Opinion

Access of dynamics vegetation during Holocene by *Poaceae* pollen grains

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Paleoecological reconstructions by *Poaceae* pollen morphology were not easy until last years. *Poaceae* pollen was marker only grassland vegetations and no more ecological or taxonomic inferences from pollen samples of Quaternary.[1,2] Though the pollen grains of the family *Poaceae* are widely found in Quaternary sediments, the *Poaceae* pollen has been low taxonomic resolution due to similar pollen morphology between species (monoporate and spheroidal pollen grains). However, studies on modern and fossil pollen grains of many species analyzed in the last years reveal more ecological inferences from *Poaceae* pollen, principally species of grassland of the South America, included Rio Grande do Sul state of Brazil.[3–6] These works provide ecological information that may be important to the reconstruction of past vegetation, such as about forests, grasslands, herbaceous and arboreal species, C3 and C4 species (species with C4 metabolism are tropical and live in warmer and drier regions, while temperate species are C3 and live in humid and cold conditions). The difference between *Poaceae* pollen is about the size of pollen grains.[3,4]

Analysis about sizes of pollen grains of plants shows that forests species have a size larger than pollen of grassland species.[3] Furthermore, some species showed diporate aperture that allows identifying palynomorphs of *Poaceae* in the high resolution[6] (Figure 1). These studies provide modern *Poaceae* pollen dataset. After, we selected the one Quaternary sediment to analysis and identify fossil *Poaceae* pollen grains, which the fossil pollen may be identified by modern pollen dataset. The Quaternary sediment is from Águas Clara's region of southern Brazil (Figure 2) and the sediment has 2, 70m depth and 10.975 C14 BP of basal age (C14 BP-years before present by radiocarbon dating. Present is the years 1950). The samples were chemically processed according to the methodology proposed by Faegri and Iversen (1989)[7] and the slides created using glycerinated jelly were deposited in the Laboratório de Palinologia da ULBRA. 60 *Poaceae* pollen grains were measured at intervals of 10cm. Results showed that *Poaceae* pollen reveals ecological information about dynamics of grassland and forest vegetation of *Poaceae*. Grassland was the vegetation dominates in the early Holocene and a low percentage of *Poaceae* forest species.

Changes are in the late Holocene (3.420years BP) when increasing the frequency of forest species. *Poaceae* pollen of forests was increasing more and more in percentage during the late Holocene. The samples of recent ages show similar percentages of both pollen grains of grassland and forest reflecting modern vegetation in the Águas Claras region. The new data of modern and fossil *Poaceae* pollen in this work documents that analysis of vegetation change in the past is possible by *Poaceae* pollen. The pollen grains of *Poaceae* species allowed shows events of climate changes. Larger pollen indicates humid conditions and expansion of forests while smaller pollen of grasslands is dominance in the samples of basal ages. The smaller *Poaceae* pollen of grassland species suggests dry conditions in the early Holocene. The new approach and the new *Poaceae* pollen database show that ecological information from *Poaceae* pollen is useful for reconstructions of vegetation with a high diversity of grasses, such as grasslands of Pampa biome from South America.

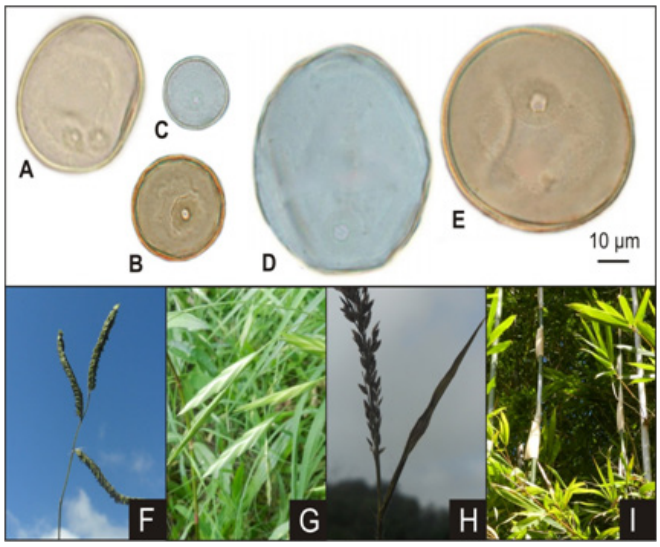

Figure 1 Different sizes of Poaceae pollen grains of grassland species (A-C) and forest species (D-E).

Diporate pollen grain of *Paspalum pauciciliatum* (A) and monoporate pollen grain of *Aristida* sp. (B), *Eragrostis neesii* (C), *Guadua trinii* (D) and *Colanthelia cingulata* (E). Poaceae plants of *Paspalum pauciciliatum* (F), *Bromus catharticus* (G), *Eragrostis neesii* (H) and *Guadua trinii* (I).

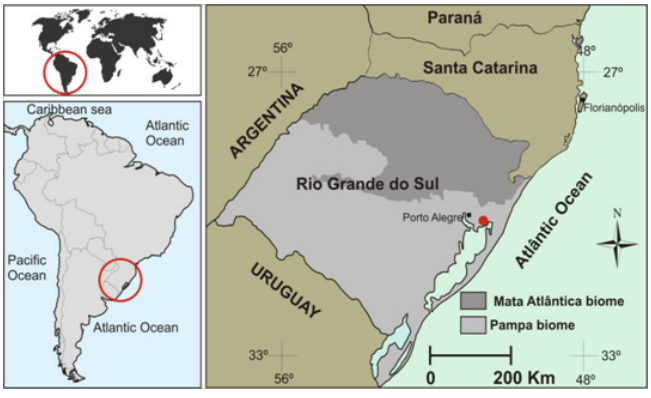

Figure 2 Map of southern Brazil showing the Quaternary sediment sampling site in Rio Grande do Sul, Brazil.

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Conflict of interest

Author declares that there is no conflict of interest.

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