Geochemical characterization and palaeoenvironmental implications of lipids in Neogene lignites and lignitic shales in NW Poland

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The lipophilic biomarker distributions in lipids of Neogene lignites and lignitic shales in western Pomerania and the midlands of Poland are presented. Twenty-six lignite samples and seven lignitic shales were obtained from twenty-four boreholes. Their extracts were separated, using thin-layer chromatography, and the saturate and aromatic fractions were analyzed by gas chromatography-mass spectrometry. The molecular compo-sitions of n-alkanes, isoprenoids, n-alkylcyclohexanes, n-alkylbenzenes, tri- and tetracyclic diterpenoids, penta-cyclic triterpenoids, as well as polycyclic aromatic hydrocarbons (PAHs) with up to five rings, were determined. The samples displayed n-alkane distributions in the range of C14–C35 and high odd-over-even carbon number predominances (CPI(25–33) from 2.9 to 7.9). Diterpanes consisted primarily of phyllocladane, abietane, isopimarane, labdane, and kaurane structures, although their abundances varied among the samples. Hopanes exhibited the biological and geochemical characteristics of low-maturity organic matter. Minor oleanane triterpenoids from angiosperms were also found. A few samples displayed evidence of biodegradation on the basis of the advanced isomerization of αβ-hopanes and the presence of short-chained n-alkanes, n-alkylcyclohexanes, and n-alkylben-zenes. A more mature stage of the above biomarkers also may have resulted in part from the oxidation of organic matter. The lignite source materials were derived from conifer and angiosperm flora as well as microbial remnants. The contribution from marine phytoplankton was excluded on the basis of the lack of C27 steroids. PAHs were predominantly perylene or phenanthrene, with minor other analogues. Thus, the data support progressive lacustrine/lagoonal sedimentation in the palaeoenvironmental mires.

Słowa kluczowe

Lignites, biomarkers, n-alkanes and isoprenoids, diterpenoids, triterpenoids, polycyclic aromatic hydrocarbons

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