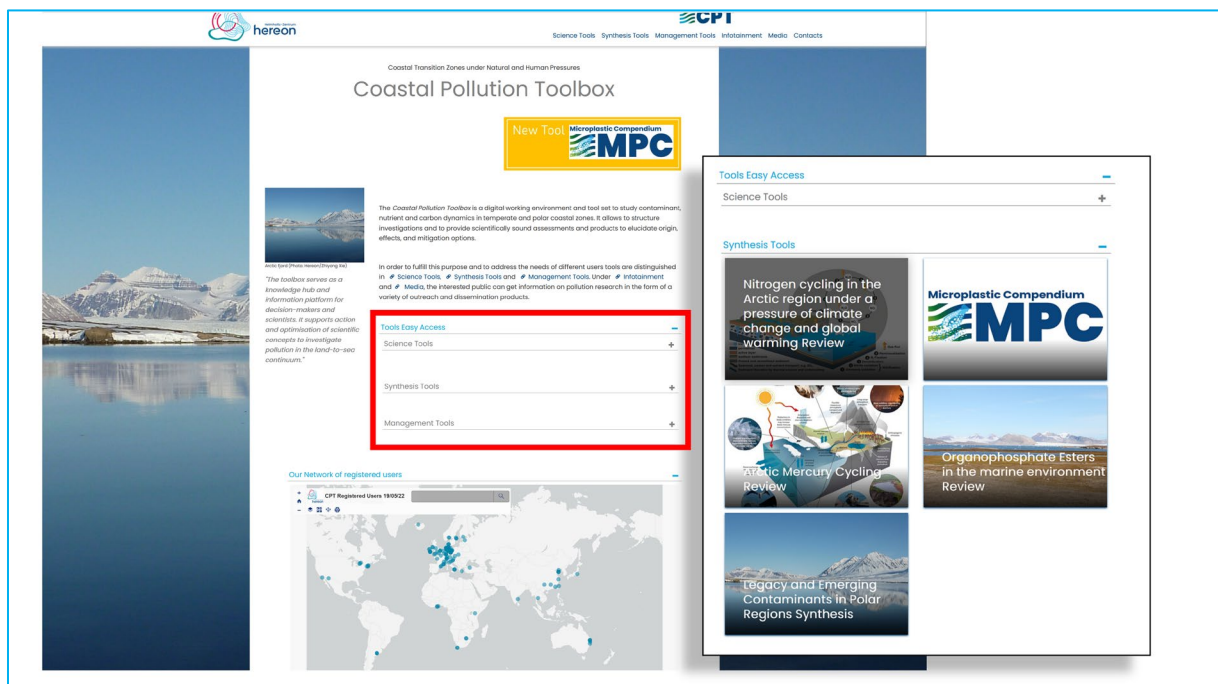
[https://www.hereon.de/imperia/md/assets/main/transfer/communication\\_media/2022/pfas\\_pm-website.mp4](https://www.hereon.de/imperia/md/assets/main/transfer/communication_media/2022/pfas_pm-website.mp4)

Please access all available *Science Tools* via

<https://www.coastalpollutiontoolbox.org/090472/index.php.en>

## Further updates

Recently you find an easy access to all existing tools. The "Tools Easy Access" button is embedded on the *Coastal Pollution Toolbox* homepage and subpages. It allows quick and targeted access to the latest tools.



## **The Coastal Pollution Toolbox at COP27 in Sharm El-Sheikh, Egypt**



As part of a joint initiative between the Institute for Advanced Sustainability Studies (IASS) and Hereon/GERICS in collaboration with the Helmholtz Centre for Polar and Marine Research (AWI), the German Climate Consortium (DKK) and the Helmholtz Climate Initiative, facilitators of the project organized a Side Event on “Innovative communication formats for mobilizing climate action”. Louis Celliers (Helmholtz Zentrum Hereon, Climate Service Center Germany, GERICS) highlighted the idea of a climate -smart coastal toolbox as a central innovation to shorten the distance between science and policy. Socially innovative tools and approaches for marine pollution, such as those developed and co-developed for the *Coastal Pollution Toolbox*, form part of the challenge to provide decision-making with usable information to create actionable knowledge for managing the impact of marine pollution on the social-ecological system under a changing climate.

An outline of the event can be accessed via

<https://www.coastalpollutiontoolbox.org/107493/index.php.en>

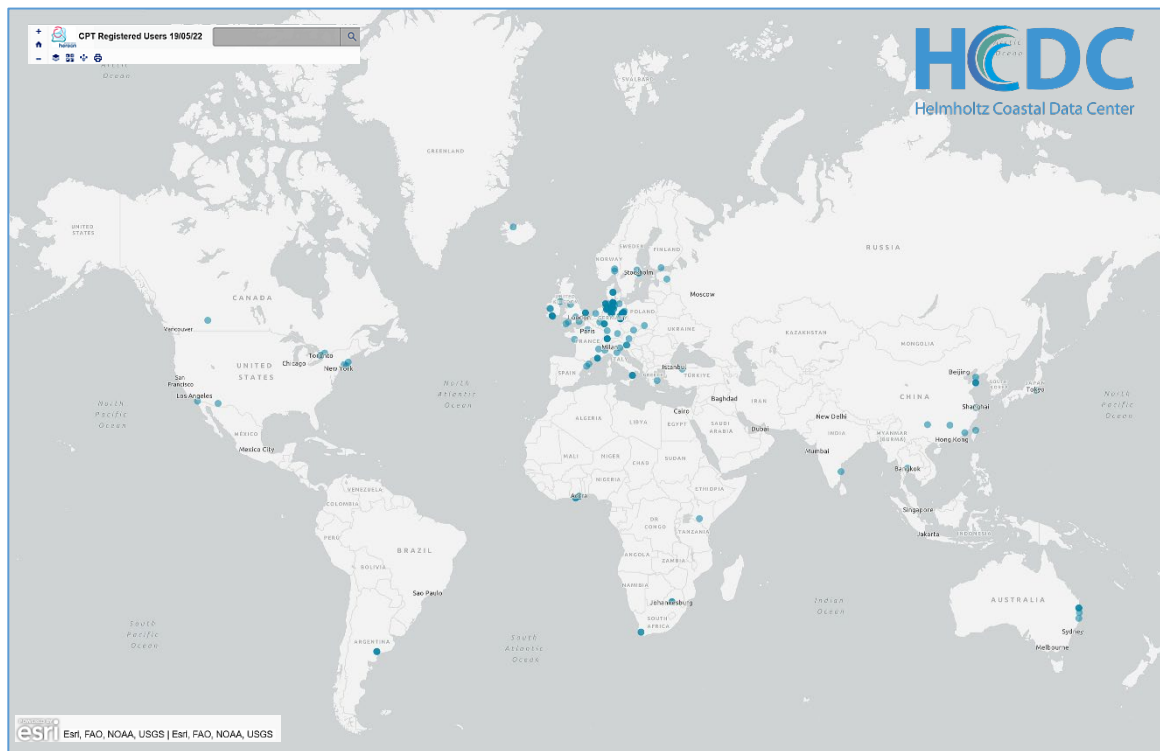
### **Network and Partners**

By November 2022 over 156 scientists, planners, industry partners and media representatives interested in pollution from 32 countries have stated interest to be informed about updates.

Have a look at the interactive map on the homepage and by using this link:

<https://arcg.is/1TK5981>

The map is provided by the [Helmholtz Coastal Data Center](#)



An active involvement on the business network LinkedIn finds continuously growing interest of 470 LinkedIn users following updates on the project.

Please have a look at our member's page and be invited to connect and share posts of us:

<https://www.linkedin.com/company/coastal-pollution-toolbox/>

## What is next?

More content within existing and newly developed digital Compendiums...

More *Science Tools* developed from peer-reviewed research...

Further reflections on the co-design framework for the co-development of tools...

An active involvement and exchange with our tool users...

## Contacts

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If you no longer wish to receive this newsletter, send us an email by clicking the following link

[coastalpollutiontoolbox@hereon.de](mailto:coastalpollutiontoolbox@hereon.de)

The *Coastal Pollution Toolbox* is an affiliated project of *Future Earth Coasts* under the international *Future Earth* initiative *Research. Innovation. Sustainability.*

