



GuMNet - A high altitude monitoring network in the Sierra de Guadarrama (Madrid, Spain)

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The Guadarrama Monitoring Network (GuMNet) is an observational infrastructure focused on monitoring the state of the atmosphere and the ground in the Sierra de Guadarrama, 50 km NW of the city of Madrid. The network is composed of 10 stations ranging from low altitude (900 m a.s.l.) to high mountain climate (2400 m a.s.l.).

The atmospheric instrumentation includes sensors for air temperature, air humidity, 4-component net radiation, precipitation, snow height and wind speed and direction. The surface and subsurface infrastructure includes temperature and humidity sensors distributed in 9 trenches up to a maximum of 1 m depth and additionally temperature sensors in 15 PVC cased boreholes down to 20 m and 2 m with a higher vertical resolution close to the surface. All stations are located in exposed open areas except for one site that is in a forested area for measuring air-ground fluxes under forest conditions. High altitude sites are focused on periglacial areas and lower altitude sites have emphasis on pastures. One of the low altitude sites is equipped with a 10 m high tower with 3D sonic anemometers and a CO₂/H₂O analyzer that will allow the sampling of wind profiles and H₂O and CO₂ eddy covariance fluxes, important for estimation of CO₂ and energy exchanges over complex vegetated surfaces. The network is connected via general packet radio service to the central lab in the Campus of Excellence of Moncloa and management software has been developed to handle the operation of the infrastructure. The data provided by GuMNet will help to improve the characterization of atmospheric variability from turbulent scales to meteorology and climate at high mountain areas, as well as land-atmosphere interactions. The network information aims at meeting the needs of accuracy to be used for biological, agricultural, hydrological, meteorological and climatic investigations in this area with relevance for ecosystem oriented studies. This setup will complement the broader network of meteorological stations of the Spanish National Meteorological Agency (AEMET), mostly distributed in the lower latitude range.

This initiative is supported and developed by research groups integrating the GuMNet Consortium from the Complutense and Polytechnical Universities of Madrid (UCM and UPM), the Energetic Environmental and Technological Research Centre (CIEMAT), AEMET, and the National Park Sierra de Guadarrama (PNSG) which provided the initial foundations of this network. GuMNet will be operational in 2016.

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