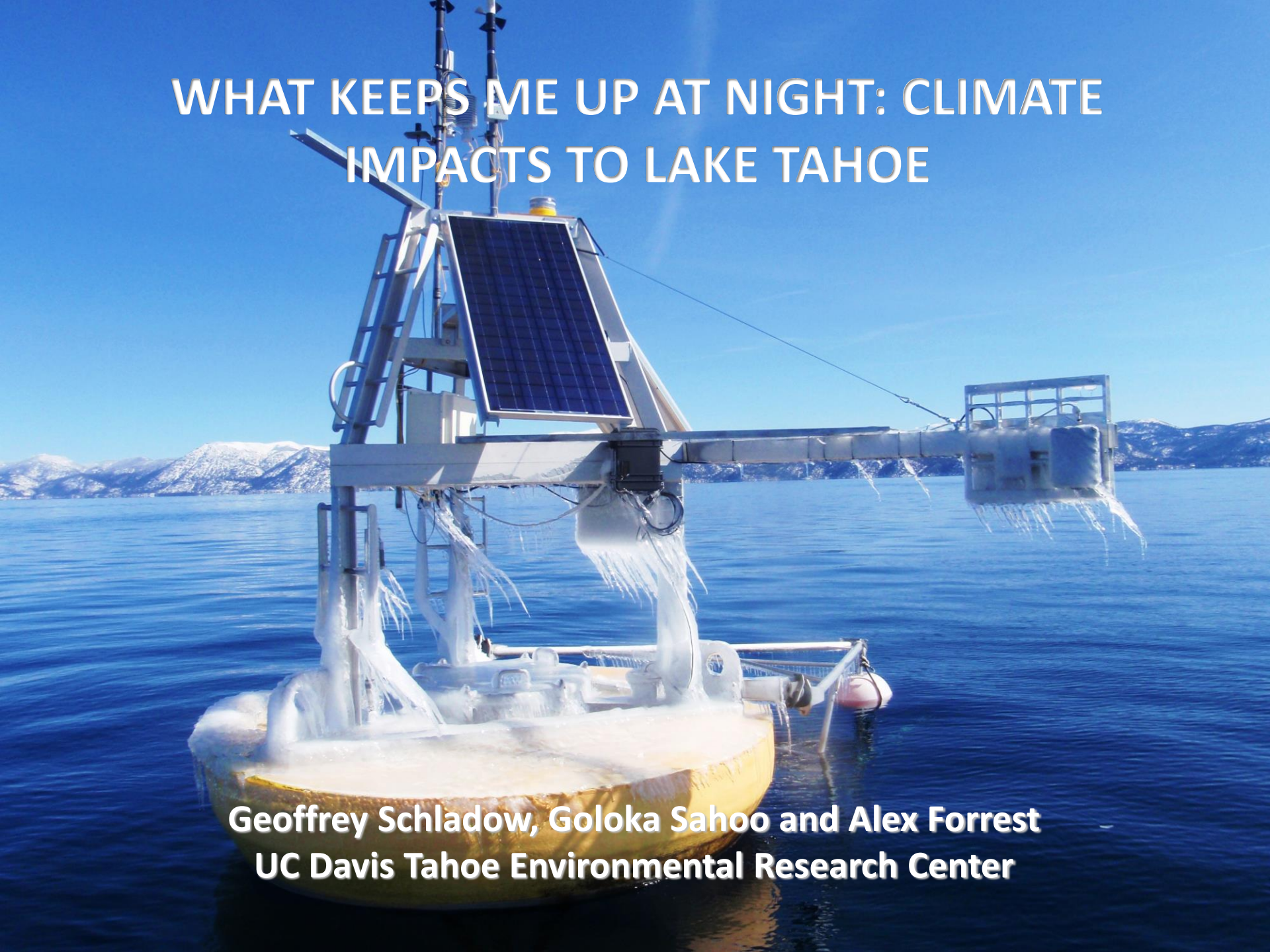
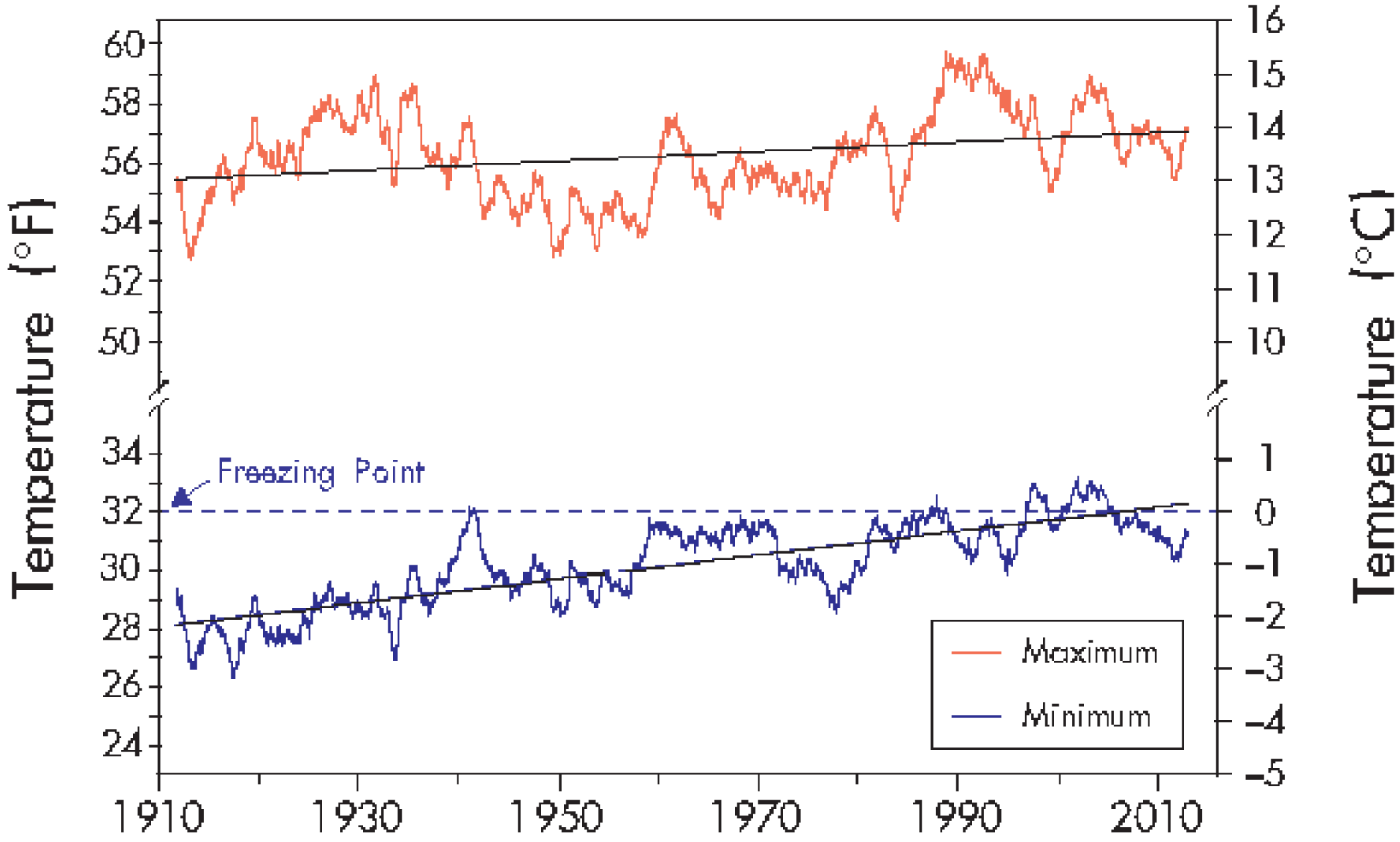


WHAT KEEPS ME UP AT NIGHT: CLIMATE IMPACTS TO LAKE TAHOE

Geoffrey Schladow, Goloka Sahoo and Alex Forrest
UC Davis Tahoe Environmental Research Center

A Century of Air Temperature Change



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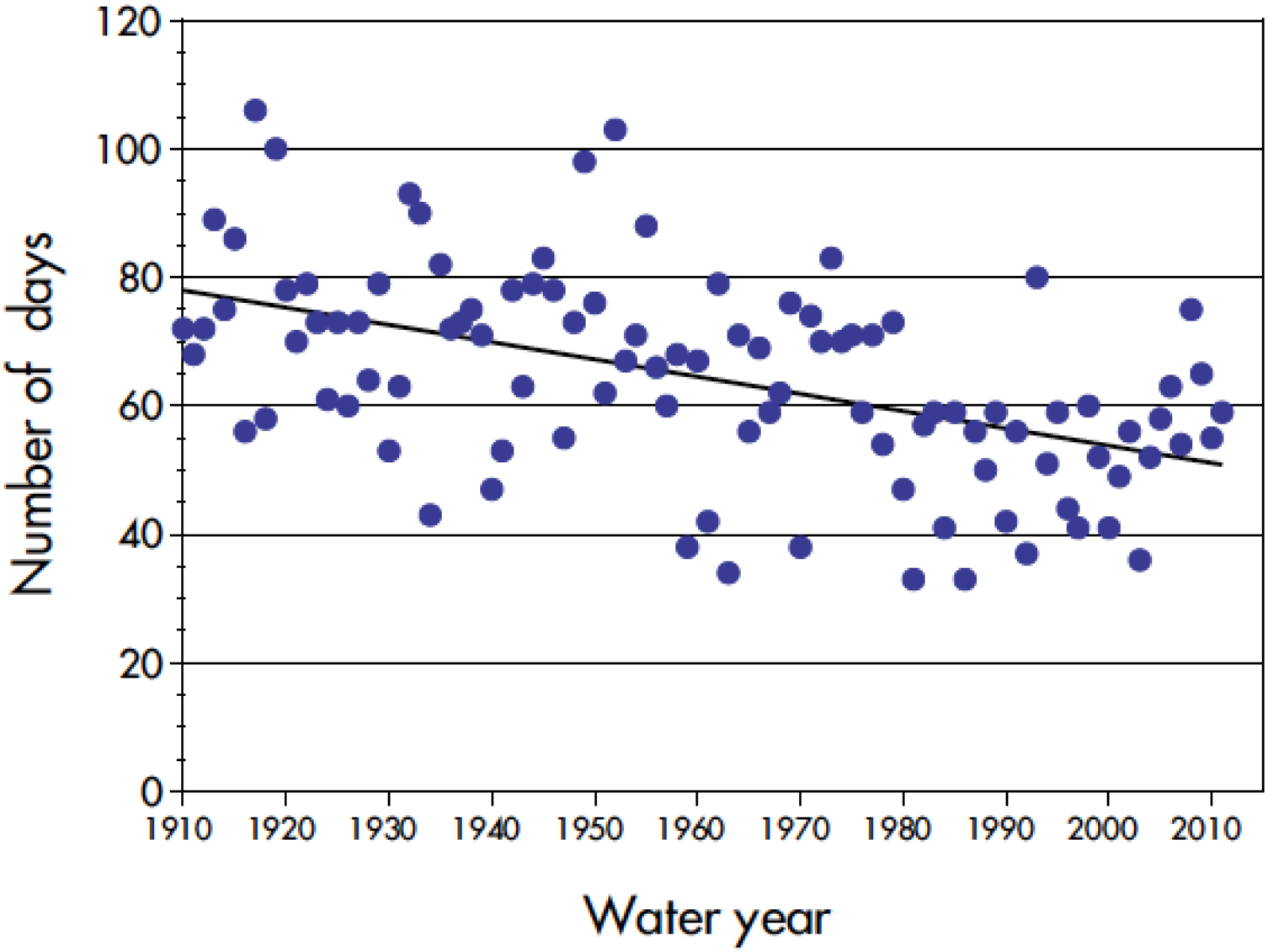
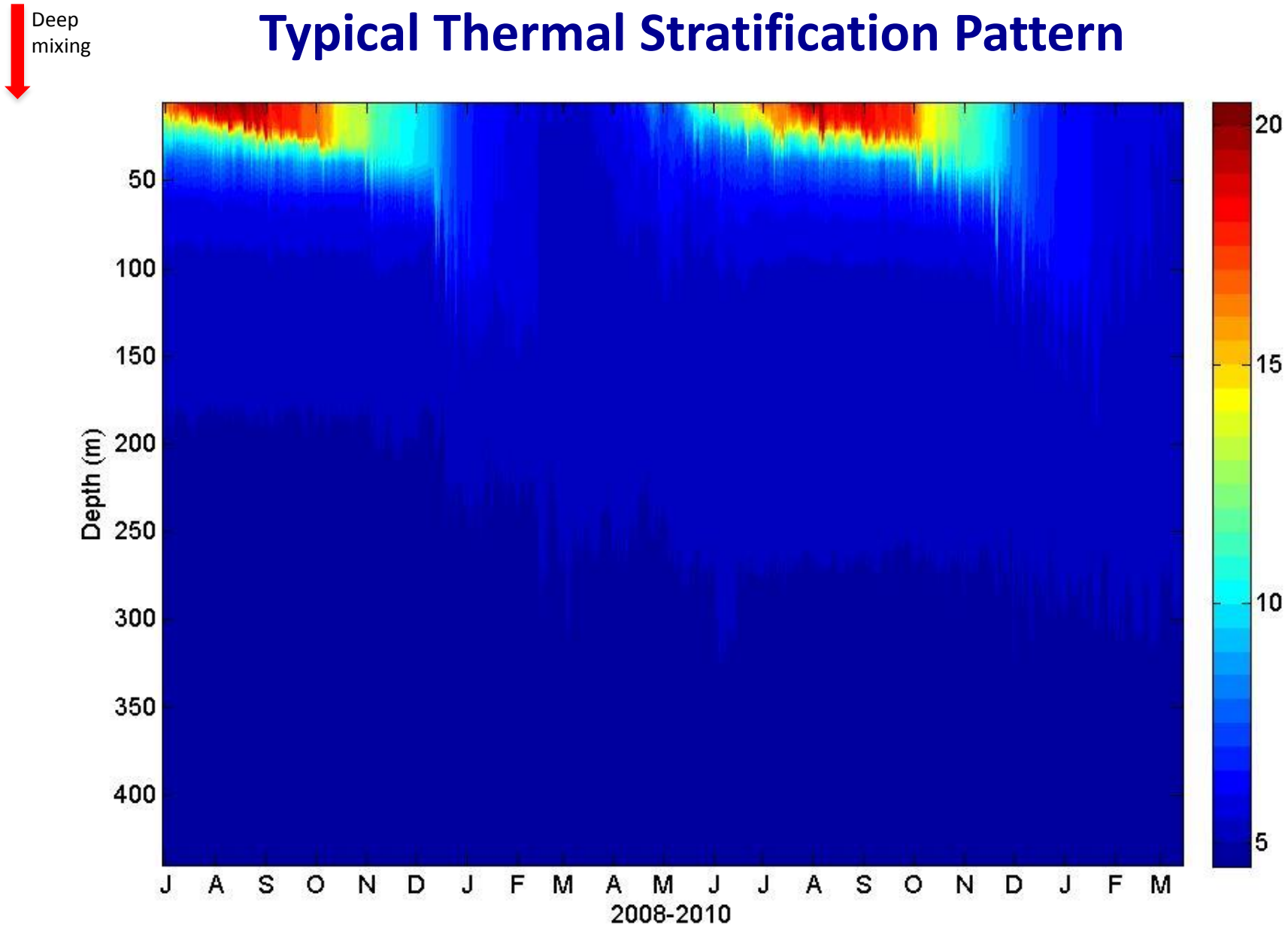
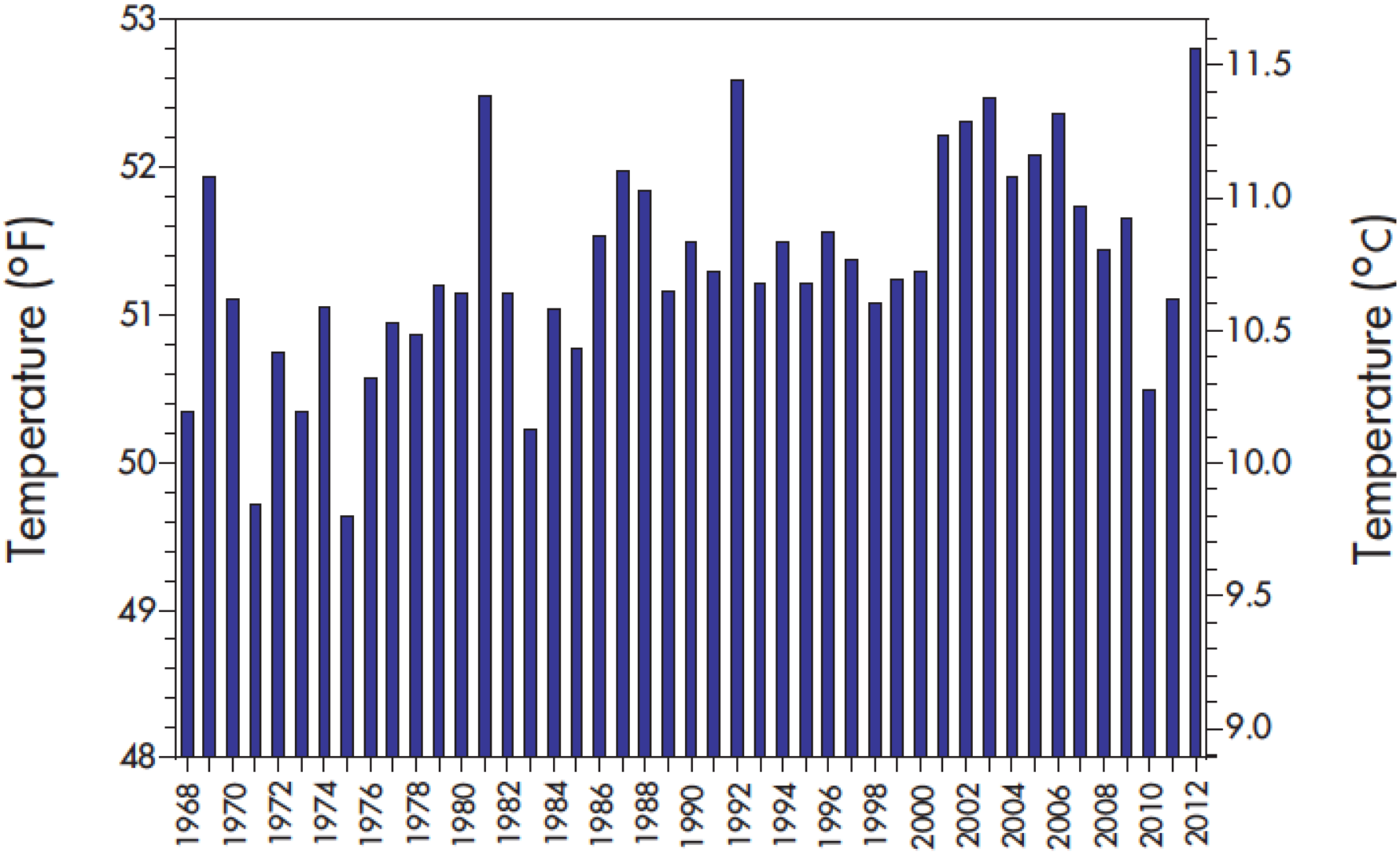
Days With Below Freezing Air Temperature



Typical Thermal Stratification Pattern



Last 45 Years - Surface Water Temperature



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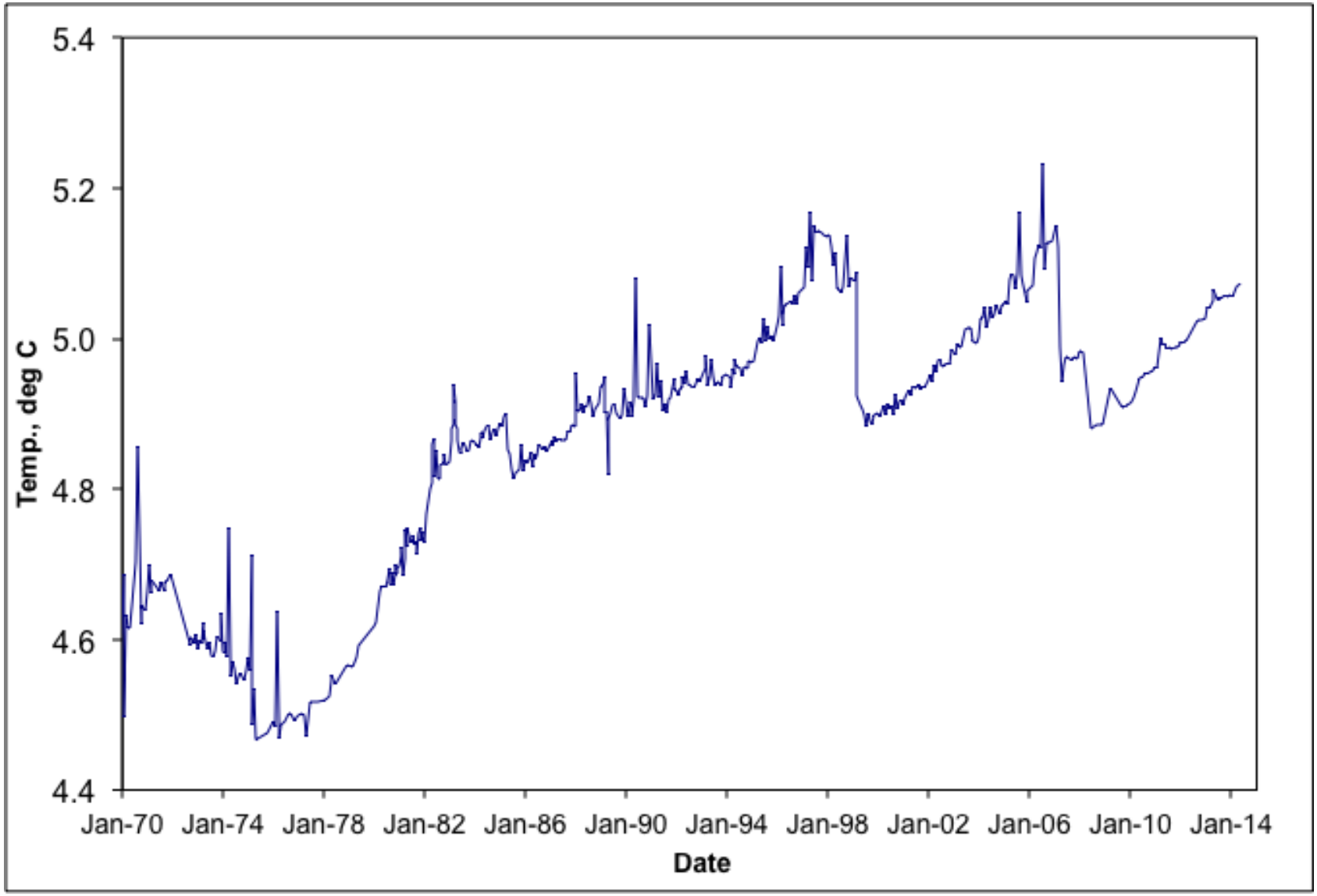
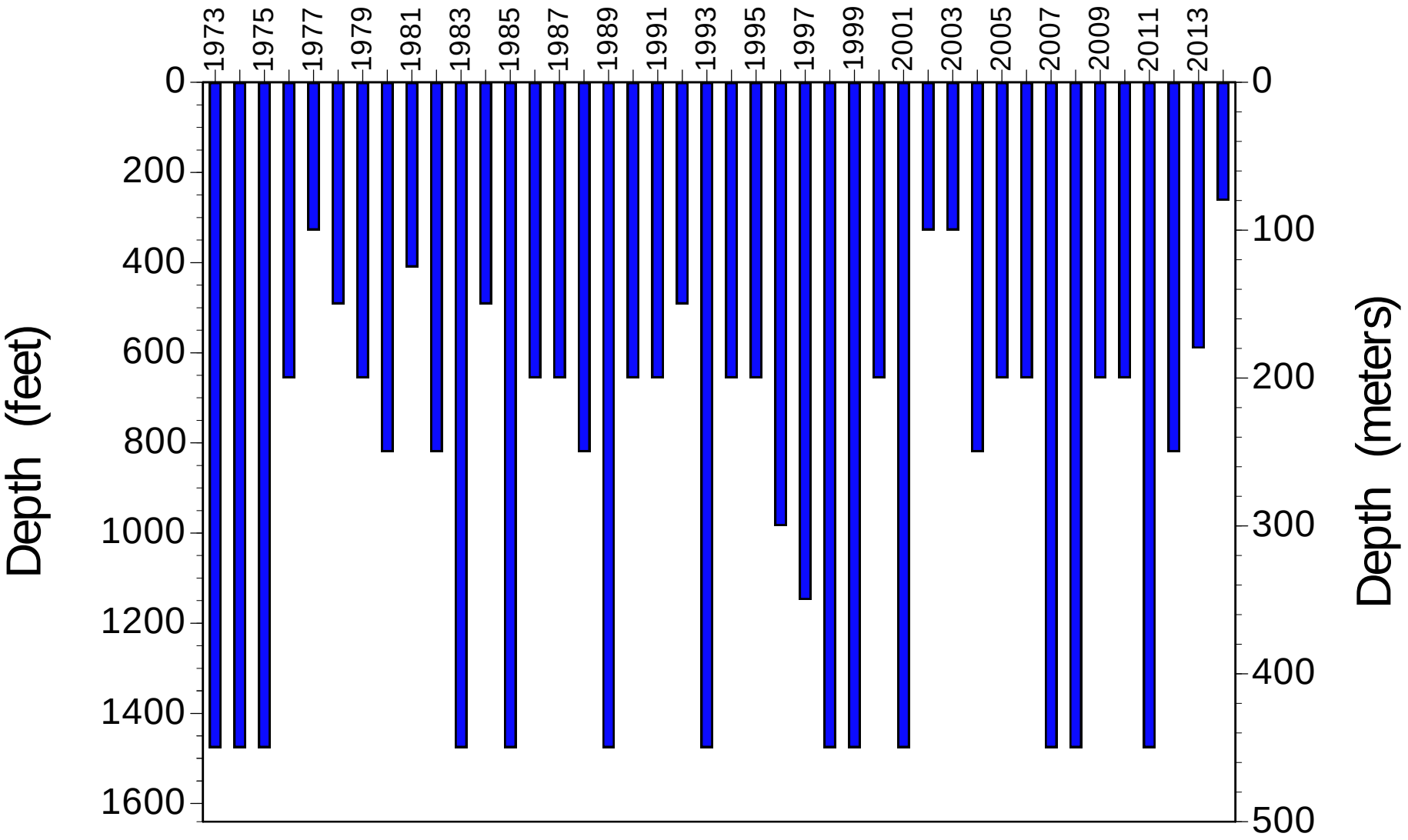
Last 45 Years - Bottom Water Temperature



Last 41 Years – Depth of Winter Mixing

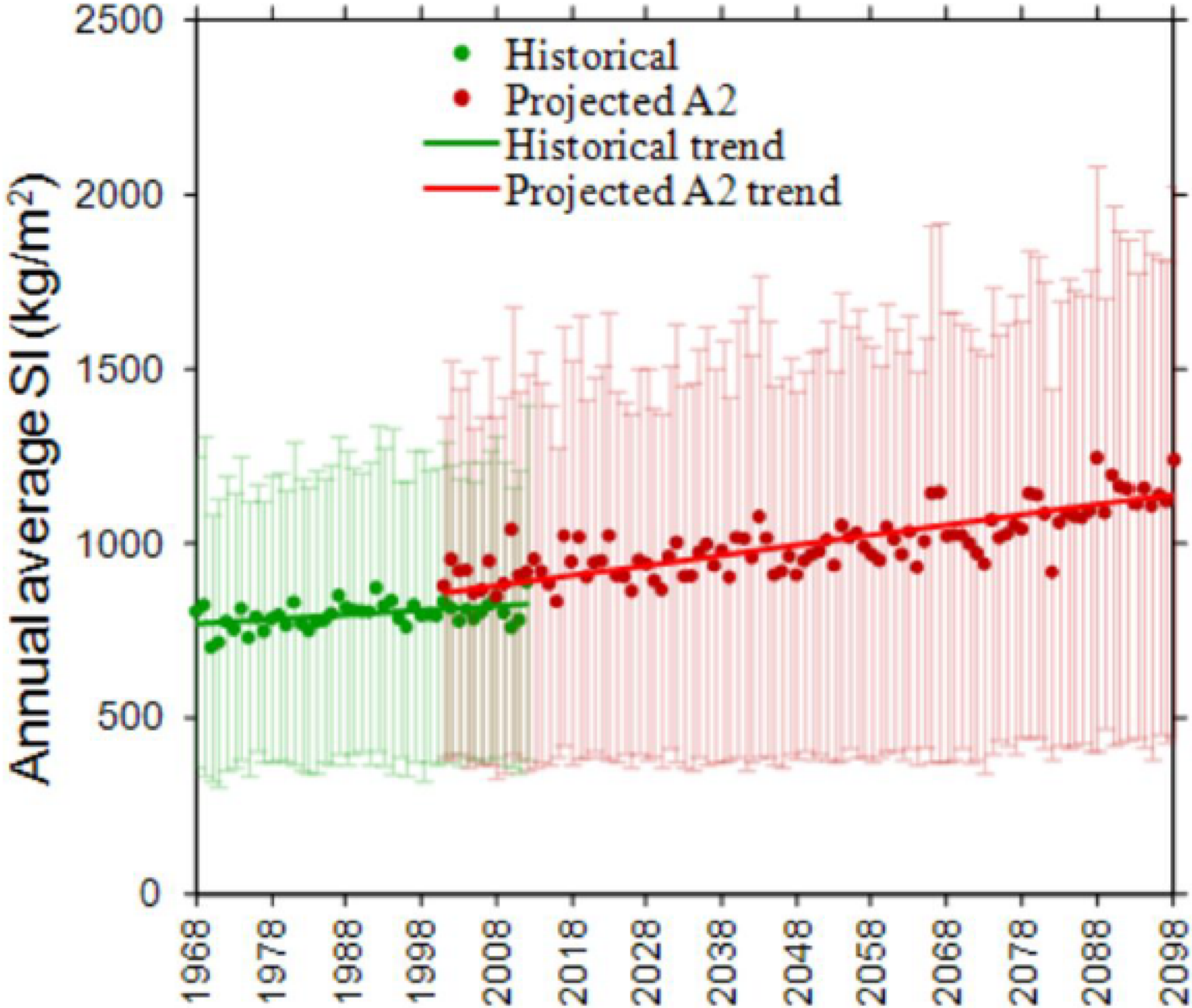


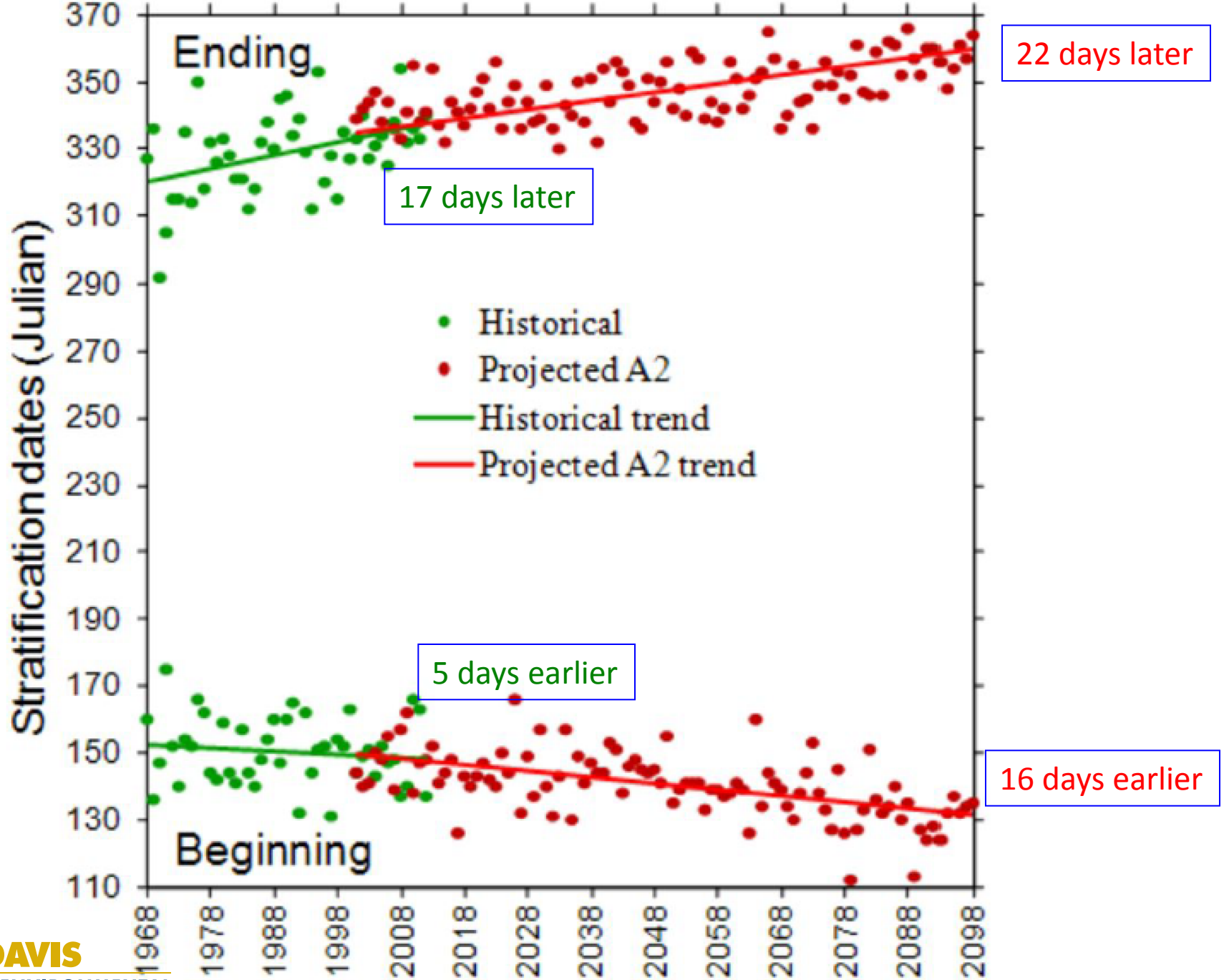
Stability Index

$$SI = \int_{0}^{z_m} (z - z_g) \times A(z) \times r(z)\, dz$$

Assumed Z_m = 100 m

SI > 600 kgm^{-2} → "Stratified"


Historical
Projected A2
Historical trend
Projected A2 trend
Annual average SI (kg/m²)
2500
2000
1500
1000
500
0
1968
1978
1988
1998
2008
2018
2028
2038
2048
2058
2068
2078
2088
2098



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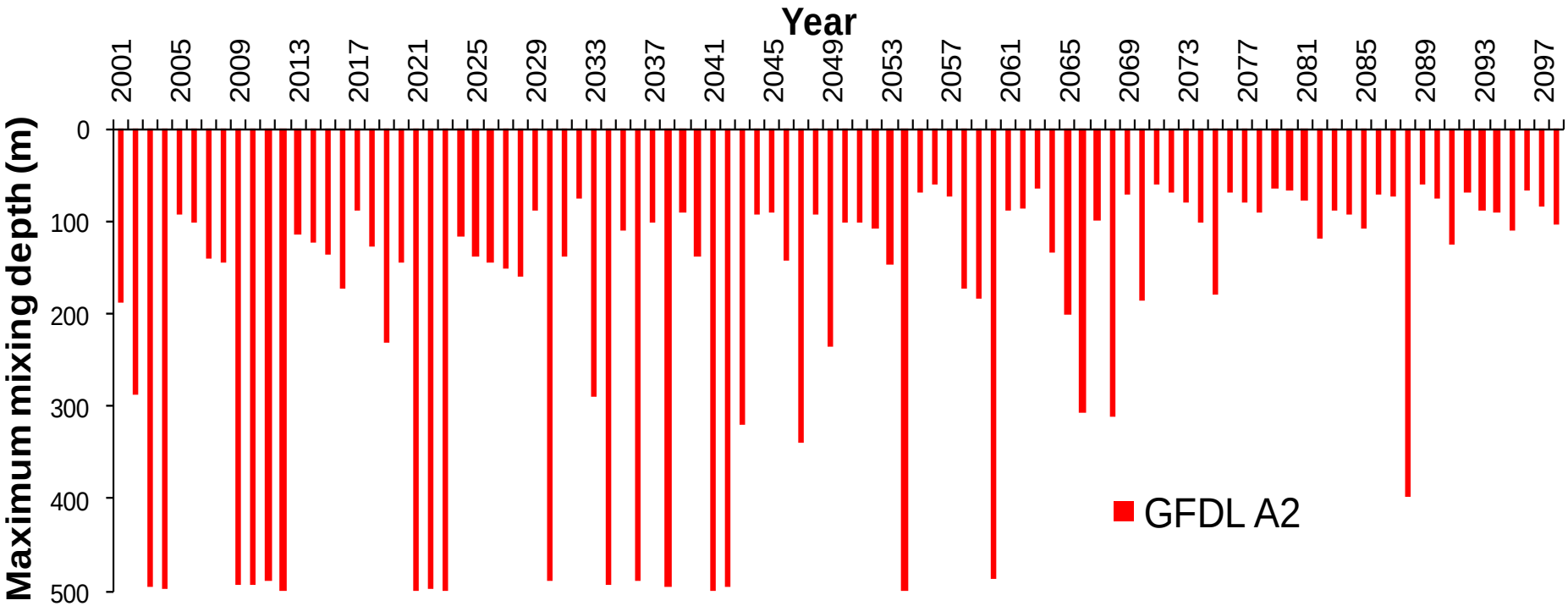
So What?

Winter Depth of Mixing in the Next 85 Years



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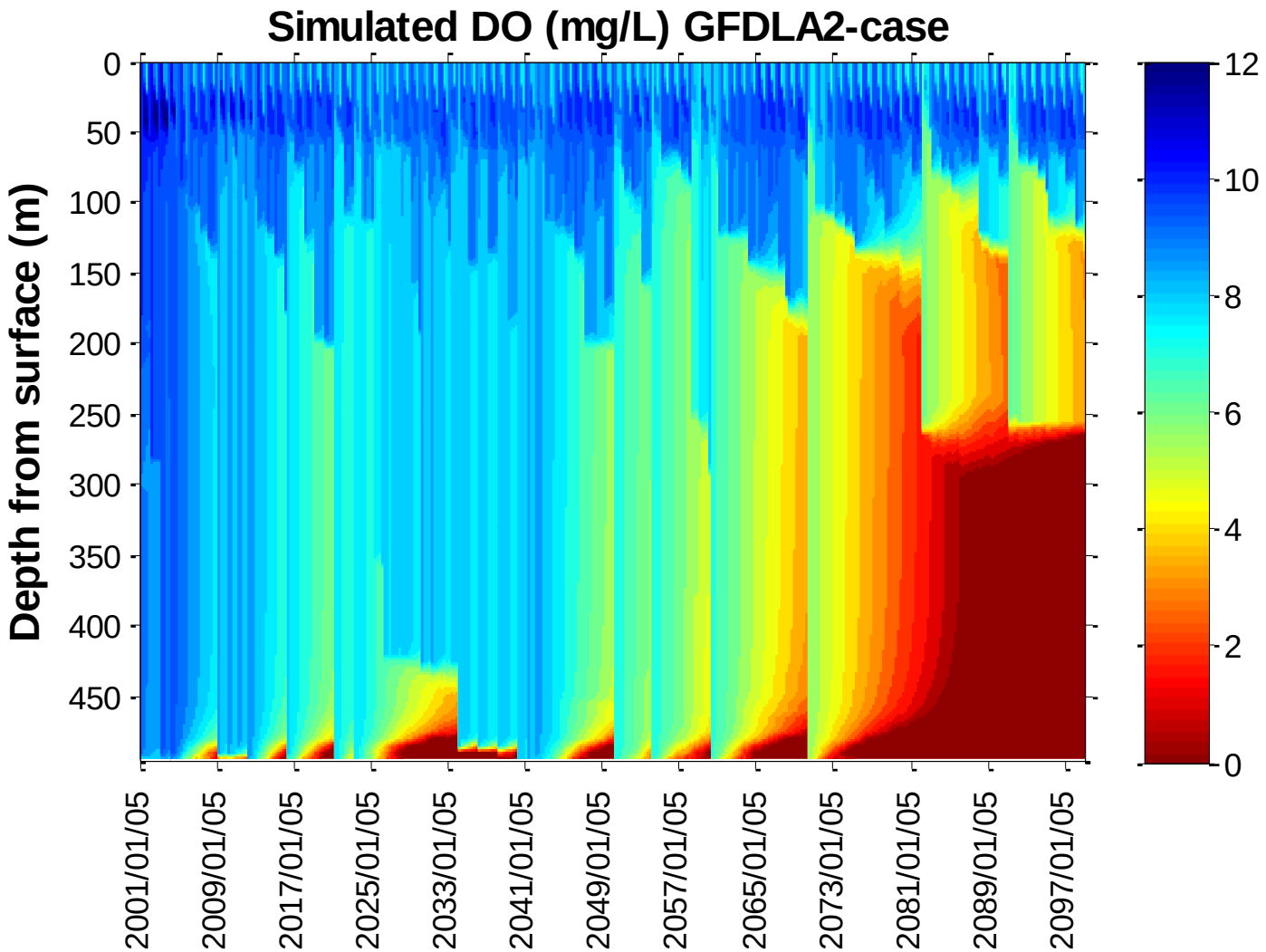
DO in the Next 85 Years? Hypoxia at Lake Tahoe?



SOD 0.04 g-O_2 m^{-2} d^{-1} Marc Beutel

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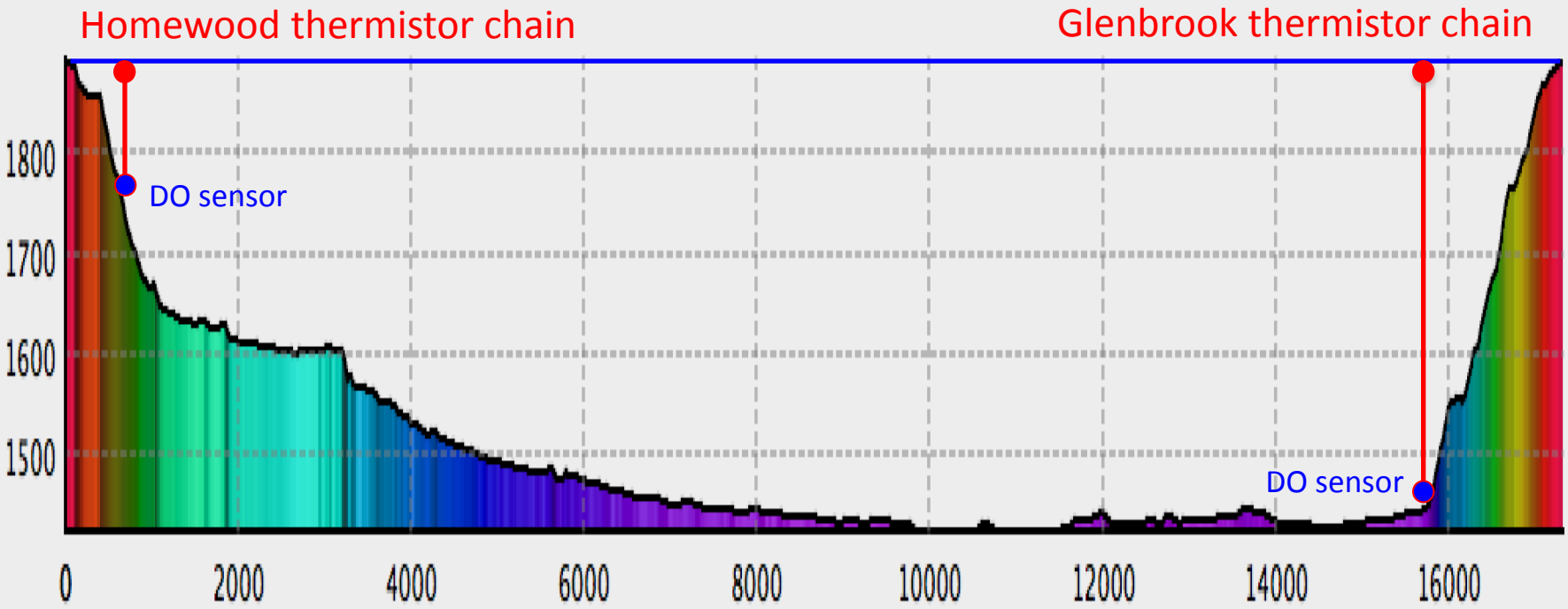

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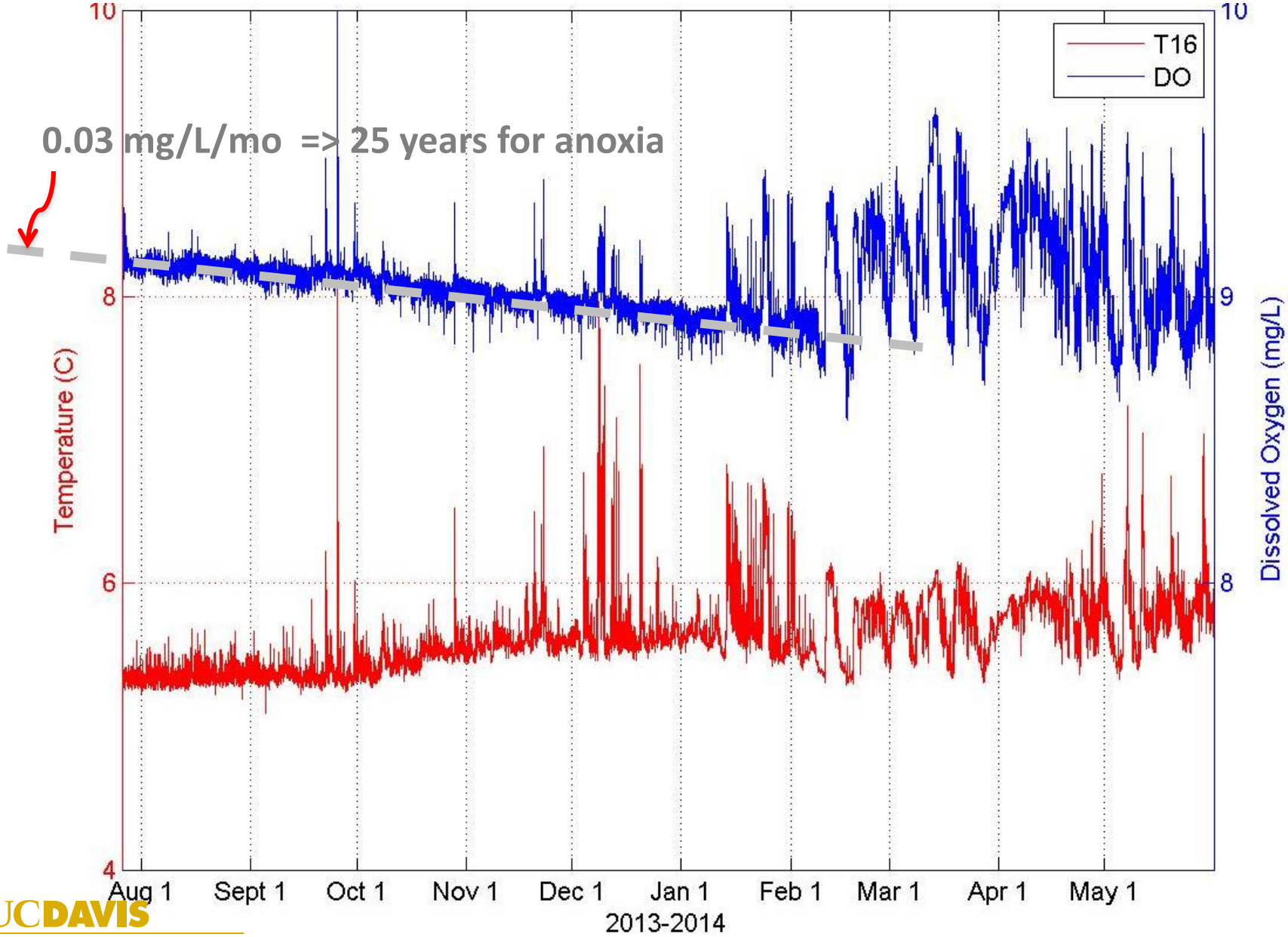
Real-Time T and DO @ 30s intervals on bottom at 112 m



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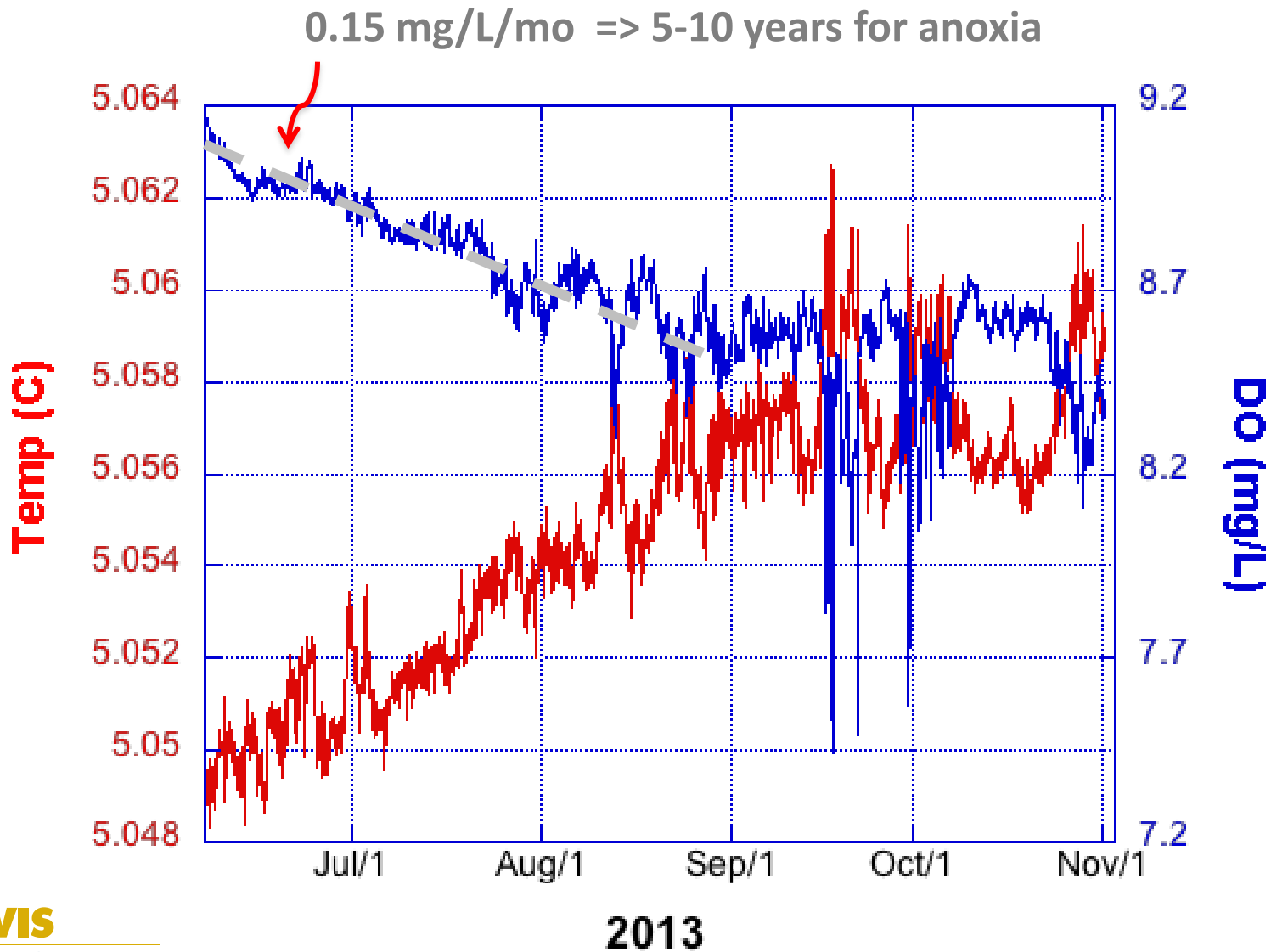
T and DO @ 10 min intervals on bottom at 446 m



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- What are the effects of lake motions on oxygen distribution?
- What is the real rate of oxygen consumption now and in the future?
- Will decadal stratification lead to hypolimnetic anoxia?
- What are the consequences of that?