15th EUROPEAN DIATOM MEETING

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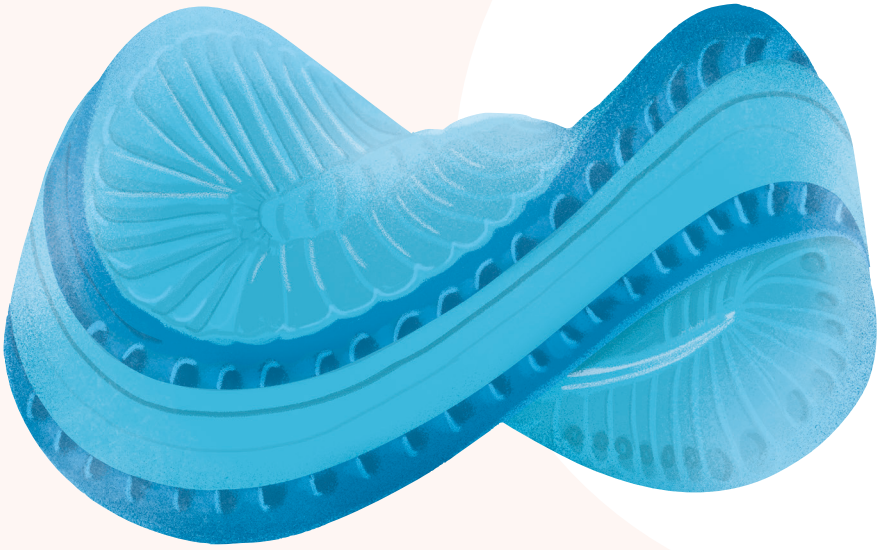

BOOK OF ABSTRACTS

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SUBFOSSIL DIATOMS OF PERIALPINE LAKES REVEAL EARLY LAKE RESPONSES TO CLIMATE WARMING AND HUMAN IMPACT IN THE 20TH CENTURY

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The majority of Perialpine lakes suffered from nutrient enrichment since the early 1960s because of the demographic growth and the economic boom that followed World War II. However, limnological surveys have remained scattered and irregular for both large and small Perialpine lakes during the early stages of nutrient enrichment, while regular monitoring programs started mainly during the most acute anthropogenic eutrophication or in conjunction with the launching of lake restoration measures. As a result, the early-stage responses of Perialpine lakes to major human-related perturbations occurred during Anthropocene can only be reconstructed based on information preserved in deep lake sediment records. Subfossil diatoms are among the most reliable biological remains in lake sediments and have been extensively used for the reconstruction of the trophic evolution of temperate lakes at secular scale. In this contribution we provide evidence of the capacity of subfossil diatoms to provide information on indirect effects of early global warming occurred in the first half of the 20th century in both large and small Perialpine lakes.

We present results of subfossil diatom studies conducted during the last ca. 10 years on sediment cores from a set of large Perialpine, and two additional smaller mid altitude lakes, located on both the northern and southern Alpine slopes. Diatom based environmental reconstructions

show that lake biological responses to major changes in lake nutrient availability during the post-war economic development was particularly rapid and coherent in different lake types north and south of the Alps. In addition, these studies reveal that first changes in the diatom species composition occurred already during the first half of the 20th century in several lakes. Although the investigated lakes differ in location, morphology (e.g. altitude, size, depth), and exposition to direct and indirect human impacts, subfossil diatoms first relevant changes mainly occurred between the 1930s and the 1940s. In most of the lakes early diatom changes consist in the rapid substitution of small centric taxa by pennate taxa mainly belonging to the genera *Asterionella* and *Fragilaria*. These changes could be interpreted as indirect community response to the first documented climate warming after the end of the Little Ice Age, that mimicked nutrient enrichment effects although being mediated by lake-specific hydrological and thermal dynamics.

The interpretation of the observed changes is difficult for some lakes due to the combination of climate related effects with superimposed and simultaneous anthropogenic perturbations that ranged from early eutrophication to hydroelectric exploitation. These results underscore: a) the importance of the paleolimnological approach for complementing and expanding limnological surveys and for predicting future lake ecological trends based on the understanding of past lake responses; b) the potential of subfossil sediment diatoms as a proxy to understand indirect effects of climate change on the planktonic lake biota.