TEMPORAL VARIABILITY OF SURFACE EDDY DIFFUSIVITIES FROM ALTIMETRY

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INTRODUCTION

Lateral eddy diffusivities are important for the oceanic distribution and uptake of various tracers (heat, carbon, nutrients and others) (e.g. Gr剖nholmen et al. 2019).

The global ocean circulation is highly sensitive to the value of lateral diffusivity used in global climate models (Marshall et al. 2017).

The results suggest that surface diffusivities are modulated by large scale climate fluctuations. This could represent a climate feedback mechanism not currently accounted for in global climate models.

Since the changes in EKE do not explain the enhanced surface diffusivities during positive ENSO events, we will explore the effect of time variable large scale flow in suppressing diffusivities using modified mixing length theory (Ferrari and Nikurashin 2010, Klocker and Abernathey 2014).

DISCUSSION

The temporal variability in the Pacific does not only seem to be related to the changes in the EKE. Surface diffusivities vary by more than half of the local mean over 80% of the global ocean.

Variability seems to be connected to large scale climate fluctuations. Surface diffusivities in the Pacific show a marked increase during positive ENSO periods.

KEY FINDINGS

Most state of the art climate models use a constant diffusive transfer coefficient. However, high spatial variability is suggested globally (Abernathey and Marshall 2013, Cole et al. 2015) and regional studies indicate temporal variability as well (Busecke et al. 2017).

How important is the temporal variability of surface eddy diffusivity globally?

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Future work will investigate if these changes are coherent below the surface - where isopycnal eddy mixing implies vertical tracer transports due to the mean tilt of isopycnal surfaces.

LITERATURE


