CONTRATO PREDOCTORAL CSIC ASTURIAS-UNIVERSIDAD DE OVIEDO

Se busca candidat@ para un **contrato de 4 años para hacer la tesis** en el CSIC en Asturias. Este contrato FPI se enmarca dentro del proyecto PyroCarbon3D '*Advancing carbon emission estimations from wildfires applying artificial intelligence to 3D terrestrial point clouds'* (más info debajo).

El tema del doctorado está relacionado con ciencias forestales, ciencias del fuego y geomática. La idea es que se centre en mejorar la cuantificación de stocks de carbono en biomasa y su combustión por incendios, utilizando nubes de puntos e inteligencia artificial.

Esta tesis se desarrollará en Mieres (Asturias) en el Instituto Mixto de Investigación en Biodiversidad (CSIC-Universidad de Oviedo- Principado de Asturias) y estará dirigida por Cristina Santín (CSIC) y Carlos Cabo (Univ. Oviedo). Además, el doctorando colaborará con un amplio equipo de investigación (Universidad de León, US Forest Service y Universidad de Washington (EEUU) y Universidad de East Anglia (Reino Unido). Se prevén estancias con estos colaboradores durante la tesis.

La fecha de inicio será en septiembre-octubre 2023.

Expresión de interés ANTES DEL 20 DE ENERO: si estás interesad@ y/o quieres saber más, escríbenos a c.santin@csic.es (Cristina) y carloscabo.uniovi@gmail.com (Carlos).

Requisitos generales: grado en disciplinas relacionadas (Ingeniería forestal, ingeniería geomática, biología, ciencias ambientales, etc.). Importante también haber finalizado o estar haciendo un máster en disciplinas relacionadas. Se requiere también estar matriculado o "preaceptado" en un programa de doctorado (este trámite lo podemos facilitar los directores de tesis).

Requisitos específicos: alta motivación por la investigación; nivel alto de inglés, conocimientos de programación/geomática, disponibilidad para vivir y trabajar en Asturias, así como para realizar estancias con los colaboradores del proyecto; capacidad de iniciativa y de trabajar tanto autónomamente como en equipo.

Convocatoria:https://www.aei.gob.es/convocatorias/buscador-convocatorias/ayudas-contratos-predoctorales-formacion-doctores-2022-0 . El plazo de solicitud es del 12 al 26 de enero de 2022.

Resumen del Proyecto PyroCarbon3D:

Wildland fires burn every year 3-5 million km2 around the world, releasing 2.2 Pg of carbon (C) into the atmosphere (equivalent to 25-30% of the global emissions from fossil fuel combustion). Accurate assessments of carbon emissions from wildfires are therefore essential to fully represent this ecosystem perturbation in models. This will allow to improve our climate forecasting abilities and to develop mitigation strategies for climate change. One of the key parameters to estimate carbon emissions is the amount of biomass (i.e. fuel) that is consumed and the C within it. Traditional field measurements of fuel and carbon consumption require long time and are not spatially explicit.

Here we aim to develop a new methodology that will advance carbon emission estimations from wildfires by providing more accurate and spatially explicit quantification of fuel and carbon consumption. The field data used will cover a range of prescribed (low-intensity) and experimental (high-intensity) fires in shrubland and forests in Spain, UK, US and Canada. This will allow us to test and validate the new methods in some of the most important vegetation covers in terms of wildfire risk both in Spain and internationally. For field data acquisition, we will use a combination of state-of-the-art technology for 3D terrestrial point clouds and traditional field-based measurements. Afterwards, four methods (i.e. algorithms) for the automatic classification of fuel types in the point clouds will be developed, implemented and tested: heuristic methods, machine learning, deep learning and hybrid methods. In addition, a new approach for calculating vegetation volume via a dual voxelization will be implemented. Subsequently, fine-scale prediction equations across the studied fuel types will be developed to correlate the 3D vegetation volume data with biomass and C data. With this information, fuel biomass and C, fuel consumption completeness and C emissions 3D maps, and averaged consumption factors for the range of fuel types and fire behaviours studied will be produced.

Finally, we will also explore the implementation of the projects outputs into the wildfire emission model Consume and the wildfire emission inventory GFED. The new methods developed here will represent a key methodological advance for the modelling and characterization of vegetation biomass and carbon. To maximize their visibility and ensure their widely use and applicability, they will be shared with the international scientific community and the general public through an ambitious dissemination program and following a full open science data policy.

Our interdisciplinary team assembled is in a unique position for delivering the project ambitious aims. It includes biologists, engineers on geomatics, geographers and foresters covering a range of expertise on wildfires, the carbon cycle, 3D model computation, and spatial forest ecology and inventory. Our team is international (4 countries), gender balanced (5 women and 6 men) and includes senior (4), mid-stage (5) and early career researchers (2).