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Advantages and disadvantages of stable carbon isotope ratios measurements on sporopollenin. A mean to characterize physiological types of plants in the past and associated CO2 assimilation processes.

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Variations in climatic parameters such as dry-season duration, rainfall, ambient temperature, O2 and CO2 atmospheric concentrations can be addressed through the geographical distribution of the plant photosynthetic pathways (C3, C4, CAM). The questions of the C4 and CAM plants origins, the induction of these metabolisms in relation with climatic factors and of their following successful expansion is an important scientific challenge. Reconstituting the respective contribution of C3 and C4 plants in paleovegetations, implies to consider the fossil plant remain. Hence, new biomarkers suitable for both modern and fossil material are necessary to characterize directly physiological plant types. C3 plants may then be distinguished from C4 plants by the ?13C values of organic carbon. The resolution and accuracy of the data may be improved if measurements are made on specific fossilised plant biomarkers stable through geological times such as pollen. It is interesting because it contains a particularly resistant biopolymer (sporopollenin) exine part of pollen grain, insoluble in organic solvents, well preserved in sediments. Stable isotope ratios measurements on sporopollenin of pollen grains appear then a powerful and accurate tool for comparing the impact of climatic factors on modern and fossil vegetation. This is an independent proxy with a time lag shorter than the vegetation biomass modifications. However no precise and reliable calibration yet exists that could be useful for both modern and fossil material. These different aspects were discussed.