

# Analysis of Fossil Pollen Record from the Late Holocene in the Turkish Highland (Middle Taurus, Turkey)

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**Abstract.** In this study, we have investigated changes of vegetation in the Mediterranean Region of Turkey approximately for the last 5000 years using pollen analysis. There were some differences in the past vegetation, but principally vegetation structure has shown similarity with the modern one. Main difference appeared with the existence of *Betula*.

**Keywords:** Mediterranean region, arboreal-nonarboreal pollen, soil samples, radiocarbon dating, human impact on vegetation

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## 1. Introduction

Fossil pollen studies are important to detect vegetation changes caused by climatic or anthropogenic reasons. Our study area is located in the Eastern Mediterranean Region and it has special place in terms of longstanding human impact on local vegetation (Karlıoğlu et al. 2015; Vermoere et al. 2002; Waelkens et al. 1999; Woldring 1984; Zeist Van et al. 1975; Zeist Van & Bottema 1991). Most of these studies were conducted in this place to emphasize similar outcome, because of this situation we made this research to encounter arboriculture zone and reveal vegetation history.

tion history based on fossil pollen in lake deposits, so we worked with soil profile series. The profile was 2,4 meters long and samples were taken with 5 cm intervals. After standard procedure of maceration (Erdtman's acetolysis) (Erdtman 1954), slides were counted and pollen diagram was plotted by using C2 program. Two different levels of deposits from this profile (that contained organic carbon) were used for radiocarbon dating. Several levels did not contain enough pollen to obtain reliable results of counting so we included a second pollen slide to calculate percentages based on the sum of at least 250 AP+NAP (arboreal pollen + non-arboreal pollen).

## 2. Material and methods

A soil profile that was assessed in this study is located in the Turkish highland area (1550 meter high), known as Middle Taurus in the Mediterranean region (Fig. 1). In the study area there is no a lake suitable for tracing vegeta-

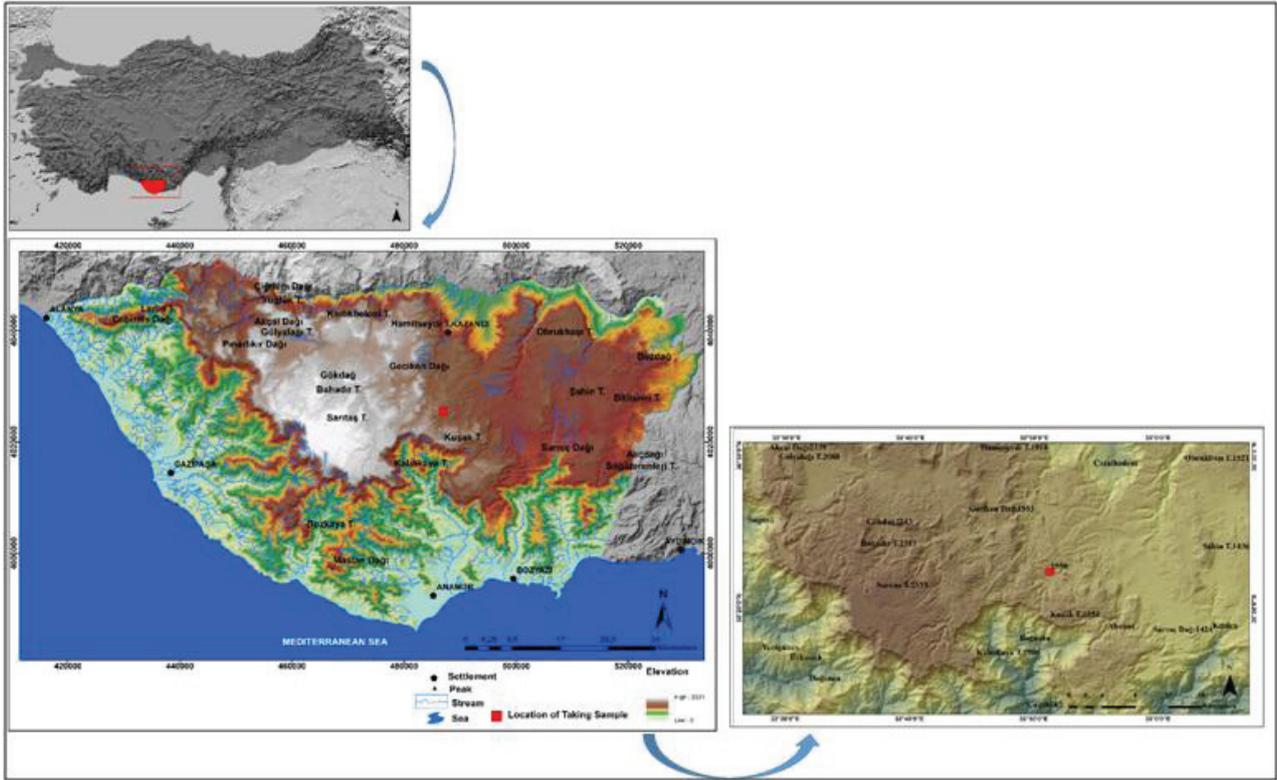


Figure 1. Location map of study area

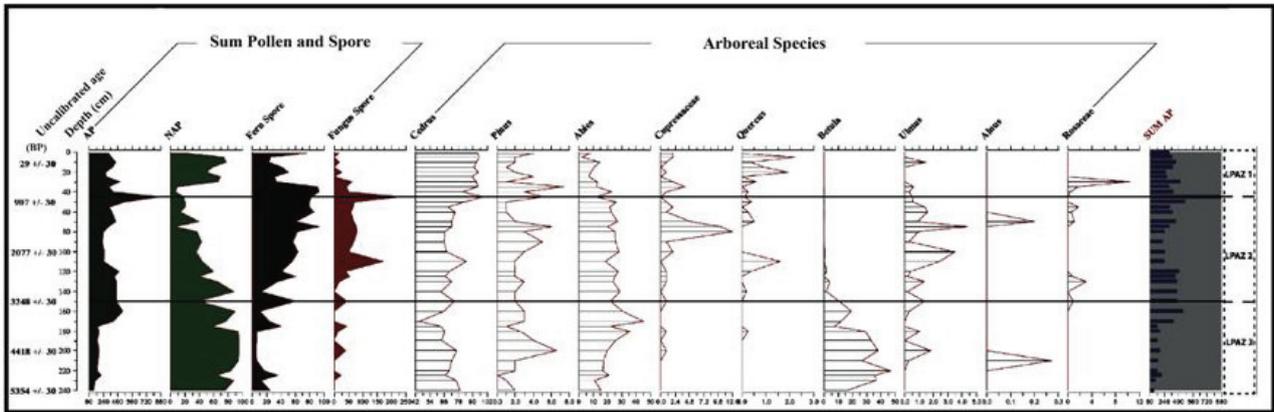


Figure 2. Pollen diagram of the arboreal plants

### 3. Results

Pollen diagram (Figs. 2–4) was divided into three local pollen assemblage zones (LPAZ 1, LPAZ 2, LPAZ 3).

Frequent arboreal pollen types are *Cedrus*, *Abies*, *Pinus*, *Quercus*, *Betula*, *Ulmus*, *Alnus* and some pollen grains belong to Cupressaceae and Rosaceae family. Non-arboreal pollen grains, encountered in this study, are: Chenopodiaceae, Asteraceae, *Polygonum*, Caryophyllaceae, Araceae,

Lamiaceae, Cannaceae, Liliaceae, Geraniaceae and Amariyllidaceae. Moreover, fungi spores and fern spores were counted (Figs. 2–4).

Most remarkable changes were observed for the last five thousand years. *Cedrus* is the most common tree throughout the pollen diagram. *Abies* is another dominant genus, but *Pinus* showed quite low rate through the pollen zones. The reason of increasing *Cedrus* pollen in the upper part of the diagram is probably related to afforestation. Some non-arboreal taxa such as *Polygonum*, Chenopodia-

ceae, Caryophyllaceae and Asteraceae can be considered as indicator of human impact on vegetation, but in this study an increase in pollen percentages of these taxa was not synchronous with the decrease of arboreal taxa. That is why, this increase shouldn't be related to human influence on vegetation. *Betula* is absent in actual vegetation, but *Betula* pollen type was found relatively numerous in the samples of 220, 230 and 240 cm (Özalp 2016; Özalp et al. 2016; Avcı 2004). The mentioned zones are also important with regard to highest rate of non-arboreal pollen grains.

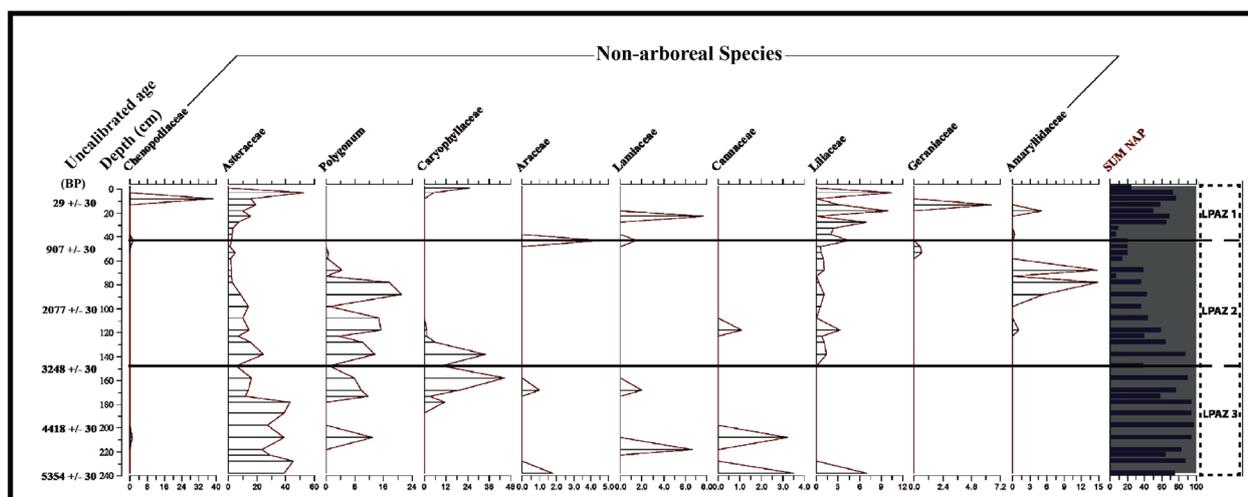


Figure 3. Pollen diagram of non-arboreal plants

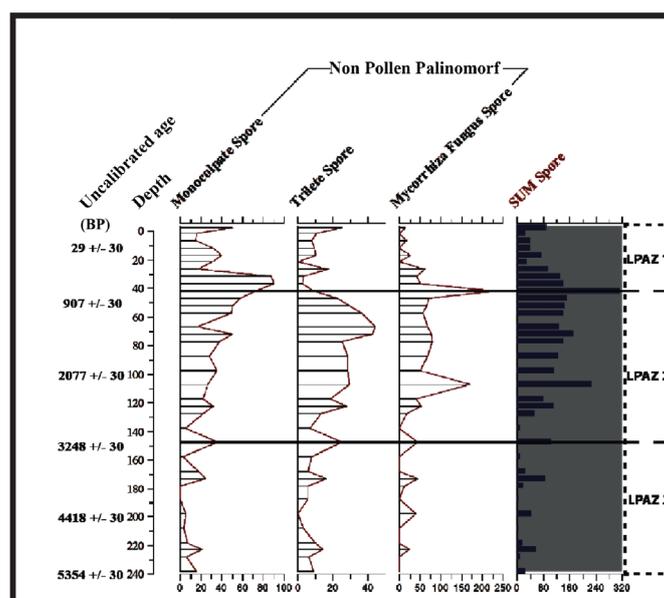


Figure 4. Diagram of non-pollen palinomorfs

#### 4. Conclusions

As can be seen, dominant elements are arboreal species in the pollen diagram. Arboriculture species, that are frequently encountered in other studies, such as: *Olive*, *Juglans*, *Fraxinus*, and also secondary vegetation element, such as *Juniperus* are absent (Zeist et al. 1975). Non-arboreal anthropogenic taxa, such as: *Polygonum*, *Chenopodiaceae*, *Caryophyllaceae*, *Asteraceae*, *Plantago*, *Cerealia* type, are either absent or too insufficient to correlate them with particular phases of human impact. The only anthropogenic indicator can be increasing *Cedrus* pollen record in the upper part of the diagram. Presence of *Betula* pollen is most surprising and remarkable, because this could point out any climatic change.

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