



Interannual variability in net CO₂ exchange in a semi-arid carbonaceous ecosystem located in the Southeast of Spain

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Net CO₂ exchange measured by micrometeorology in different terrestrial ecosystems is generally interpreted in the context of biological processes (photosynthesis and respiration). Here we examine the possibility of an abiotic CO₂ source in addition to biological processes acting in carbonaceous ecosystems. Carbonate rocks represent the world's largest carbon reservoir and outcrop on *ca* 12% of the water free Earth surface (Ford and Williams, 1989). Geochemical reactions can proceed as dissolution of CO₂ and stone to form bicarbonate, or precipitation consuming bicarbonate to produce both calcium carbonate and CO₂. Results suggest that this abiotic CO₂ source is related to ventilation of both the soil and subterranean macropores (caves), capable of storing large amounts of CO₂. In this study we quantify the net CO₂ exchange for a semi-arid shrubland ecosystem over a carbonaceous substrate located in the Southeast of Spain (Sierra de Gádor, province of Almería) called "El Llano de los Juanes". In this context, carbon fluxes were measured continuously over nearly three years using the eddy covariance technique. Traditional methods for filling gaps, like ecophysio-

logical non-linear regressions, cannot be used in carbonaceous ecosystems due to the hypothesized existence of abiotic CO₂ source. We selected two different methods for filling gaps: the “marginal distribution” method (Reichstein et al., 2005) and neural networks.