“CLIMATE DIMENSION OF NATURAL HALOGENS IN THE EARTH SYSTEM: PAST, PRESENT, FUTURE”

Información de interés:

This project has received funding from the European Research Council (ERC) under the European Union’s Horizon 2020 research and innovation programme (grant agreement No 726349).

Summary:

Naturally-emitted very short-lived halogens (VSLH) have a profound impact on the chemistry and composition of the atmosphere, destroying greenhouse gases and altering aerosol production, which together can change the Earth´s radiative balance. Therefore, natural halogens possess leverage to influence climate, although their contribution to climate change is not well established and most climate models have yet to consider their effects. Also, there is increasing evidence that natural halogens i) impact on the air quality of coastal cities, ii) accelerates the atmospheric deposition of mercury (a toxic heavy metal) and iii) that their natural ocean and ice emissions are controlled by biological and photochemical mechanisms that may respond to climate changes. Motivated by the above, this project aims to quantify the so far unrecognized natural halogen-climate feedbacks and the impact of these feedbacks on global atmospheric oxidizing capacity (AOC) and radiative forcing (RF) across pre-industrial, present and future climates. Answering these questions is essential to predict if these climate-mediated feedbacks can reduce or amplify future climate change. To this end we will develop a multidisciplinary research approach using laboratory and field observations and models interactively that will allow us to peel apart the detailed physical processes behind the contribution of natural halogens to global climate change. Furthermore, the work plan also involves examining past-future climate impacts of natural halogens within a holistic Earth System model, where we will develop the multidirectional halogen interactions in the land-ocean-ice-biosphere-atmosphere coupled system. This will provide a breakthrough in our understanding of the importance of these natural processes for the composition and oxidation capacity of the Earth´s atmosphere and climate, both in the presence and absence of human influence.

Convocatoria: **ERC-2016-COG - ERC Consolidator Grant**

Investigador principal**: Alfonso Saiz López.**

Importe concedido**: 1.979.112 €**

Comienzo: **01/09/2017** Finalización: **31/08/2023**

“HOMO- AND HETERO-TYPIC INTERACTIONS IN ASSEMBLED FOLDOMES”

Información de interés:

This project has received funding from the European Research Council (ERC) under the European Union’s Horizon Europe Research and Innovation Programme (Grant Agreement No 101042403).

Summary:

Self-assembly is a fundamental foundation of life, but what about co-assembly? The main goal of BiFOLDOME is to decipher co-assembly to understand self-assembly. Amyloids were assumed to be assembled by one type of protein, but the recent structural characterization of a 1:1 hetero-amyloid suggests that amyloids composed of two distinct proteins playing key roles in health and disease may be common. In fact, a viral proteins can compete with human proteins to form distinct 1:1 hetero-amyloids. Taking a leaf from viral playbooks, this means that for a given self-assembling sequence there may be a mating sequence driving the preferential 1:1 co-assembly of the two. Thus, understanding what drives the preferential formation of co-assembled forms over conventional self-assembled species will afford an entirely new vision on assembly processes transversal to many fields of knowledge. BiFOLDOME is organized around three different levels of complexity: (1) characterizing the formation, structure and energetics of representative paradigms of 1:1 co-assembled amyloids using solution and solid-state NMR spectroscopies, and energy calculations, featuring novel technical innovations that we will develop. This will provide the basis for self-assembly by delivering a firm understanding of co-assembly. (2) Applying the fundamental knowledge from (1) to the manipulation of self-assembled, disease-associated proteins using the powerful concept of 1:1 co-assembly. (3) In a final stage, BiFOLDOME will reliably study the assembly of biomolecular condensates, which constitutes a different level of complexity. Initiation of condensate assembly and dynamical arrest or “hardening” into amyloids will be possible thanks to the new tools developed earlier in the project, among which OptoNMR stands out. OptoNMR will enable controlled, light-triggered self- and co-assembly of proteins in situ, within the NMR tube, for real time, high-resolution characterization of biomolecular assembly.

Convocatoria: **ERC-2021-STG - ERC Starting Grant.**

Investigador principal: **Miguel Ángel Mompeán García.**

Importe concedido**: 1.496.823 €**

Comienzo: **01/11/2022** Finalización: **31/10/2027**