Submitted Abstract

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Abstract

Mountain ecological and socio-economic systems are intrinsically linked with one another via a series of complex interactions and feedback mechanisms, which relationships can be disentangled only by combining interdisciplinary perspectives and integrated observation and analysis. This situation makes the study of mountain socio-ecological systems increasingly complex and multidisciplinary, requiring the use of new technological tools and the necessary statistical and computational skills to appropriately manage large datasets, integrate them into reproducible, open databases, and build up robust models to comprehensively assess the status and trends of mountain biodiversity, climate, and its many contributions to people.

Smart Ecomountains—the Thematic Center on Mountain Ecosystems of the European Research Infrastructure LifeWatch-ERIC (Sierra Nevada, Spain)— adopts this “system thinking” approach by bringing together knowledge from different areas of expertise. The scientific and technical team monitors a diverse suite of ecological, climatic, and socio-economic mountain variables, using in-situ observational sampling, automated instruments, remote sensing surveys, and citizen observations. The data management team coordinates the transfer of data from field sites to the central data center. The team standardizes and automates data collection and processing tasks; stores and processes data; publishes data products in open-access repositories for users to use; and develops relevant operational tools, such as digital monitoring forms and applications to prevent errors and facilitate in-situ data collection. The ICT team develops Virtual Research Environments and Vlabs to facilitate international multidisciplinary research-working environments in which scattered mountain scientists will easily exchange, access, and analyze quality-assured, open-access data through their web browser.

Here, we will present our long-term monitoring programme and share our experience in integrating data of extremely diverse nature (e.g. biological collections, measurements, observational data, meteorological projections, satellite images, etc.). We will also present different tools that we are developing to improve our understanding on mountain social-ecological systems, and support society, managers, and policymakers with scientific-based tools and knowledge to address key mountain challenges.