

# Long-term temperature changes in lakes of the McMurdo Dry Valleys

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## Results:

Surface waters followed trends in air temperature, with a cooling trend until 2005, and a warming trend since 2005. Deeper waters showed less change than surface waters over the 15 year study period.

## Introduction:

The McMurdo Dry Valley (MCM) ecosystem has long been viewed as sensitive to subtle changes in climate. Air temperature has been monitored in Taylor Valley since 1986. While temperatures in the lakes of the MCM study area have been measured since before 1995, these data have not been compiled. Here we present long-term temperature data from Lake Fryxell, and the east and west lobes of Lake Bonney. We hypothesize that changes in air temperature will be reflected in lake temperatures.



## Methods:

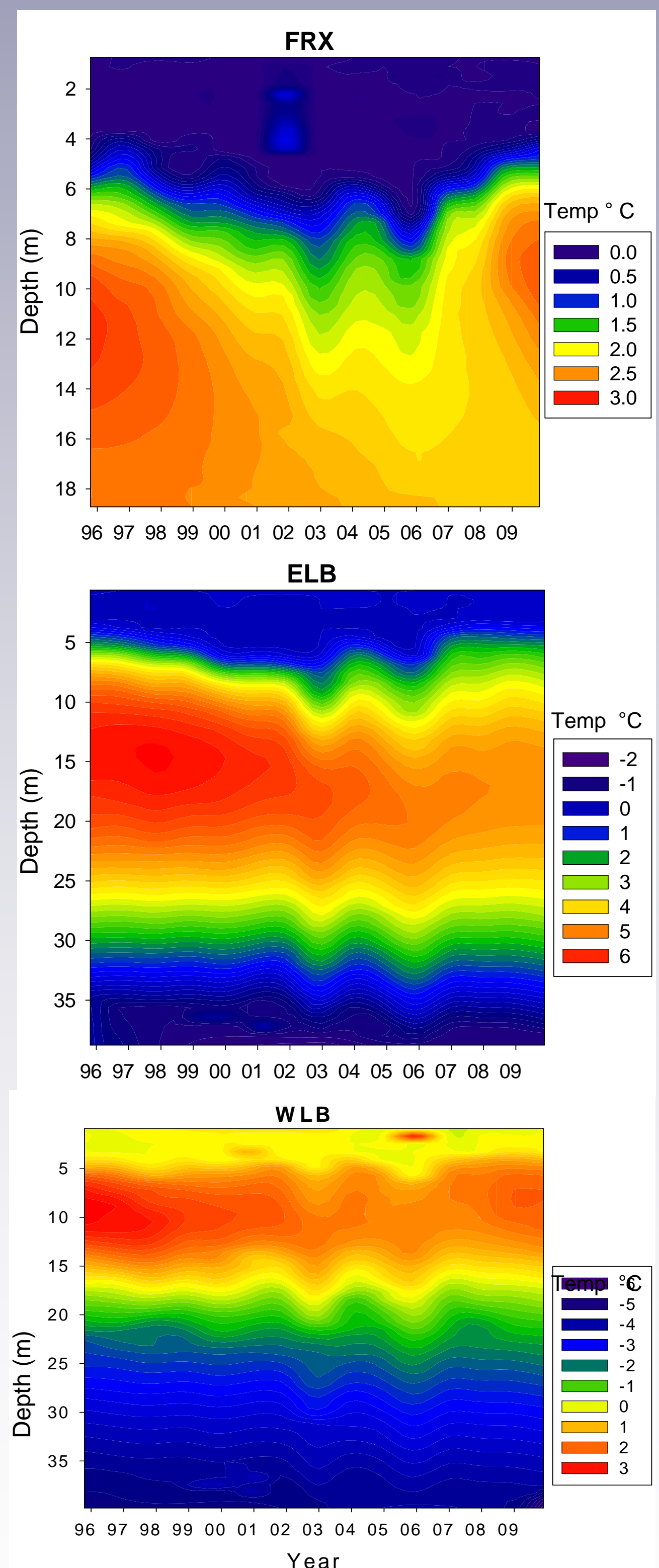
Temperature was measured annually during routine limnological sampling runs in Lake Fryxell (FRX) and East (ELB) and West (WLB) Lake Bonney using a Sea-Bird SBE 25 Sealogger CTD with SBE 03-01/F temperature sensor. Measurements took place during late October/early November between 1995 and 2009. Data were contoured to show temperature changes over time throughout the 15 year period for each lake (Figure 1). Temperature change per year was calculated at surface, middle, and deep depths in each lake (Table 1).

General trends in temperature changes (°C/year) in MCM lakes			
	FRX	ELB	WLB
<b>Surface</b>	1995-2005: -0.12 2005-2009: +0.52	1995-2002: -0.15 2005-2009: +0.37	1995-2005: -0.09 2005-2009: +0.39
<b>Mid</b>	1995-2005: -0.12 2005-2009: +0.19	1995-2009: -0.08	1995-2009: +0.03
<b>Deep</b>	1995-2005: -0.06 2005-2009: +0.03	1995-2009: +0.06	1995-2009: +0.03

**Table 1.** General trends in temperature changes in lakes Fryxell, East Lake Bonney and West Lake Bonney in the surface (Fryxell 6m; East Bonney 5.1m, West Bonney 5.5m), middle (Fryxell 11m, East Bonney 19.9m, West Bonney 20.5m), and bottom (Fryxell 16m, East Bonney 34.7m, West Bonney 35.5m) depths of each lake.

## Relevance:

The lakes of the McMurdo Dry Valleys are microbially dominated. An understanding of long-term changes in lake temperature is important as they may influence rates of biological processes, thereby affecting ecosystem function.



**Figure 1.** Contour plots of temperature measured during late October/early November between 1995 and 2009 in the water columns of Lakes Fryxell, and the east and west lobes of Lake Bonney.