



Post Doctoral Research Scientist Marine Organic Geochemistry

Job description:

The chemistry team (CEM) of the Mediterranean Institute of Oceanography (MIO: <https://www.mio.osupytheas.fr/fr>) seeks for an experienced post-doc researcher on the marine geochemistry /atmospheric chemistry field that will study the dynamics of burning biomass (BB) compounds in marine waters in the frame of FIRETRAC project (see below for details) recently funded by French national agency (ANR). The post-doc research will be involved in most of the work packages of the project which comprise: field sampling (atmospheric and marine samples; WP2), chemical analyses of BB tracers and related compounds (WP3); sample preparation for compound specific isotope analysis (WP4) and finally biodegradation experiments (WP5).

FIRETRAC short description:

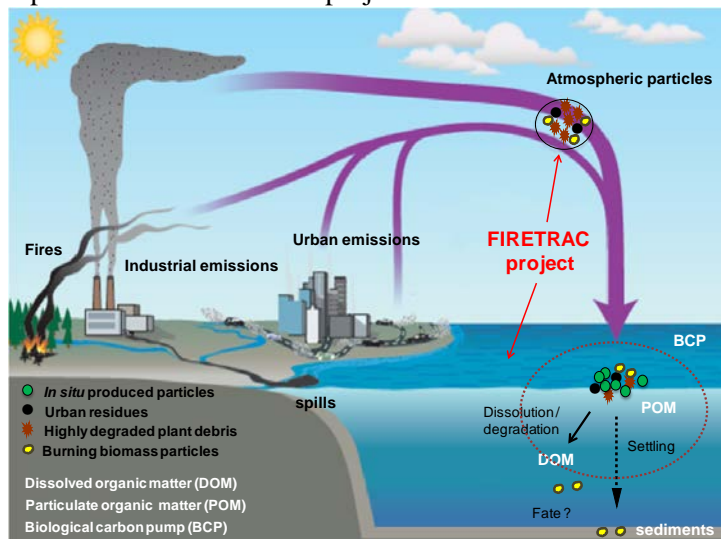
Biomass burning (BB) and wildfire-produced atmospheric particles are significant contributors to global atmospheric particulate matter, with strong impacts on ecosystems, public health and climate. Yet these impacts are highly uncertain, largely owing to our inability to track BB particulate matter and its evolution throughout ecosystems. Despite that BB particles are the major concern of several international programs and projects their marine dimension has been largely neglected. FIRETRAC is the first attempt that aims to shed light on BB and wildfire-produced atmospheric particles dynamics in marine waters and establish their link with the marine biological carbon pump (BCP). Such information is of great importance as it will give a very strong evidence if BB associated molecules (BB tracers such as anhydrosugars and polyaromatic hydrocarbons or PAHs) have the potential to be rapidly mineralized, and thus re-injected to C-cycle as CO₂, or stored for several thousands of years in the dissolved organic matter (DOM) pool/or marine sediments. This will help to improve the global modeling on BB particles (transfer from air to sea and further fate at sea), improve carbon budgets with respect to CO₂ emissions, and thus provide better estimates on possible local or global climate variations.

FIRETRAC will provide the necessary breakthroughs in our understanding of BB particles dynamics in the marine environment by:

(a) measuring anhydrosugar and PAHs concentrations over a 2-year period in the air at 2 contrasted land sites (urban and remote) and the sea in 3 marine stations located a few Km offshore the North Western Mediterranean coast. Analyses will be performed in total suspended particles, seawater, surface sediments and high molecular weight dissolved organic matter obtained after ultrafiltration.

(b) performing radiocarbon dating (i.e. $\Delta^{14}\text{C}$) and $\delta^{13}\text{C}$ analysis on individual anhydrosugars isolated from the above matrices which will provide valuable information regarding their fate and sources in seawater.

(c) assessing the bioavailability of BB particles performing biodegradation experiments on model BB compounds (e.g., levoglucosan, pyrene) under the presence of heterotrophic marine bacteria. Such information is complementary to molecular level $\Delta^{14}\text{C}$ measurements as it provides in a short time scale the behavior of the same compounds in marine waters which is not feasible with $\Delta^{14}\text{C}$ (half life 5730 yr). The results obtained from the 2-year monitoring will be used for modeling to assess the transfer of BB particles from the atmosphere prior their deposition to sea. The project involves state-of-the-art instrumentation such as EA-AixMICADAS for radiocarbon dating, EA-IRMS for $\delta^{13}\text{C}$ analyses, LC-Q-TOF-MS for anhydrosugar analysis, and GC-MS for PAHs including flow cytometry and PCR for microbiological measurements. Overall, "FIRETRAC" involves 3 French institutional partners: MIO, CEREGE and CEFREM in collaboration with the EPFL



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Figure 1: Impact of BB and wildfires-particles on the biological carbon pump and positioning of the FIRETRAC project.

(Switzerland). The strength of the consortium resides on the complementary of the team which assembles marine and atmospheric chemists, marine bio- and microbiologists, and geochemists. The expertise of this "interdisciplinary community" will be put together in an effort to obtain a complete picture of how environmental pressures (natural or anthropogenic) issued from the BB and wildfires particles may impact the composition of the Mediterranean atmosphere and what is the fate of their major compounds (anhydrosugars and PAHs) in the Mediterranean Sea (e.g., impact on BCP, accumulation or degradation?). FIRETRAC is a valuable contribution to the SOLAS program and fully in line with the CHARMEX and MERMEX scientific programs for the Mediterranean Sea. Considering the increasing occurrence of wildfires, along with the emissions from fossil fuels, accurate prediction of the climate effects requires a better understanding of marine BCP functioning in relation with BB processes.

About the employer:

Most of the research will be carried out at the MIO which is located in the Marseille-Luminy campus of the University of Aix-Marseille, in southern France. The MIO Oceanography research laboratory is under the joint direction of Aix-Marseille University, Toulon University, CNRS and IRD. MIO main research objective is to better understand the oceanic system and its evolution in response to global changes. MIO constitutes a center of expertise in marine biology, ecology, biodiversity, microbiology, physics, chemistry and biogeochemistry. Our working environment is the world ocean, along with its continental, atmospheric and sediment interfaces. MIO includes 240 people with 124 University professors, associate professors including researchers (CNRS, IRD), 67 engineers and technicians, and 43 doctoral students as well as an administrative team supporting research.

Required Skills:

The grant can be awarded to foreigners or French researchers having spent at least one year over the last three years in a foreign country and have at least a 3-year post-doc experience working in the same or a similar field (Marine Organic chemistry/Atmospheric chemistry). It is essential the candidate should have a strong background in Analytical Chemistry (preparative

chromatography, LC-Q-TOF and GC-MS) and carbon isotopic chemistry specifically in carbohydrate and PAHs analyses. Experience in microbiology and atmospheric modeling is also preferred. The appointee is also expected to perform field sampling (atmospheric particles, marine sediments & seawater) thus experience in sampling procedure is also required.

Application procedure, timetable and salary:

The applicant should provide by e-mail to christos.panagiotopoulos@mio.osupytheas.fr the following:

- a Curriculum vitae
- two references letters
- a cover, motivation letter

Application deadline: 15th January 2021.

Interviews will be carried out: 20-25th January 2021

Duration: 24 months

Position availability: March 2021

Net Salary: 2400-2500 €

For further assistance please call Christos Panagiotopoulos on +33-(0)4-86-09-05-26.