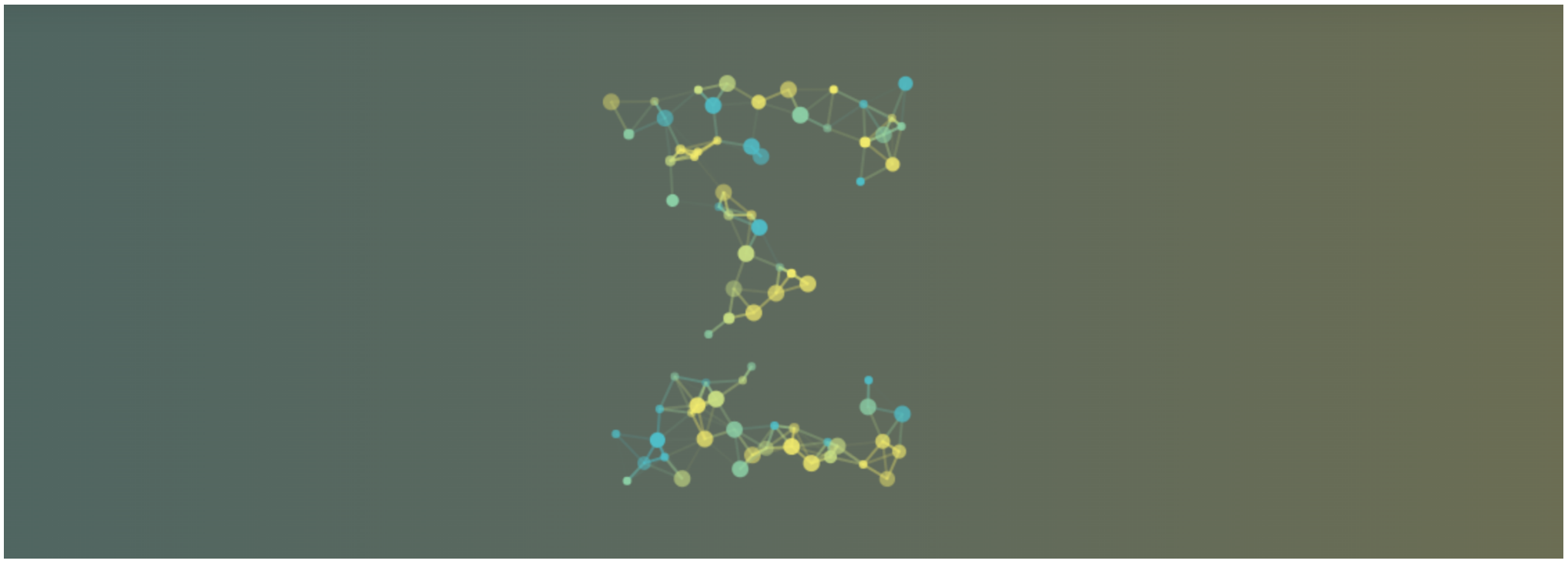
EMF Newsletter 2022

2023-02-02



Activity conducted at EMF between *01/01/2022* and *31/12/2022*

Basic support activity

- **Programming support**: R. Olmo, E. Romero, P. Martínez
- **Data management support**: Anna Ávila
- **Statistical support**: J. Bookwalter, S. Marañon/X. Luoqian, M. Móstiga, L. Fuzessy/D.Sol, B. Claramunt/A. Zango/A. Jolivet, I. Funes
- **Modelling support**: J. Margalef/F. Lloret, P. Andrés, J. Bosch/F. Sgolastra

Participation in research projects

- **MODOSIN** (PPNN - IP: E. Batllori, UB-CREAF) and **MATOSEG** (Fundación Biodiversidad - IP: P. Casals, CTFC): creating the new app SiteDrought for the LFC.
- **RESONATE** (H2020 - Researchers: J. Martínez, F. Lloret, J.M. Espelta): Assisting in the use of MEDFATE for the evaluation of forest ecosystem services.
- **PHUSICOS** (H2020 - Researchers: P. Andrés, E. Doblas): Show the effectiveness of nature-based solutions to reduce the risk of extreme weather events in rural mountain landscapes.
- **FORGENIUS** (H2020 - Researchers: M. Mencuccini): Parameterization of process-based models.
- **BOMFORES** (MCINN) - IP: M. De Cáceres, Researchers: R. Molowny-Horas, V. Granda, R. García Valdés. Project led by EMF and started in September 2022.

Participation in transfer projects

- **Contracte programa / Oficina Catalana de Canvi Climàtic** - (Researchers: J. Vayreda, M. Banqué) for the projection of forest dynamics over Catalonia during the XXIst century and the evaluation of ecosystem services.
- **WWF** - (Researchers: E. Doblas, J. Vayreda, M. Banqué) for the projection of forest dynamics over Spain and the evaluation of C sequestration.

Network building

- Model developers contacted with the aim to have a frequent collaboration
- Participation in a working group to define management scenarios at the level of Catalonia (CREAF – CTFC – OCCC – DARP – CPF)

Training & mentoring

Courses taught:

- R Training courses (basic R and spatial R) (Watering Talents/CREAF)
- Process-based forest modelling with MEDFATE (Watering Talents/CREAF and University of Eastern Finland)

Mentoring:

- Technician (O. Amorós) in creation of web applications with R (MODOSIN and MATOSEG projects)
- Co-supervised PhD theses: J. Maspons (CREAF) and S. Harati (UdeM)

Model development

Design and implementation:

- Development of the growth, mortality and recruitment models for MEDFATE.
- Development of the capability to evaluate management scenarios using MEDFATELAND.
- Development of an Integral Projection Model (IPM) to project forest dynamics in Catalonia for the Oficina Catala de Canvi Climatic.

Parameterization:

- Parameter estimation of MEDFATE models for woody taxa of the Spanish National Forest Inventory (SNFI) using trait databases and calibration exercises.

Evaluation:

- Evaluation of the performance of MEDFATE and IPM for the prediction of forest dynamics in Catalonia, between SNFI2 and SNFI4.

New software & updates

- `meteospain` (new)
- `sapfluxnetr` (updates)
- `meteoland` (update and maintenance, IN PROGRESS)
- LFC web apps (maintenance)
- `medfate`,`medfateland` and `medfateutils` (updates following model development)
- `Rtigre` (new, local)
- `Rvfsmod` (new, local)

Datasets added to the EMF catalog

- **HydroSHEDS** [https://www.hydrosheds.org]: HydroBASINS (watershed boundaries and sub-basin delineations), HydroRIVERS (vectorized line network of all global rivers that have a catchment area of at least 10 km2 or an average river flow of 0.1 cubic meters per second, or both), HydroLAKES (shoreline polygons of all global lakes with a surface area of at least 10 ha).
- **AVAMET** [https://www.avamet.org/]: Automatic meteorological station network from the Pais Valencia meteorology association.
- **AdapteCCA** [https://escenarios.adaptecca.es]: Tool to visualize and download climate change projections for Spain.
- **PhenoCam** [https://phenocam.sr.unh.edu/webcam/]: Cooperative continental-scale phenological observatory that uses imagery from networked digital cameras to track vegetation phenology in a diverse range of ecosystems across North America and around the World.
- **GEDI** [https://gedi.umd.edu/data/products/]: High-resolution laser ranging of Earth's forests and topography from the International Space Station.
- **NABBS** [https://www.pwrc.usgs.gov/bbs/index.cfm]: Cooperative effort between the U.S. Geological Survey's Patuxent Wildlife Research Center and Environment Canada's Canadian Wildlife Service to monitor the status and trends of North American bird populations.
- **RCP database** [https://tntcat.iiasa.ac.at/RcpDb/]: The RCP database aims at documenting the emissions, concentrations, and land-cover change projections of the so-called "Representative Concentration Pathways".
- **PaleoClim** [http://www.paleoclim.org/]: High-resolution paleoclimate data for use in biological modeling and GIS.
- **PaleoFire** [https://www.paleofire.org/index.php]: The Global Paleofire Database (GPD) provides the scientific community with a global paleofire dataset for research and archiving sedimentary records of fire.

Models added to the EMF catalog

- **FORCAsT** [https://doi.org/10.5281/zenodo.4776662]: FORest Canopy Atmosphere Transfer model is a canopy model capable of simulating the formation of secondary organic aerosol (SOA) from biogenic VOC oxidation.
- **FORCEEPS** [http://capsis.cirad.fr/capsis/help_en/forceeps]: A forest community model for woody species (Angiosperms and Gymnosperms). Inspired by the gap model ForClim, deals with environmental and biotic filtering of forest communities and ecosystem processes such as biomass production.
- **PICUS** [https://boku.ac.at/en/wabo/waldbau/research/working-areas/waldoekosystemmodellierung/dynamische-oekosystemmodelle/picus]: The PICUS model family is based on the patch model approach and comprises the three model variants,each operating on a different level of physiological detail.
- **MAIDEN** [https://dendro-eco.uqat.ca/maiden/]: MAIDEN is an ecophysiological model that was created to explore the relationships between climate variability and forest growth-productivity. The simulations can be verified using different data to validate the different processes in the model, including dendroecological growth data, 13C and 18O data and measurements of ecosystem carbon and water fluxes.

Publications using EMF tools

- Ameztegui et al. (2022). Uncertainty of biomass stocks in Spanish forests: a comprehensive comparison of allometric equations. For. Ecos. (https://doi.org/10.1186/s40663-021-00308-w).
- Miezite et al. (2022). Trajectories of wildfire behavior under climate change. Can forest management mitigate the increasing hazard? J. Env. Management (https://doi.org/10.1016/j.jenvman.2022.116134).
- Caballol et al. (2022). Disease in regenerating pine forests linked to temperature and pathogen spillover from the canopy. J. Ecol. (https://doi.org/10.1111/1365-2745.13977).
- Balaguer-Romano et al. (2022). A semi-mechanistic model for predicting daily variations in species-level live fuel moisture content. Agr. For. Met. (https://doi.org/10.1016/j.agrformet.2022.109022).
- McDowell et al. (2022). Mechanisms of woody-plant mortality under rising drought, CO2 and vapour pressure deficit. Nat. Earth & Env. (https://doi.org/10.1038/s43017-022-00272-1).
- Morera et al. (2022). Historical and future spatially-explicit climate change impacts on mycorrhizal and saprotrophic macrofungal productivity in Mediterranean pine forests. Agr. For. Met. (https://doi.org/10.1016/j.agrformet.2022.108918).
- Alonso et al. (2022). Bacterioplankton composition as an indicator of environmental status: proof of principle using indicator value analysis of estuarine communities. Aquat. Microb. Ecol. (https://doi.org/10.3354/ame01979).
- Vilà-Vilardell et al. (2022). Prescribed fire after thinning increased resistance of sub-Mediterranean pine forests to drought events and wildfires. For. Ecol. & Man. (https://doi.org/10.1016/j.foreco.2022.120602).

Publications from other collaborations (2021-2022)

- Flo et al. (2022) Vapour pressure deficit is the main driver of tree canopy conductance across biomes. Agr. For. Met. (https://doi.org/10.1016/j.agrformet.2022.109029)

- Poyatos et al. (2021) Global transpiration data from sap flow measurements: the SAPFLUXNET database. Earth. Syst. Sci. Data (https://doi.org/10.5194/essd-13-2607-2021)
- Yáñez-Serrano et al. (2021) GLOVOCS-Master compound assignment guide for proton transfer reaction mass spectrometry users. Atm. Env. (https://doi.org/10.1016/j.atmosenv.2020.117929)
- Funes et al. (2022) Carbon stocks and changes in biomass of Mediterranean woody crops over a six-year period in NE Spain. Agron. Sust. Dev. (https://doi.org/10.1007/s13593-022-00827-y)
- Ruffault et al. (2022) Plant hydraulic modelling of leaf and canopy fuel moisture content reveals increasing vulnerability of a Mediterranean forest to wildfires under extreme drought. New Phytol. (https://doi.org/10.1111/nph.18614)

Ecosystem Modelling Facility

WHAT WE DO

- Provide training and technical support for modelling activities to research groups at CREAF.
- Develop and promote the use of process-based and empirical models aimed at predicting the response of terrestrial ecosystems to global change at multiple scales from the forest stand to the region.
- Facilitate discovery of data sets or models relevant for ecosystem modelling activities.
- Develop tools aimed at facilitating the interoperability between data sources and models, and between different models.
- Develop and maintain interactive web applications for ecosystem data exploration and visualization.

CONTACT

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