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TRACE ELEMENT RECORDS IN HIGH MOUNTAIN LAKE SEDIMENTS IN NW SLOVENIA DATED BY ^{210}Pb

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Abstract. Assessments of trace element concentrations of anthropogenic or natural origin, especially of Cd, Pb and Zn, have been the subject of several studies during the last decade. These metals have been intensively used in industry, especially in the northern hemisphere. Due to worldwide reduction in particulate emission by industry and anti-knock lead in gasoline, their global emission into the atmosphere has been decreasing since 1975 [1, 2].

For many trace elements long-range atmospheric transport is the most important source of contamination and lake sediments can act as archives of atmospheric deposition of those elements. In our study trace element concentrations of As, Cd, Co, Cr, Sb, Pb and Zn were determined in sediments from three small high mountain lakes in northwestern Slovenia. Sediments for trace element analysis were collected in 1999 at Lake Planina pri Jezeru, in 1998 at Lake Krn and in 1996 at Lake Ledvica. Radiometric dating of the sediments was carried out using the Pb-210 method. Ages and sedimentation rates were estimated using constant rate supply (CRS) model using the software package of Shukla [3].

According to Pb-210 dating, the accumulation rates of the sediments range from 0.14cm/year in Lake Ledvica to 0.26 cm/year in Lake Krn (Fig. 1). In Lake Planina pri Jezeru the sedimentation rate was determined to be 0.24cm/year and has greatly increased in the last 15 years.

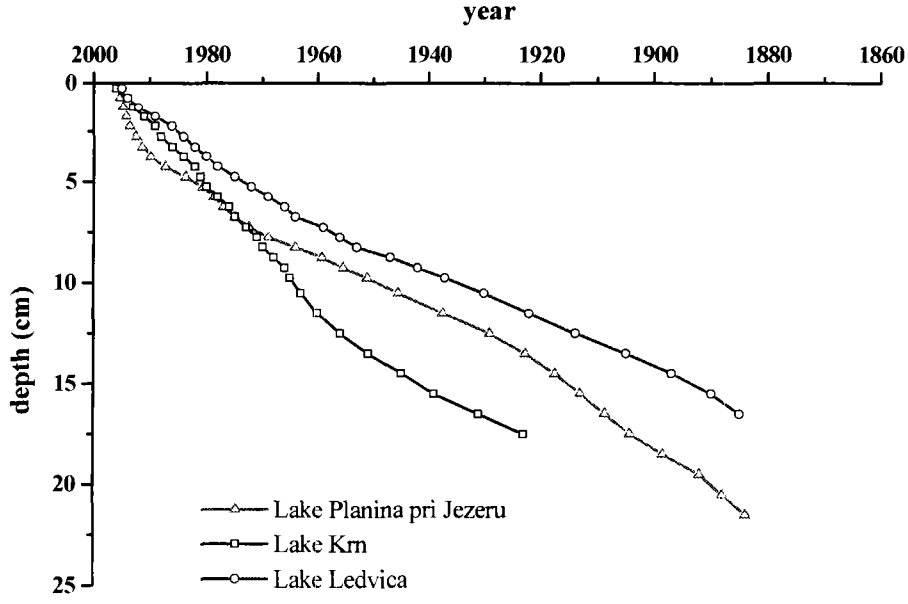

FIG. 1. Results of Pb-210 dating in the studied lakes.

Changes in concentrations with depth are obvious for all determined elements in Lake Planina pri Jezeru and Lake Krn (Fig. 2). In the sediment from Lake Planina pri Jezeru three periods of lake history can be distinguished. Concentrations increase at the depth 0-7cm. The decrease in concentrations, especially of Pb and Cd, in the last 25 years is probably due to use of lead-free gasoline in Western Europe. Concentrations are relatively constant in the segment between 7-19cm and reflect the period of highest industrial emissions in the 20th century. From the depth 19-35cm concentrations decrease rapidly with depth and show the influence of the industrial revolution in the 19th century. Concentrations in the detailed profile from Lake Krn are variable in the upper 8cm and are higher than below this depth. Concentrations are relatively constant in the segment from 8-18cm. In this sediment sequence only the concentration of Sb decreases with depth. Explanation of the concentration changes in Lake Krn is still difficult. The distribution of elements in Lake Ledvica is similar to that in Lake Planina pri Jezeru. Concentrations in the sediment slightly increase to the depth of 3cm, are relatively constant between 3-13cm and decrease to the depth of 16cm. These changes can be explained in the same way as those at lake Planina pri Jezeru.

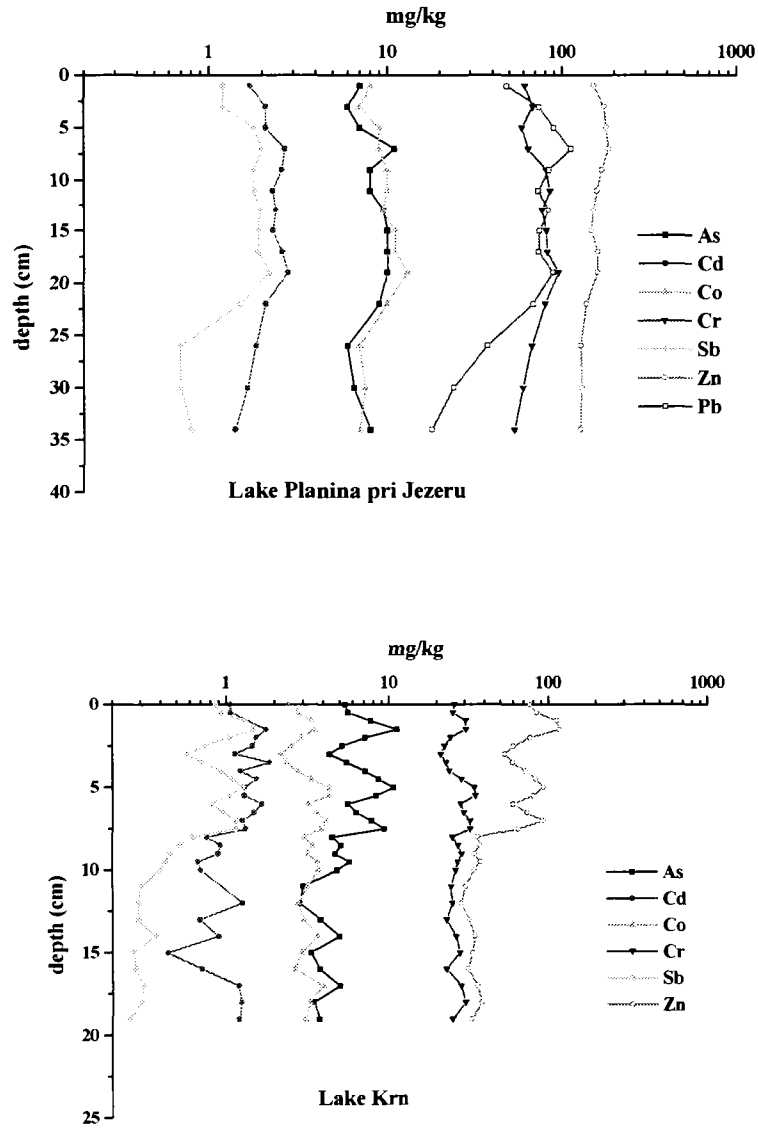

FIG. 2. Distribution of elements in Lake Planina pri Jezeru and Lake Krn.

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