



Post-fire Salvage logging management represses the role of Mediterranean coniferous forests as carbon sinks

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Fire is a frequent perturbation in Mediterranean ecosystems inducing changes in land use/cover types, thereby altering water, energy and carbon balances. Although short -term effects of fire in the carbon balance can be reasonably estimated, longer term effects are more uncertain and influenced by several factors. What is more, vegetation cover and development may differ with burnt-wood management. Post-fire salvage logging is historically practiced by forest administrations around the world. It consists of felling and removing burnt trunks, and is often combined with the elimination of the remaining woody debris (branches, logs, and snags) by chipping, grinding, or mastication. Although regeneration can depend on several factors like features of burned stands, soil texture, nutrient availability or post-fire weather conditions, most studies confirm a negative effect of the salvage logging treatment, hindering regeneration of the main species and reducing understory cover. These effects can modify the net ecosystem carbon balance (NEE) during several years after a fire.

The aim of this work is to compare carbon dioxide and water vapour exchange from two different post-fire managements: “salvage logging” and “non intervention”, during the fourth year following fire, using eddy covariance measurements. The study site is located in the Sierra Nevada National Park (SE Spain). In September 2005, a wildfire burned ca. 1,300 ha of reforested pine between 35 and 45 years old and treatments were established in early 2006. Different partitioning approaches were applied to analyze the evolution of photosynthesis and respiration processes throughout the year and their contributions to the measured NEE for both treatments. In addition, plants cover, soil properties and nutrients were used to interpret differences in the measured fluxes and involved processes. For annually integrated measurements, the parcel treated with salvage logging acted as a net source of carbon emitting 90-120 g C m⁻², whereas the untreated parcel absorbed around 120 g C m⁻¹. Differences in the estimated annual NEE for both treatments were attributed to differences in plant cover.