



Late Quaternary development of the Fryxell basin, Taylor Valley, southern Victoria Land

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Lake Fryxell in Taylor Valley is known to be a remnant of the much larger proglacial Lake Washburn, which occupied large areas of the Taylor Valley during or even prior to the Last Glacial Maximum. The existence of this proglacial lake is best documented in the occurrence of deltaic deposits well above modern Lake Fryxell. Despite the knowledge about the existence of this proglacial lake, a detailed investigation of its sedimentary deposits in comparison with the sedimentation existing in Lake Fryxell today has not been carried out so far. For this purpose, a c. 10 m long sediment record has been recovered during an American-German expedition in November 2002 from the centre of Lake Fryxell. The sediment sequence recovered was investigated for its chronology and sedimentological characteristics.

Radiocarbon dating was conducted on several horizons throughout the sequence. Dating the sediment surface revealed a reservoir effect of approximately 2500 years in Lake Fryxell today, which is in a good agreement with that reported from Lake Hoare close by. Dating the lower sediment sequence revealed several reversals, most of which were likely due to redeposition and, particularly, the extremely low content of organic matter. Nevertheless, the oldest sediments recovered likely were deposited during or prior to the Last Glacial Maximum, at a time when proglacial Lake Washburn occupied Taylor Valley.

The sedimentological investigation of the sediment sequence revealed distinct changes in the amount of organic matter accumulation, grain-size distribution, and mineralogical composition. These changes are discussed in the light of changes in lake size, transport mechanisms and energies, and hydrologic settings existing during the time of sedimentation. The sediments from Lake Fryxell, at the top of the sequence, are char-

acterized by alternating horizons of microbial and algal mats and interspersed horizons of coarse sand. These alternations can probably be traced back to advances and recessions of Canada Glacier, located upvalley, thus influencing the eolian transport along the valley. In the sediments deposited during Lake Washburn times, in contrast, organic matter is almost absent, and fluvial or fluviolimnic sediments are dominant. In addition, turbidites are common, particularly in the lower part of the sequence. They probably are due to the fact that Lake Washburn filled out large parts of the U shaped Taylor Valley during this period, including the steep slopes currently exposed far over Lake Fryxell. The transition from Lake Washburn to Lake Fryxell apparently was gradual. Evidences for a sudden collapse of the Ross Ice Shelf blocking the Taylor Valley during the Last Glacial Maximum do not exist.