Passive sampler technique Sigma-2 with automated microscopic real colour image processing for particle measurements in the size range from 2.5-80 μm

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Air quality measurements of German health and recreation resorts are based on specific quality standards and are licensed by state regulations. For this purpose easy and cost-effective passive sampling techniques are in use. Apart from measuring gaseous pollutants, fine and coarse particulate matter is sampled and analyzed. For collection of the coarse particulate size fraction the passive sampler Sigma-2 is used (VDI-guideline 2119-4). The special construction allows particle sampling, which is protected against direct radiation, wind and precipitation. On a transparent adhesive collection plate particles larger than 2.5 μm are analyzed by automated optical microscopy. Size, optical density and various shape parameters of each particle are extracted from the images. Apart from the standard gray value measurements (8-bit resolution) an established real color image processing system adds additional details for single-particle analysis. For this purpose two main color models are applied: the RGB for the channels **R**ed, **G**reen and **B**lue as well as the HSI model for **H**ue, **S**aturation and **I**ntensity. The real color technique allows for fully automated characterization of three main particle groups: geogenic, anthropogenic and biogenic (pollen). The special shielding and construction of the passive sampler permits to calculate ambient concentration rates as well as particle-size distributions. Beside routine applications, air quality research requiring a detailed differentiation for given pollutants is carried out all over the world. For this purpose, our method is combined with a more specific chemical particle characterization technique (SEM-EDS) as well as with trace element (ICP-MS) and isotope ratio (MC-ICPMS) analysis.

The test methods of organic matter and the implication for paleoenvironment: Late Cenozoic sediment from Xingou Drill in Jianghan plain

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In this article, organic matter compositions of the rock samples have been directly measured by the temperature-controlled method. The theoretical validity and practical feasibility of this method were analyzed, and based on the experiment the data of samples from the 400m-deep Xingou Drill in Jianghan Plain has been acquired. The result shows in the drill there are higher TOC and TOC/TON, and lower TON, compared to the data from other sites, which suggests that the evolution of Jianghan Plain might been greatly affected by rivers, and the lakes there are poor in nutrition. According to correlation study with sedimentary facies, it indicates that in Neogene period (including the early Pleistocene) Jianghan Plain is warm and wet, with well developed paleolakes. While the decrease of TOC and TON in middle Pleistocene, implies a relatively cold-dry climate and increasing climate fluctuation. The relatively wet climate of late Pleistoncene give birth to higher plant cover. In Holocene the paleolakes developed and it exists higher preservation rate of organic matter. The climate changes of late Cenozoic indicated by organic matter compositions from the drill are similar to results of researches on other regions in China. However, the characteristics of paleoclimate are different due to the regional diversity.

Periods	Numbers	TOC	TON	TOC/TON
Q4	45	0.58	0.04	17.1
Q3	65	0.71	0.02	36.5
Q2	14	0.46	0.02	22.9
Q1	59	0.46	0.02	23.4
N	26	0.51	0.02	23.4
Avg.	209	0.57	0.03	26.1

Table 1: The organic elemental composition of Late Cenozoic sediments from Xingou Drill in Jianghan plain