

## Paleoenvironment change inferred from lipid compounds of Takano Formation, Nagano City

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### Introduction

The Takano Formation is a relict freshwater lake sediment ranging from 2 to 15 ka and located in Nagano Prefecture, Japan. It may record paleoenvironmental conditions of Japan from the Last Interglacial to the Last Glacial periods. Organic compounds in sediments are molecular fossils, which can be used as indicators of the paleoenvironments. Lipids from aquatic macrophytes and phytoplanktons are indicators of the lake water conditions, while lipids from terrestrial plants are indicators of the past vegetation in the catchments. In this study, lipid compounds in the Takano Formation were analyzed as a part of the multilateral study on the paleoclimate of central Japan from 3 to 15 ka.

### Materials and Methods

The 54 m length core drilled at Takano Formation was sliced at 1 cm interval. For lipid analysis, mixed samples of 2 cm thickness were freeze-dried and ground into powder. The samples taken every about 50 cm were analyzed as follows.

The CH<sub>2</sub>Cl<sub>2</sub>-MeOH(3:2) extracts from powdered samples were saponified with KOH. Neutral fractions were obtained from alkaline solution by solvent extraction. Then aliphatic hydrocarbons, aromatic hydrocarbons and alkanols/sterols were separated by a silica gel column chromatography. Aliphatic hydrocarbon and alkanols/sterol fractions were analyzed by GC and GC-MS.

### Results and discussion

Aliphatic hydrocarbon fraction is composed of n-alkanes from C17 to C31. The major n-alkanes were odd carbon-numbered mid- and long-chain homologues. The relatively high abundance of mid-chain n-alkanes (C23 and C25) should indicate a significant contribution aquatic macrophytes. The major components of the alkanol/sterol fractions were n-alkanols from C16 to C30 with an apparent even-over-odd predominance and sterols from C27 to C29.

The n-alkane and n-alkanol distributions changed with depth. This must indicate that organic matter supplied to sediments varied. The ratio of mid- and long-chain n-alkanes to total n-alkanes was in the range of 85-95 %. The major sterols were C29 homologues such as 24-ethylcholest-5-en-3b-ol and 24-ethyl-5a-cholestan-3b-ol, which are regarded as indicators of terrestrial higher plants. These facts indicate that the sediments mainly contain lipids reflecting higher plants' contribution.

The ratio of the mid-chain n-alkanes to total n-alkanes increases as the depth decreases from 4500 to 1000 cm. It suggests that the aquatic macrophytes contribution increased as the sedimentation proceeded. Therefore the Takano Formation will allow us to infer continuous paleoenvironments.