



Geological contribution to the GHG budget of the Capo Caccia karst ecosystem (NW Sardinia, Italy)

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Capo Caccia karst area (North-West Sardinia, Italy) is one of the monitoring points of the Italian ICOS infrastructure. The carbon flux in this region is continuously performed by direct measurement of gas exchanges across canopy-atmosphere interface using an eddy covariance tower placed over a Mediterranean maquis, constituted by sclerophyl species. As the net ecosystem carbon balance in this terrestrial ecosystem does not only respond to physiological features of its vegetation, the geological contribution to the GHG budget has been investigated through the relationships among atmosphere-biosphere-geosphere gas exchanges.

Since carbon dioxide is involved in the geochemical cycle of the karst processes, the environmental monitoring programme has been extended to the underground atmosphere using micrometeorological stations installed within caves.

The preliminary data show a static cave air CO₂ concentration ranging from 500 ppm to 1600 ppm, with periodic gas plumes that reach up to 18,000 ppm. Correlation analysis point out that subsurface-atmosphere gas exchange reflects environmental forcing related to atmospheric variables. In fact the degassing mainly occurs by barometric pressure changes and via density driven flow. Subsurface air ventilation can be also induced by water table oscillations, so future step of the study will take into account the relationship between the unsaturated zone and the near marine ecosystem.

Even though underground air mass is reasonably small respect to the outside atmosphere, when considering the high density of karst features of Capo Caccia karst ecosystem, its temporal CO₂ pattern provides evidence that the amounts of carbon that might be released from subsurface could be noticeable at both local and regional scale.

Integrated monitoring of atmosphere dynamic can give clues for understanding carbon cycle model and multidisciplinary approaches contribute for filling the gap in global carbon budget.

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