

## **Land use changes and its climatic implications in Northern Italy during the Dark Ages**

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Here we present an interdisciplinary study on land use changes in Northern Italy at the transition from the Roman Empire to the Early Middle Ages. The combination of archaeological data and high-resolution pollen analyses carried out in the Fiaavè basin (Trentino) provide a detailed insight in socio-economic changes and its implications with climate in the Dark Ages. The vegetation in this area is dominated up to 1000 m by submediterranean trees like *Fraxinus ornus* and *Ostrya carpinifolia*, superseded by a mixed *Fagus* and *Abies* forest with variable amounts of *Picea abies*. Since 2008 archaeological surveys in the Fiaavè basin as well as excavations conducted on a fortified hill-top settlement (castrum) in 985m register the settlement development of this settlement cluster and reveal an almost continuous occupation from Roman to Early Medieval Times. In addition a high-resolution pollen record from a 1.30 m thick peat sequence of the bog “Palude di Fiaave” discloses four main phases: (1) in the Late Iron Age high amounts of arboreal pollen and the spread of *Abies* demonstrate a decrease in settlement activity suggested by wetter climate conditions. (2) During the Roman Empire a phase with arable farming in the basin starts. *Olea*, *Juglans* and *Castanea sativa* are introduced and document the onset of horticulture in this region. (3) After 300 AD - during the Migration Period - the wet and cool conditions have had poor impact on settlement activity. Agricultural (*Cerealia*) and nitrophilous indicators (*Plantago*, *Chenopodiaceae*, *Urticaceae*) are continuously proved. However a change within the cultivated crops in relation to the climate conditions is observed. Subsequently a progressive recovery of *Pinus* followed by *Abies* and *Fagus* marks the climatic improvement at the beginning of the Early Medieval Times. (4) The time from 600 to 800 AD is characterized by increasing frequency and diversity of anthropogenic-related indicators. The implications of these land use changes with climate conditions are discussed.