

Marie Skłodowska Curie Action –Postdoctoral Fellowship 2023 (MSCA-PF-2023)

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Department /Institute /Centre Name	Department of Applied Mathematics. E.T.S. de Ingeniería Agronómica, Alimentaria y de Biosistemas.
Address	Avda Complutense s.n. Madrid 28040 España.
Province	Madrid
Research Area	Environment and Geoscience (ENV) Mathematics (MAT) Information Science and Engineering (ENG)
Brief description of the Centre/Research Group	The GSC (Complex System Research Group) is a multidisciplinary team of 20 researchers, belonging to different UPM Schools, with extensive research and teaching experience in Physics, Mathematics, Statistics, Chemistry and various branches of Engineering. Their training allows them to carry out high-quality research work, internationally recognized, in the interdisciplinary area of Complex Systems. GSC collaborates with similar groups in the US, South America and Europe. Within the UPM, it occupies the global position 11/184 of the research groups according to the latest Results Report of the UPM Quality Plan of 2019, highlighting position 3/184 in the dissemination of research results and position 5 /184 in the recognition of merits. One of the research lines in the GSC is Biocomplexity in Agrarian Systems. The behaviour of agricultural systems is not linear, because it refers to feedback loops that can explain and predict the behaviour of each element, which, when affected, has an impact on the others, like an interconnected network of information. In our group we have focused on: scale laws that relate different levels of aggregation, predictive models based on machine learning, and patterns recurrence in agricultural systems. We are applying these tools to various topics such as: analysis of porous soil structures, mapping of vegetation indices and soil properties, dynamics of grasslands in semi-arid zones and deforestation. http://www.gsc.upm.es/gsc3/



Project description	Ecosystems are considered complex systems with non-linear dynamics in space and time for more than three decades. However,
	only recent research focuses on tackling the complexity of ecosystem
	system, rangelands comprise 30–40% of the Earth's landmass.
	supporting approximately 1 billion people; this makes them suitable
	land types to study ecosystem dynamics with significant human
	activity effects. This type of land is heavily affected by land
	degradation which reduces biological productivity, ecosystem
	The Normalized Differentiated Vegetation Index (NDVI). obtained
	from Remote Sensing, is widely used to monitor rangelands. The
	NDVI series are non-linear, non-stationary and seasonal. NDVI and
	its relationship with meteorological variables (temperature and
	precipitation) have reported different results depending on the
	topography of the terrain. However, these relationships are essential
	to forecast drought situations that affect in Spain.
	The objective of this project is to forecast the responses of the
	rangeland NDVI to temporal dynamics of temperature and
	precipitation for an arid environment. Several methods will be
	applied, beginning with Time Delay Neural Network (TDNN).
Applications: documents to be submitted and	Letter of motivation and CV before 1 st of May
deadlines	