Polycyclic aromatic hydrocarbons in materials of burned peatbogs

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The composition of polynuclear aromatic hydrocarbons (PAHs) formed during the burning of various organic-rich materials differs considerably.

Materials and methods

The composition of non-substituted PAHs in partly fired peatbog deposits was determined. A total of 32 samples was collected from 12 peatbogs located far from urban and industrial centers. These encompassed 12 peat samples from the fired layer, 12 peats from the underlying layer, and 8 peats from the superficial layer formed on the burned peat. The contents of 17 PAHs compounds were determined in dichloromethane extracts derived from the samples examined.

Discussion of results

The mean content of Σ17 PAHs in peats was 0.10 ppm, in a layer of burned peats was somewhat higher – 0.12 ppm, whereas in a newly formed superficial root layer three times higher – 0.313 ppm. In all peat samples the presence of three-ring hydrocarbons, i.e. acenaphthene, fluorene and phenanthrene, and four-ring fluoranthene was noted. Among the remaining hydrocarbons pyrene was traced in some samples of moss and sedge-moss peats, whereas perylene – in moss peats. Apart from perylene, the samples examined did not contain five- and six-ring compounds. The content of PAHs determined in a burned peat layer did not differ much from that in peats. No considerable amounts of five-and six-ring hydrocarbons were recorded within a burned peat layer, even though the formation of these compounds is linked to the burning of organic-rich materials. The new turf-root layer formed on the burned peats is featured by a PAH different pattern. In all the samples examined a higher concentration of fluoranthene, and the presence of all the determined four-ring hydrocarbons and five-ring benzo(b)fluoranthenu and benzo(e)pyrene were noted. In most samples benzo(a)pyrene and benzo(k)fluoranthene were recorded too. The composition of PAHs in this layer is similar to that observed in hard coals and airborne particulates (Bojakowska, Sokokowska, 2001; Gardner et al., 1995).

Conclusions

A relatively poor "fingerprint" of PAHs in a burned peat layer and the presence of a larger number of these compounds, and the composition of PAHs in a newly formed superficial layer may suggest that most hydrocarbons be linked to atmospheric fallout of PAHs derived from coal combustion.

References

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U-Pb geochronology from the Howard Peaks Intrusive Complex (Northern Victoria Land - Antarctica): new evidence for magmatic age and U-Pb resetting in zircons

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High-precision in-situ analyses were carried out on individual zircon grains in selected samples from Howard Peaks Intrusive Complex (Deep Freeze Range, North Victoria Land - Antarctica) to constrain the batholith emplacement age and its parental source. Metaluminous, calc-alkaline bt-monzogranites, granodiorites and tonalites, some of which showing a charno-enderbitic character and often affected by a pervasive high-temperature solid-state ductile deformation, have been analyzed by means of LAM-ICPMS and multi-collector LAM-ICPMS to investigate the U-Pb and Lu-Hf systematics of zircon.

The analyzed zircons display complex internal features, such as relict cores, euhedral concentric oscillatory and convoluted zones, highly luminescent domains, and patches of unzoned zircon sometimes retaining ghost zones.

U-Pb zircon dating and Hf isotopic ratios define three different groups: 1) magmatically zoned zircons with emplacement ages in the range 510-490 Ma and mean Hf/Hf ratios around 0.2823; 2) texturally complex zircons showing distinct younger reset ages (from magmatic age down to 440 Ma) and Hf/Hf ratios as in group 1; 3) relict cores with a maximum age of 2,7 Ga and distinctly less radiogenic Hf (0.2813).

We propose that the textural features of the zircons and the wide spread in the otherwise concordant U-Pb ages could be attributed to resetting events affecting the U-Pb system only. Recrystallization under high temperature ductile deformation conditions and different degrees of fluid access for individual zircons could be related to the occurrence of a NE-SW dextral strike-slip shear zone in this area. Furthermore, the emplacement of a widespread younger basic magmatism in the whole Deep Freeze Range area may have favoured thermally-driven Pb loss.

References

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