BIOGRIP Soil and Water Node, Stellenbosch University

2-year Postdoctoral Research Fellowship Available at the Department of Earth Sciences, Faculty of Science, Stellenbosch University

BIOGRIP is the biogeochemistry research infrastructure platform funded by the Department of Science and Innovation (DSI) in South Africa. "Biogeochemistry" is the study of how biological, geological, chemical, and physical processes interact to shape natural environments over time and space and the intersection of these natural environments with the human population. It covers a range of interdisciplinary research foci, from the origin and diversification of life to how anthropogenic drivers alter modern environments, to the response of natural systems to environmental change and how these processes and changes impact on human lives. Embedded within BIOGRIP are opportunities for postdoctoral researchers to assist with the fulfilment of BIOGRIP's mandate to develop analytical platforms for biogeochemistry research and to conduct research in the many branches of biogeochemistry.

Project Title: Impacts of dust aerosols on human health and marine ecosystems.

Scope of research and scientific objectives:

Dust particles and aerosols can influence local air quality or travel long distances, impacting remote regions. Increased anthropogenic activities, changes dust deposition and composition. The potential effects range from posing risks to human health to enriching the open ocean with nutrients. The nature of these impacts is largely determined by the source of the dust, e.g., natural or anthropogenic, which influences particle size, shape, and composition. In addition, the impact depends on the transport and exposure pathways. This project is organized into two main topics: impact of dust of anthropogenic origin on human health and impact on marine ecosystems, particularly on phytoplankton primary production as the base of the food web. Both ultimately serve a science for society approach. The target areas are southern Africa and the surrounding oceans. The project targets four main themes: (a) dust loads and fluxes (b) geochemical composition and solubility, (c) source appointment, and (d) environmental effects.

The key question is whether or when dust is harmful to human and marine ecosystem health. This question shall be addressed through a combination of field and laboratory work as well as modelling. Field work (dust and ancillary data collection) will take place in southern Africa and oceans near and south of South Africa. It will target dust of diverse sources, including industry, mining, smelting, agriculture and wildfires. As such it will require seasonally resolved year-round sampling to assess summer and winter-specific sources. Some of the geochemical target

components of this project critical for human and marine ecosystem health are mercury, lead, arsenic, vanadium, as well as iron, zinc, cadmium and copper. The outcome of the fellowship will include developing existing and establishing new sampling and analytical protocols, producing peer-reviewed publications, and assisting BIOGRIP in meeting its deliverables. Deliverables will also include developing relationships with local and governmental stakeholders and producing a report for government organizations.

The scientific objective of this project include:

(i) Investigate dust aerosols in southern Africa and over the oceans south of South Africa including the Southern Ocean.

(ii) Through comprehensive assessment of the geochemical composition and transport pathways,

- assess the potential impact on human and marine ecosystem health
- appoint natural and anthropogenic sources

(iii) Develop new analytical capacity for the use of metal isotopes in source appointment.

(iv) Work with research, governmental and industry partners to develop mitigation strategies.

Key Responsibilities:

- Manage the project and research
- Conduct field work both on land and at sea; Conduct sample processing and analysis
- Produce scientific publications and conference presentations
- Support BIOGRIP to develop analytical platforms to advance biogeochemistry research. This includes improving existing and establish new analytical protocols to advance South Africa's geochemical analytical skills set, particularly for source appointment (e.g., via metal isotope analysis) and impact assessment (e.g., via solubility testing)
- Supervise and train postgraduate students
- Occasional teaching at undergraduate (1-3 years BSc) and Honours (4th year BSc) level
- Produce reports to outline progress to the DSI annually and assist BIOGRIP in meeting its translational research deliverables

Host:

The postdoctoral fellowship will be embedded in the DSI-funded BIOGRIP Soil and Water Node at Stellenbosch University (PI Dr Janine Colling) and will be hosted by the Department of Earth

Sciences (PI Prof Susanne Fietz). The appointed candidate will be required to engage widely with a range of researchers at BIOGRIP, SU Central Analytical Facilities, and in relevant South African institutions, as well with international collaborators and with stakeholders.

Requirements:

- PhD (**must have graduated within the last five years**) in Geosciences, Earth or Environmental Sciences or related field
- Track record of publications in peer-reviewed international ISI-accredited journals commensurate with experience, in the field of dust aerosols' impact on marine ecosystem and/or human health. The outputs need to demonstrate key contributions or lead authorship.
- Track record of communication of scientific outcomes at scientific conferences, meetings or workshops, particularly in the field of dust aerosols' impact on marine ecosystem and/or human health.
- Background in dust aerosol sampling and geochemical analysis, particularly for major ions and metals
- Expertise in data processing, interpretation and visual representation

Experience in the following would be an advantage

- programming (R, Python)
- interactions with the public and/or stakeholders and in science communication
- planning, conducting and leading field work and sampling campaigns on land and at sea
- trace metal clean work and GEOTRACES best practices
- laboratory ion and mass chromatography, dust leaching protocols
- training of junior researchers, including under- and postgraduates

Additional considerations:

- valid driver's license and willingness and ability to work in remote environments is of advantage to conduct the field work.
- individuals that are able to work independently, but also have leadership skills reflecting the level of experience will be preferred.

Application closing date: Please submit your applications before 6 December 2024, but latest before 13 December 2024.

Commencement of duties: January 2025, or as soon as possible

Duration and remuneration: The position is for one year, starting in early 2025, that can be

extended to the following year, where the second year is subject to satisfactory progress in the first year. A competitive salary of R350,000/annum is available. A once-off contribution towards moving and the first two months of accommodation as well as medical and visa fees if applicable can be negotiated on a case-by case basis. Please note that postdoctoral fellows are not appointed as employees and their fellowships are awarded tax free. They are therefore not eligible for employee benefits.

Enquiries and applications: Send a letter of motivation, accompanied by a comprehensive curriculum vitae, including a list of scientific and outreach outputs, a Research Statement, and the names and contact details of two referees, to Dr Janine Colling, the manager of the SU BIOGRP node and Prof Susanne Fietz, Head of Department at Department of Earth Sciences, at *sfietz@sun.ac.za.* Please combine all documents into one file (pdf) labelled with your name and use the following subject line in your email: Postdoctoral Research Fellowship.

More information on our websites:

https://www.biogrip.ac.za/

https://www.sun.ac.za/english/faculty/science/earthsciences

or on Social Media:

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