

Anomalously High Surface Water $f\text{CO}_2$ values in the 2014-15 NE Pacific Warm Water “Blob”

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MISSION STATEMENT

The primary mission of NOAA Surface Ocean Observing Program (SOOP) underway measurements program is to build and sustain a global CO_2 observing system that will respond to the long-term observational requirements of NOAA's Climate Change Program and provide input to international assessments of carbon sources and sinks in the global oceans.

BACKGROUND

In 1992, the NOAA Surface Ocean Observing Program (SOOP) was initiated by the Climate Observations Division of the NOAA Climate Program as a part of the Global Ocean Observing System. In 2004 we expanded our underway $f\text{CO}_2$ measurements on container ships in the Global Oceans. To date we maintain underway $f\text{CO}_2$ measurements in research and container ships in the Atlantic, Pacific and Arctic Oceans.

RECENT NEW RESULTS

Since 2014 SSTs in the Northeast Pacific Ocean (NEP) reached historically high levels exceeding more than 2°C warmer than normal (Figure 1). This mass of anomalously warm water has been centered in the eastern and central North Pacific and, more recently, along the Pacific coast from Canada to Mexico (Bond et al., 2015). Concomitant with the large SST anomalies from January 2014 through May 2015 are higher than normal surface water $f\text{CO}_2$ values ($400\text{-}450\ \mu\text{atm}$; Figure 2), which exceed atmosphere values in this region by as much as $60\ \mu\text{atm}$ (Figure 3). These preliminary results indicate the surface water $f\text{CO}_2$ values have changed along the cruise track, causing the region to transition from a carbon dioxide sink to a source during the warm season from March to November. If this mass of anomalously warm water continues to expand these changes to the oceanic carbon sink in the region could have significant implications for the oceanic carbon budget.

Reference: Bond, N. A., M. F. Cronin, H. Freeland, and N. Mantua (2015), Causes and impacts of the 2014 warm anomaly in the NE Pacific. *Geophys. Res. Lett.*, 42, 3414–3420. doi: 10.1002/2015GL063306.

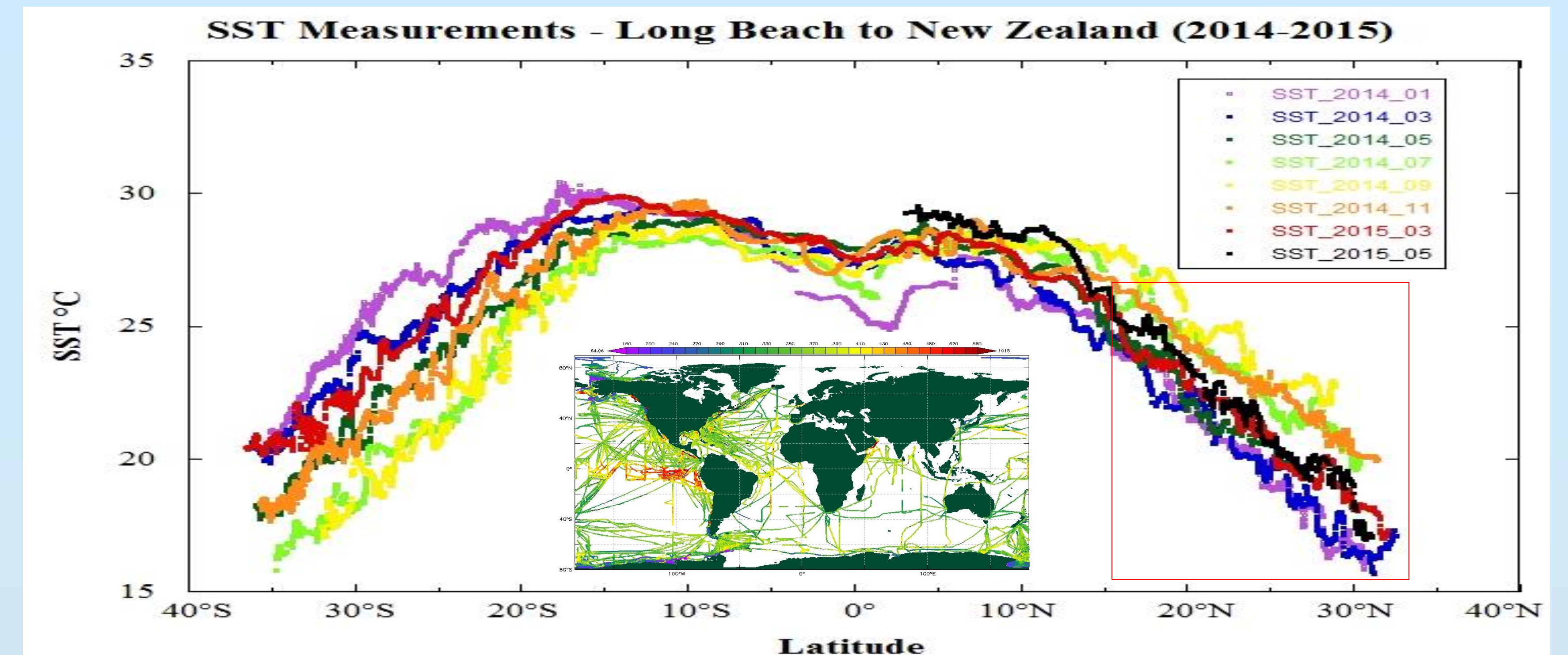


Figure 1. Sea Surface Temperature (SST) from Long Beach to New Zealand.

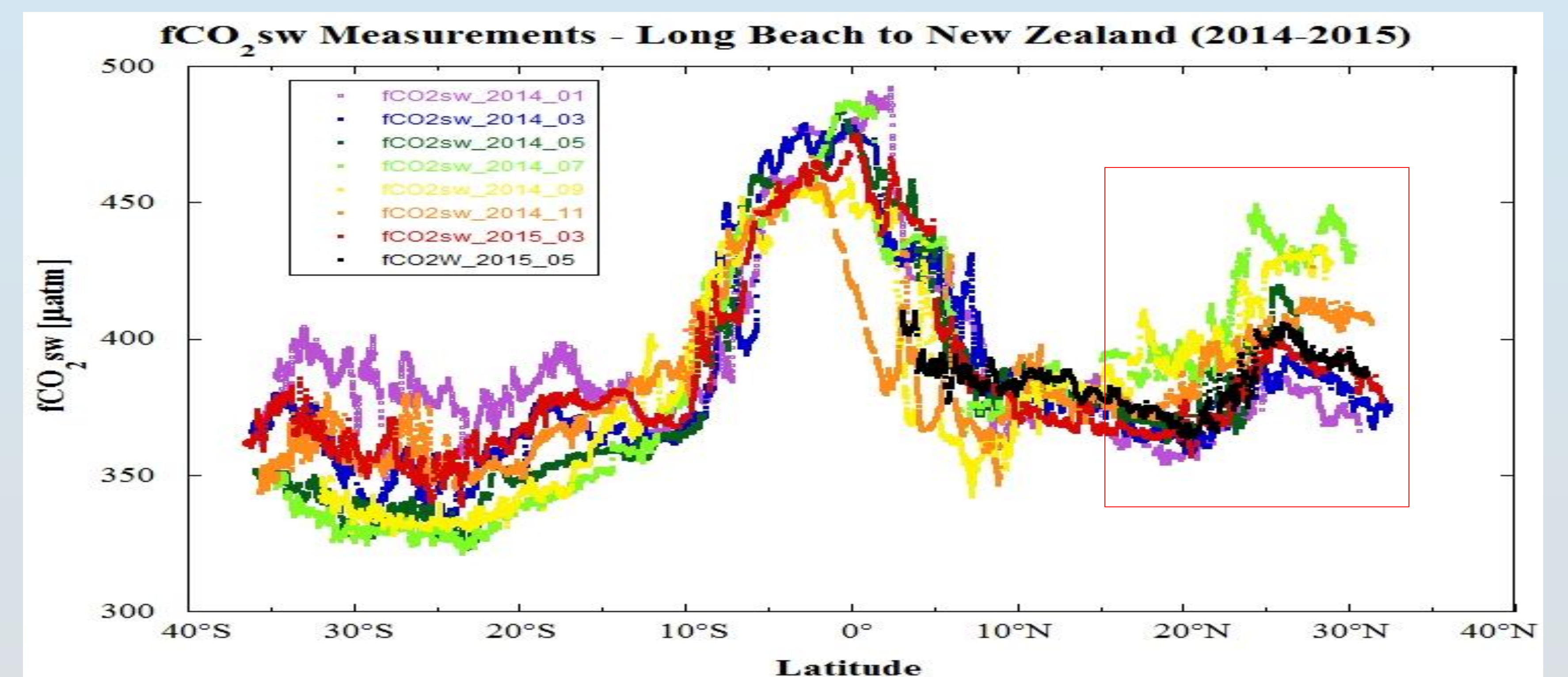


Figure 2. Surface ocean $f\text{CO}_2$ (in μatm) from Long Beach to New Zealand.

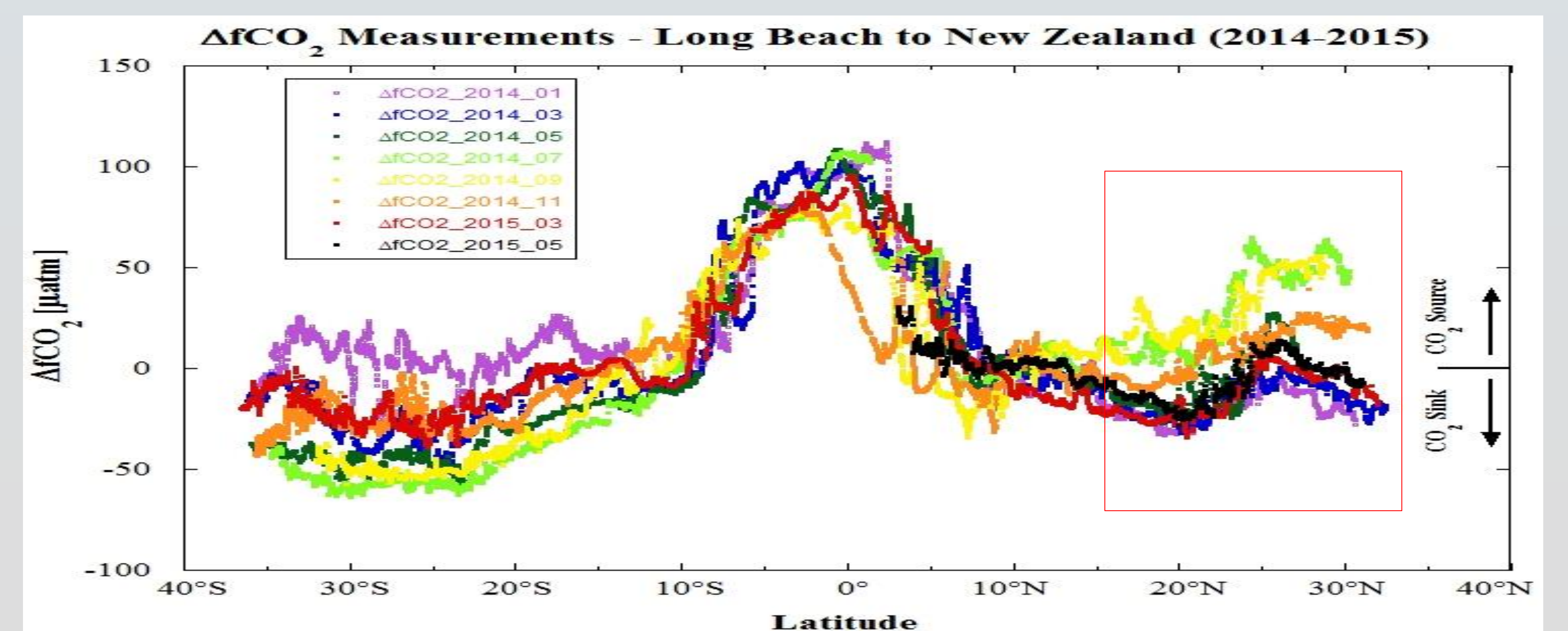


Figure 3. Surface ocean $\Delta f\text{CO}_2$ (in μatm) from Long Beach to New Zealand.