***Título del proyecto:*** South American dust ocean fertilization: Ironing out paleo-to-present observational challenges (Dusty SAM)
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***Fecha de inicio y finalización:*** 1 noviembre 2025-31 octubre 2028 (tentativo)
***Financiamiento:*** EUR332.827
***Resumen:*** Mineral dust aerosols reduce atmospheric carbon dioxide concentrations ($CO_{2atm}$) by fertilising iron (Fe)-limited oceans and enhancing primary productivity. However, the resulting perturbation to Earth's radiation budget is highly uncertain, as the scientific understanding of this dust-climate interaction is very low. Southern South America (SSA) is the main dust supplier to the southern oceans, the most susceptible to Fe fertilization. Iron limitation is first encountered <700 km offshore of SSA, where models show that most dustborne soluble Fe originates from super-coarse dust (diameters between 10-62.5 micrometres). The greatest changes in global dust activity occur at glacial-interglacial timescales, and it has been proposed that the weakening of this fertilizing effect of dust is a main contributor to the rise in $CO_{2atm}$ during the last deglaciation. High Fe fertilisation from SSA dust during the Last Glacial Maximum (LGM) is thought to be due to enhanced emissions of glaciogenic dust. Thus, better constraining the role of super-coarse particles and of glaciogenic dust particles in SSA's present-day and paleo dust cycles is key to quantifying the indirect effect of dust on global climate. This project aims to improve the understanding of this dust-climate interaction by a combination of present-day and paleo observational and experimental techniques. An aerosol monitoring program will be carried out both close to the sources in Patagonia's eastern coast, and after medium-range atmospheric transport in the Southwestern Atlantic Ocean, to characterize present-day particle size-resolved dust fluxes and atmospheric transformations of Fe. Also, a continental-scale sampling of land and marine paleo-dust archives will be carried out to evaluate these same processes since the LGM. All observations and experimental work will be designed so as to maximize the compatibility of observed and experimental parameters with the way they are represented in Earth system models