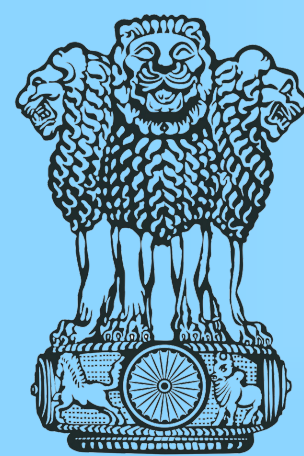


The effect of climate change on internal wave activity in the Andaman Sea

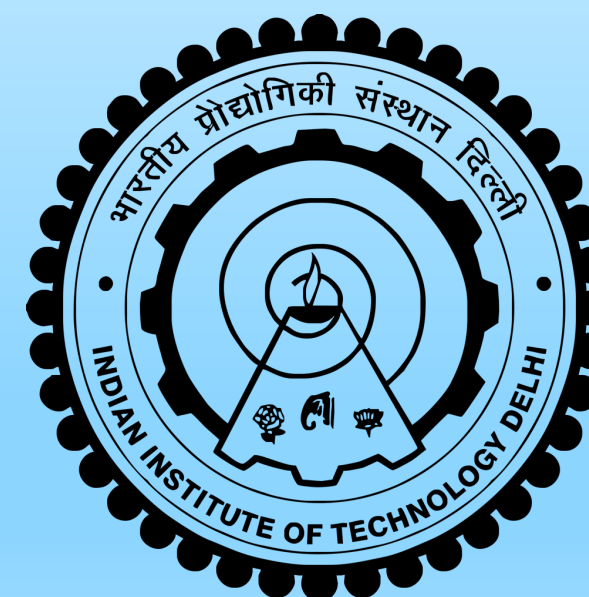
B. Yadidya and A. D. Rao

Indian Institute of Technology Delhi

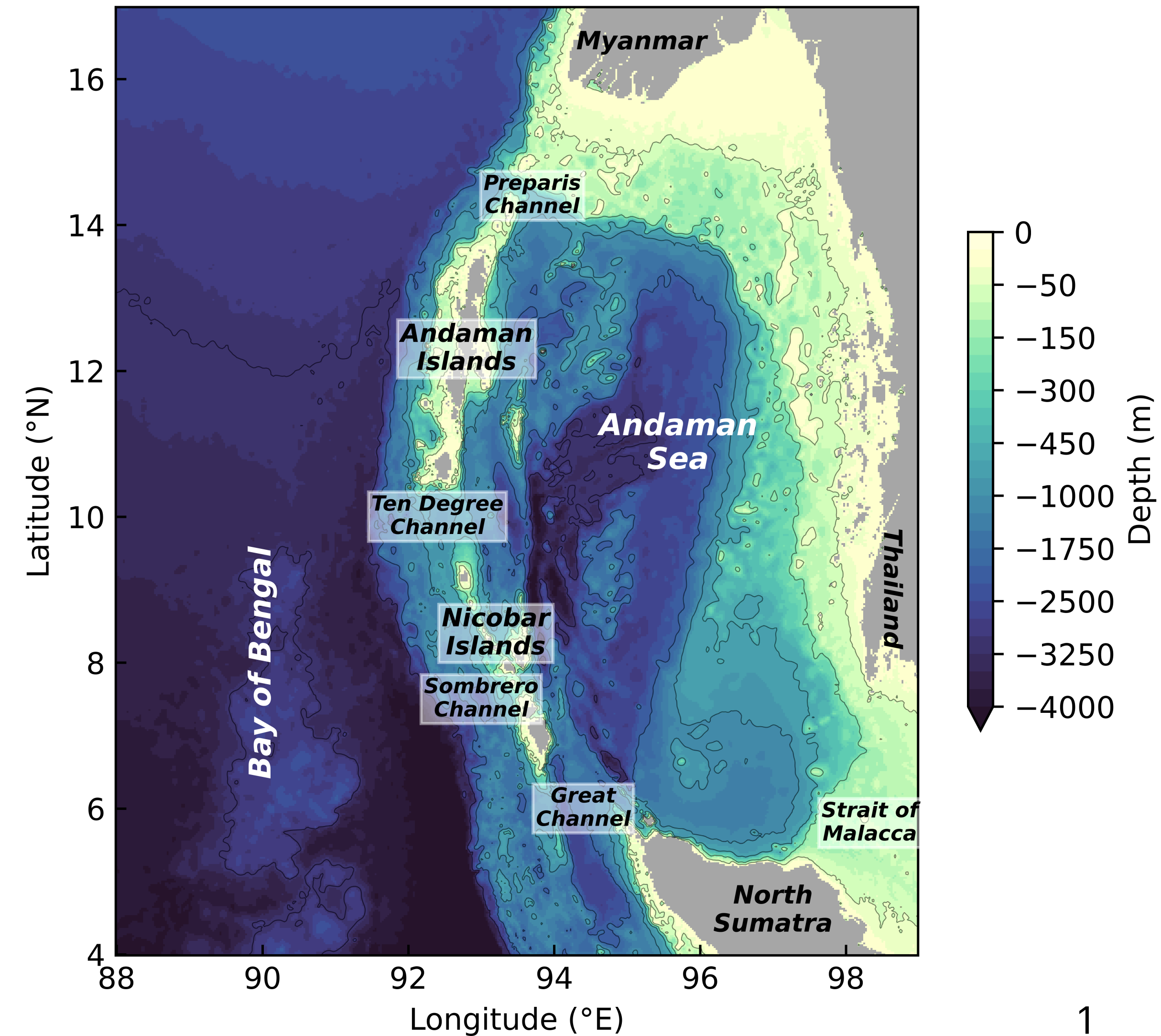
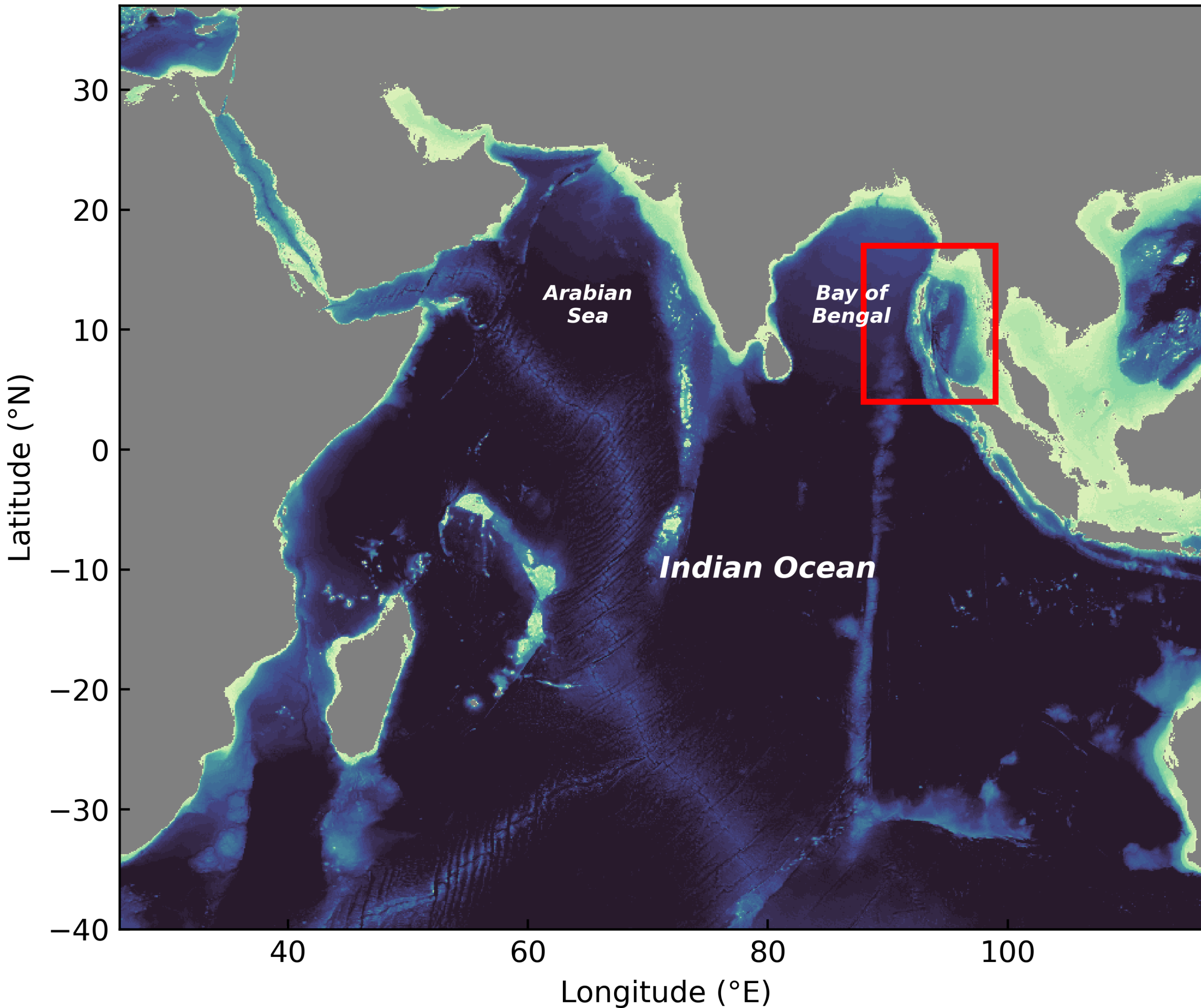


सत्यमेव जयते

Department of Science & Technology
Govt. of India



Region of interest – Andaman Sea

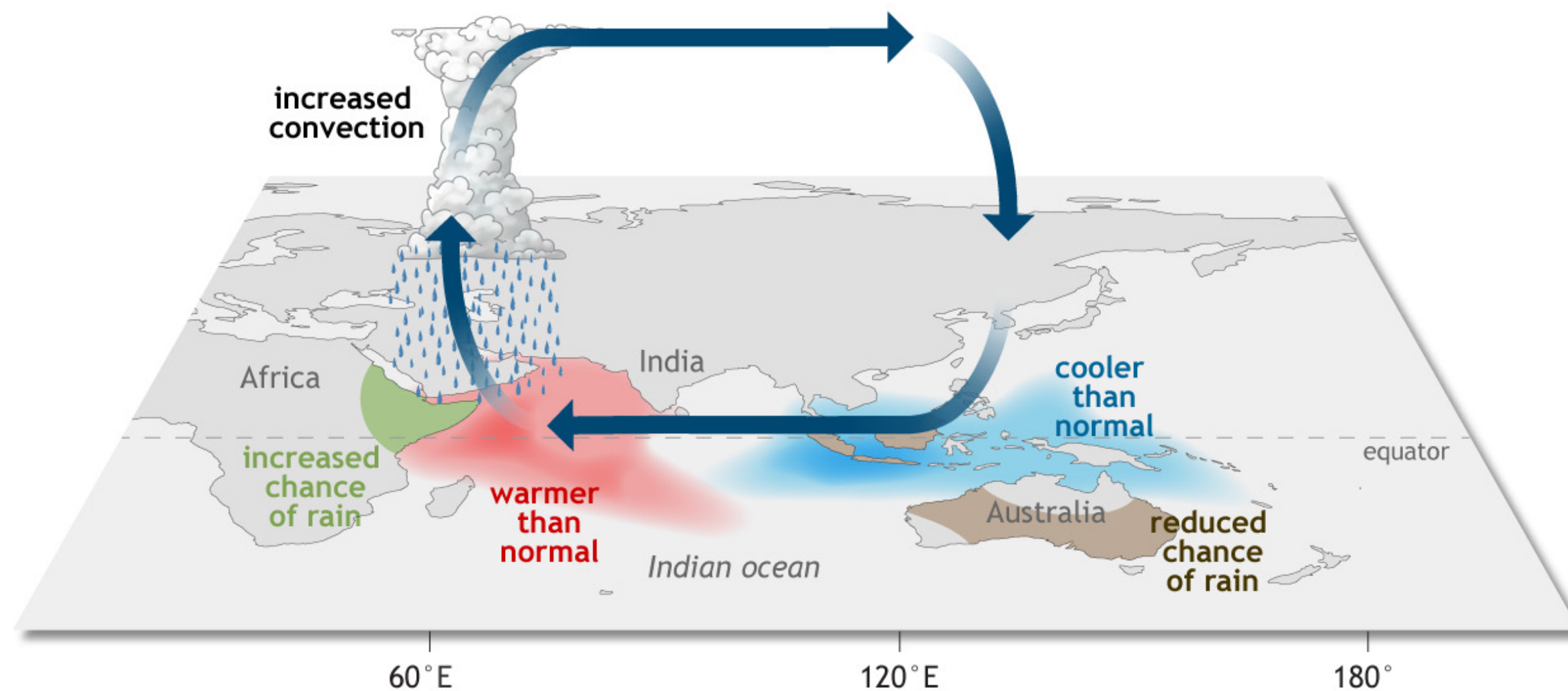


Indian Ocean Dipole - Interannual variability of IWs

B. Yadidya and A. D. Rao. “Interannual variability of internal tides in the Andaman Sea: an effect of Indian Ocean Dipole”.
*Under Review at **Scientific Reports**.*

INDIAN OCEAN DIPOLE

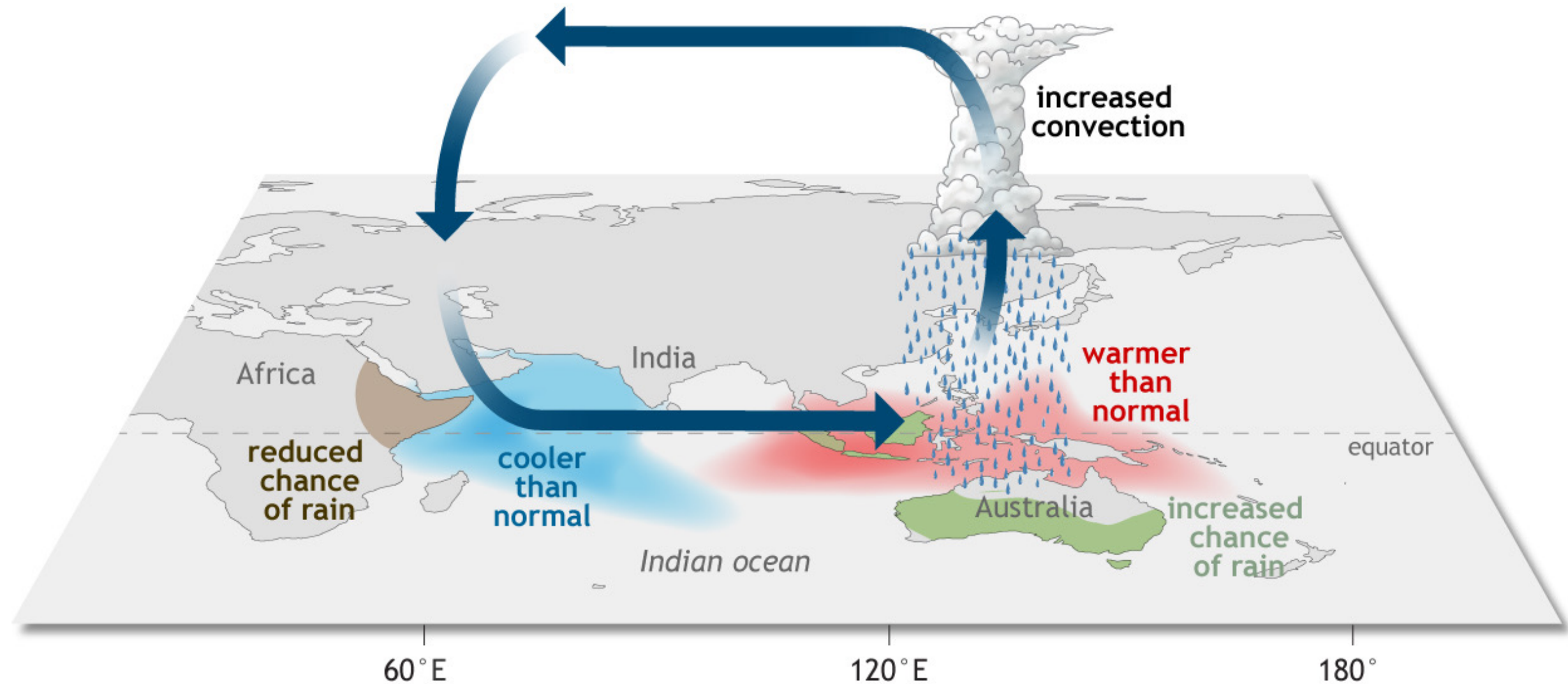
Positive phase



NOAA Climate.gov

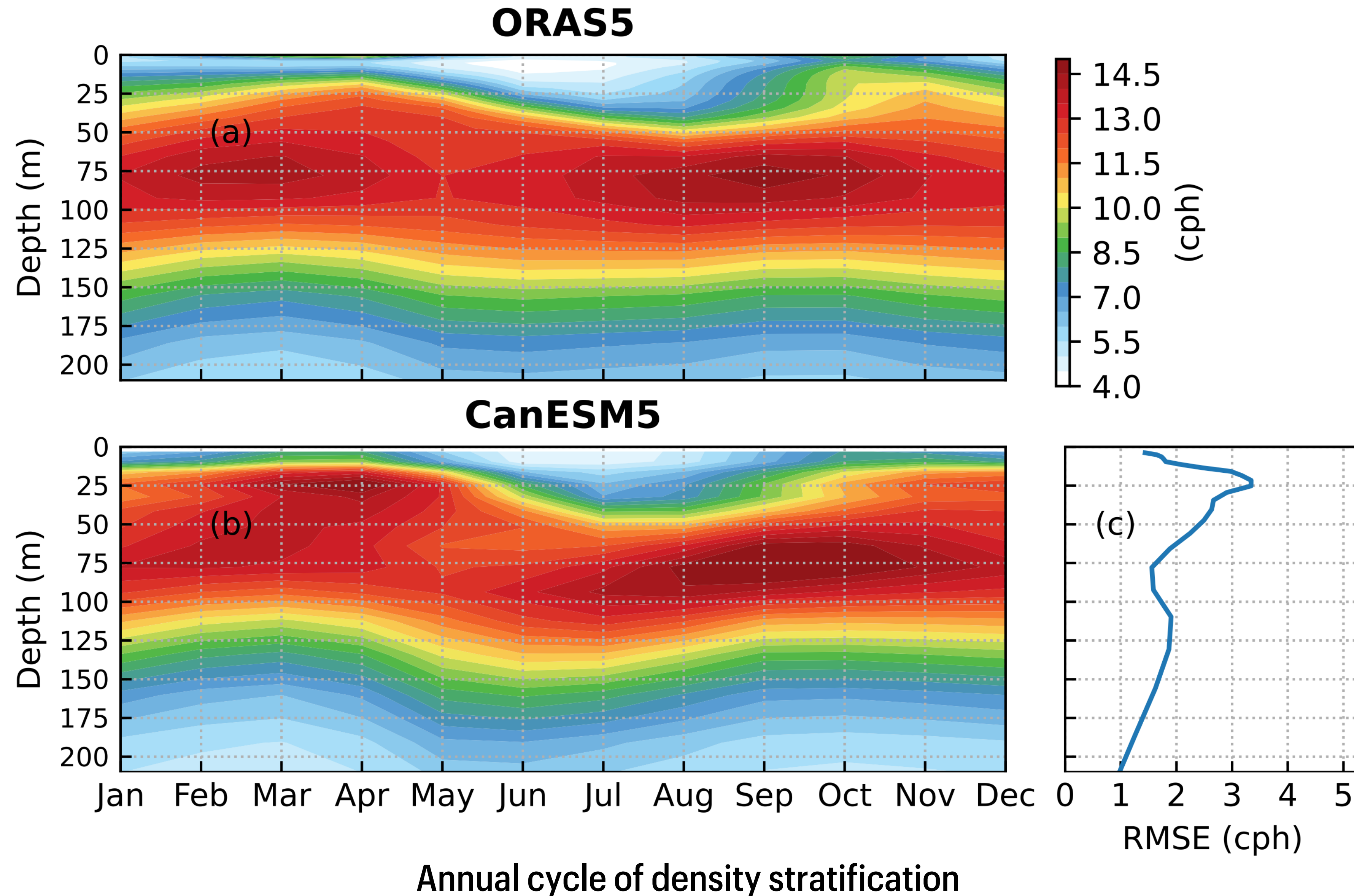
INDIAN OCEAN DIPOLE

Negative phase

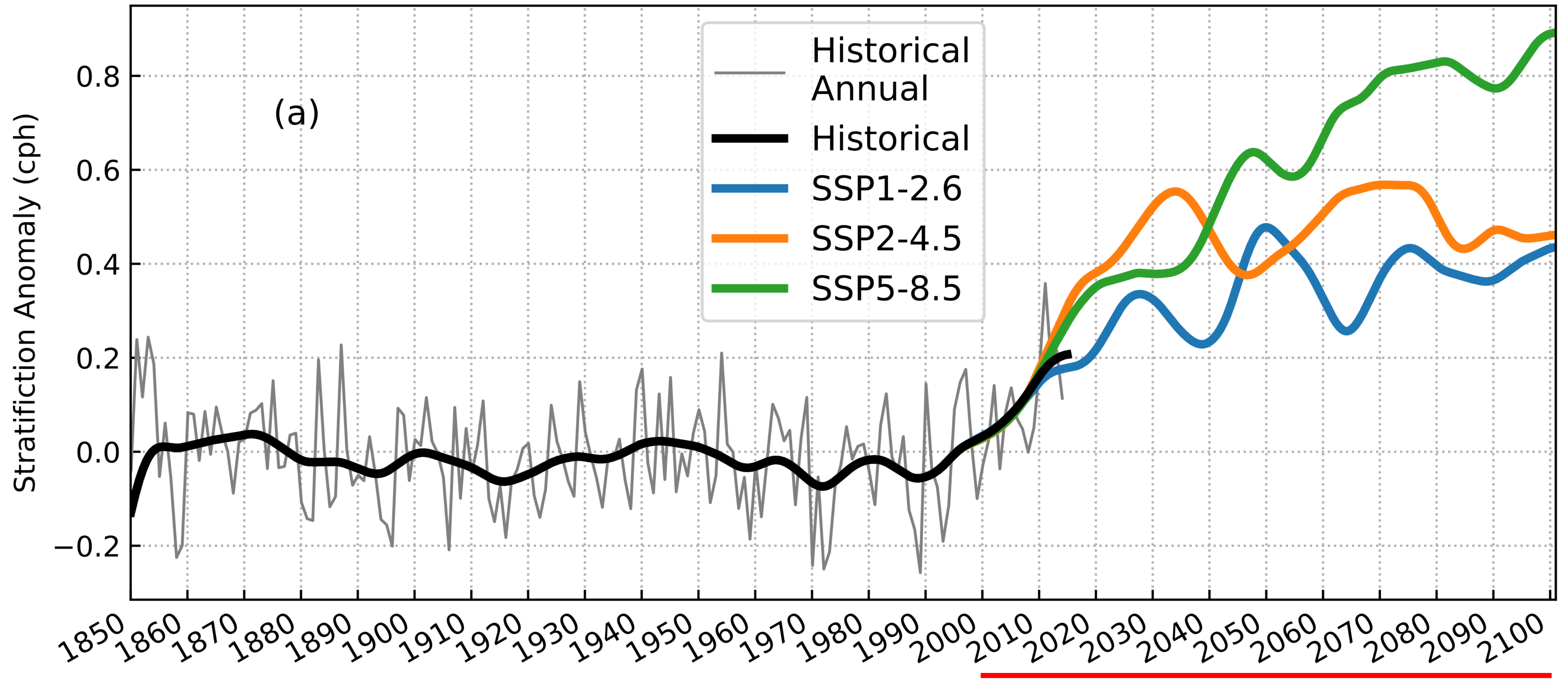


NOAA Climate.gov

Validation of CMIP6 data – CanESM5

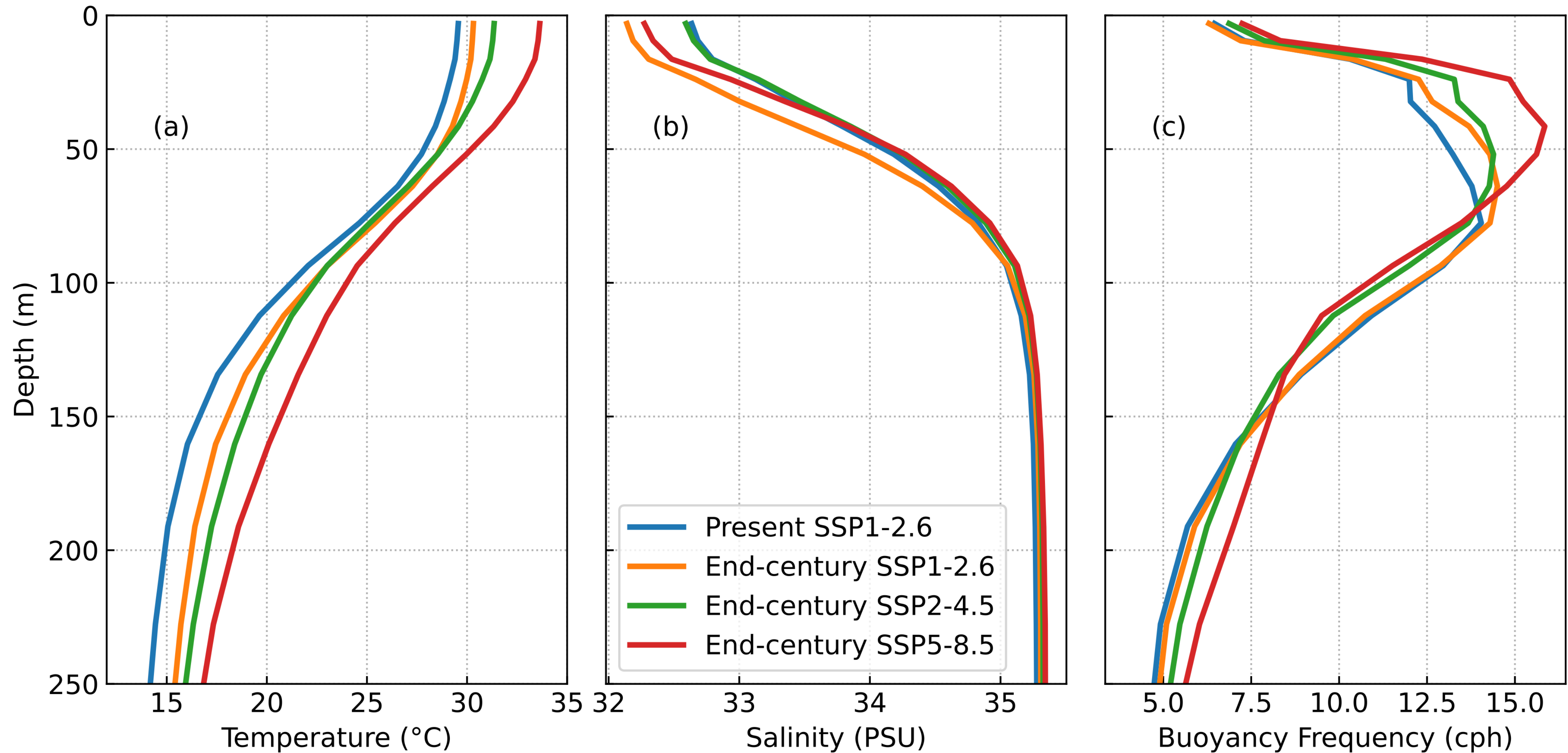


Stratification is increasing since 2000



Time series of depth-averaged stratification anomaly relative to the 'Historical'

Vertical profiles for model (MITgcm) initialisation



Domain-averaged profiles of temperature, salinity, and buoyancy frequency in the present (2015-2024) and end-of-century (2091-2100) under different SSP scenarios

Internal Tide Energetics

$$\langle DIS_{bc} \rangle = \langle Conv \rangle - \langle Div_{bc} \rangle$$

Dissipation = Generation - Propagation

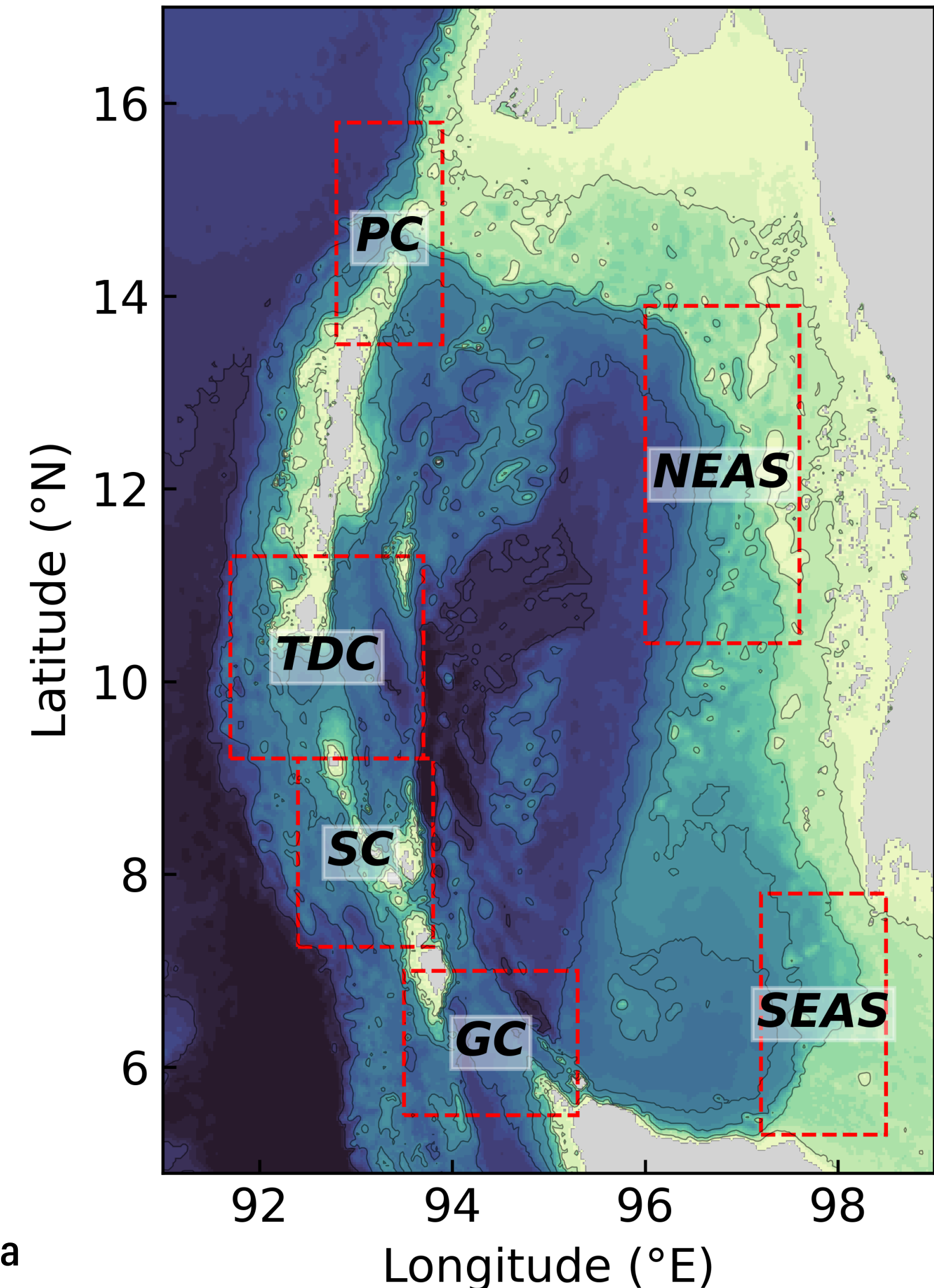
$$Conv = g \int_{-H}^{\eta} \rho' w_{bt} dz$$

$$DIV_{bc} = \nabla_h \cdot \left[\int_{-H}^{\eta} u' p' dz \right]$$

PC – Preparis Channel;
GC – Great Channel;

TDC – Ten Degree Channel;
NEAS – North East Andaman Sea;

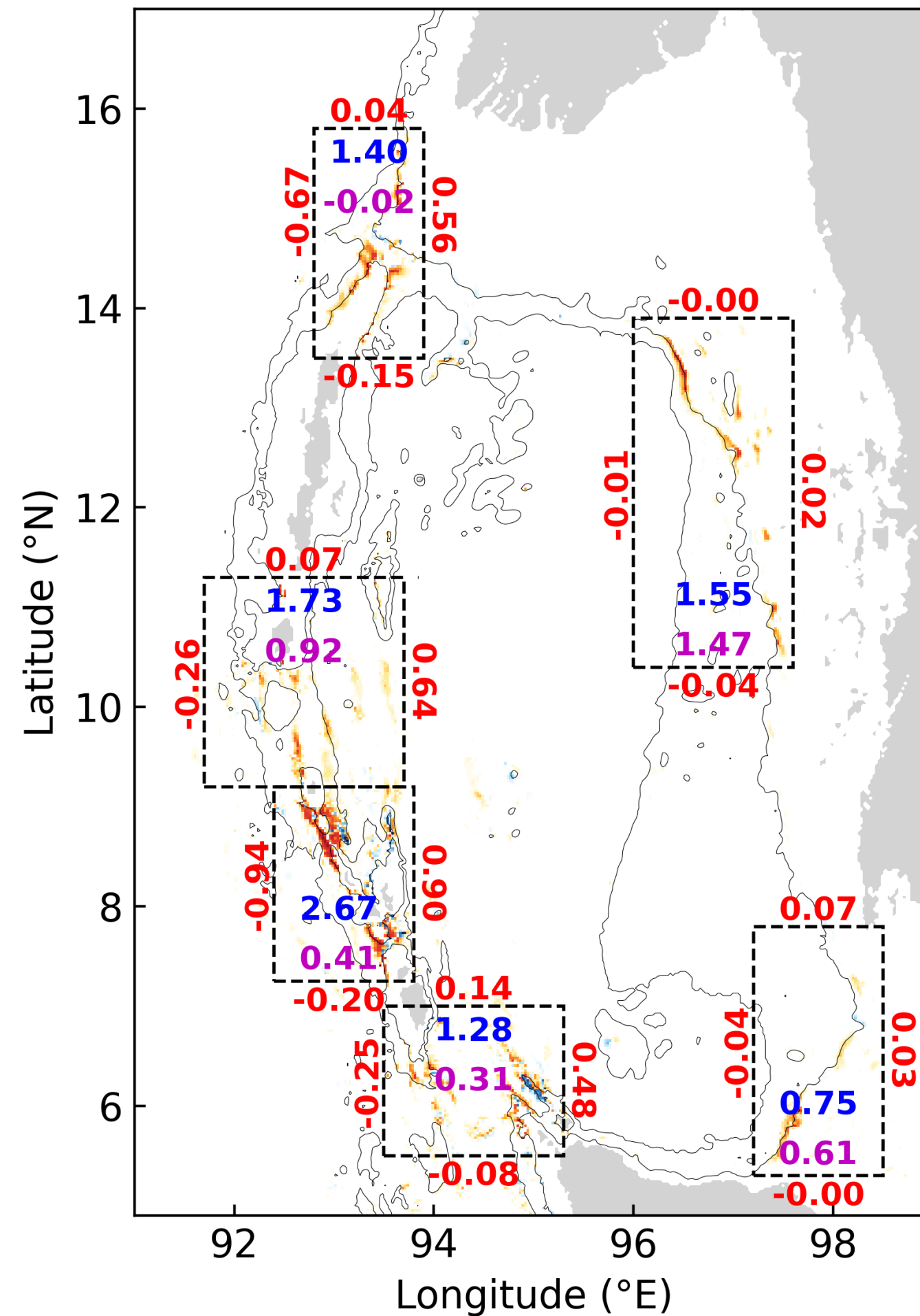
SC – Sombrero Channel;
SEAS – South East Andaman Sea



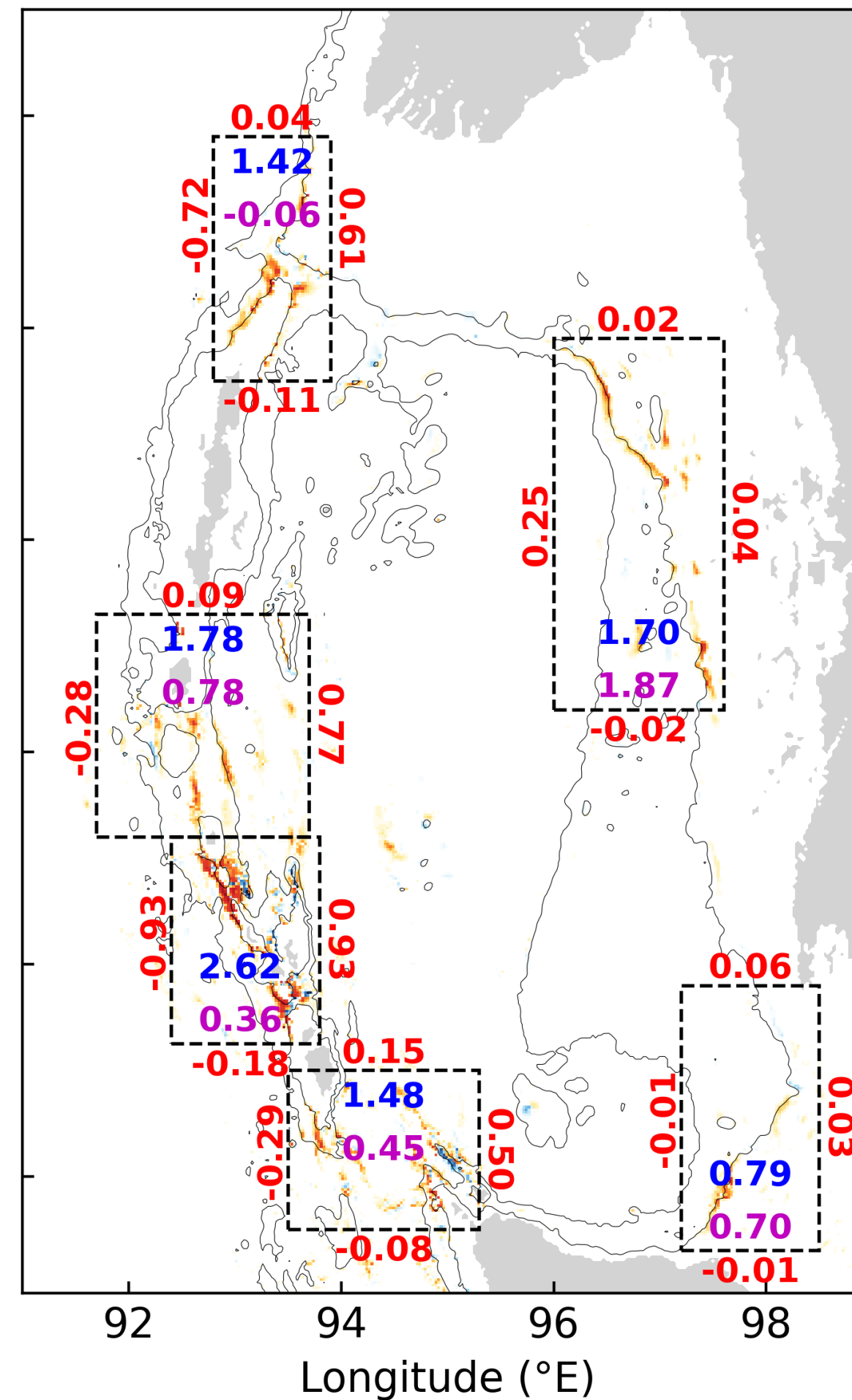
Internal Tide Energetics

$$\langle DIS_{bc} \rangle = \langle Conv \rangle - \langle Div_{bc} \rangle$$

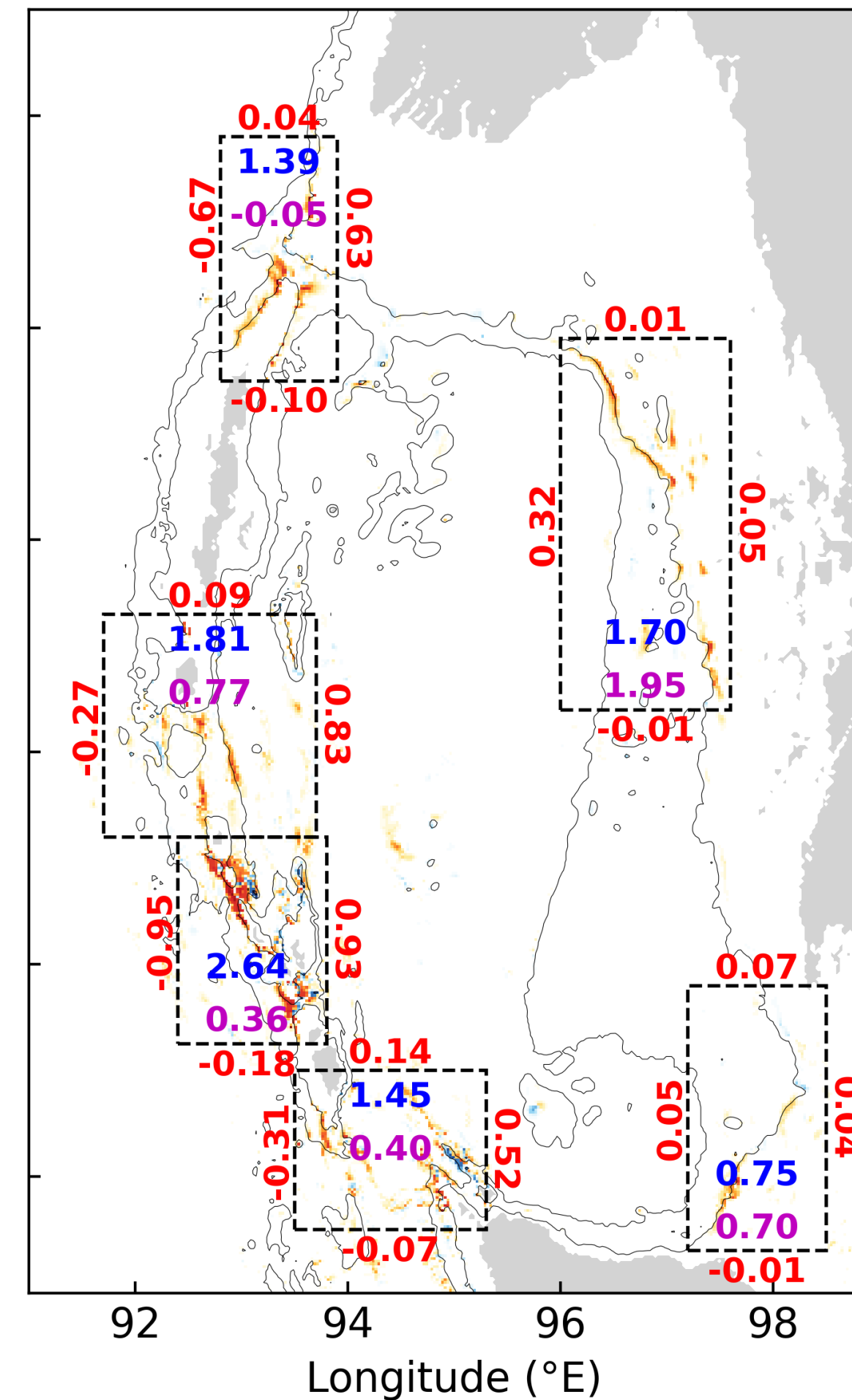
(a) Present SSP1-2.6



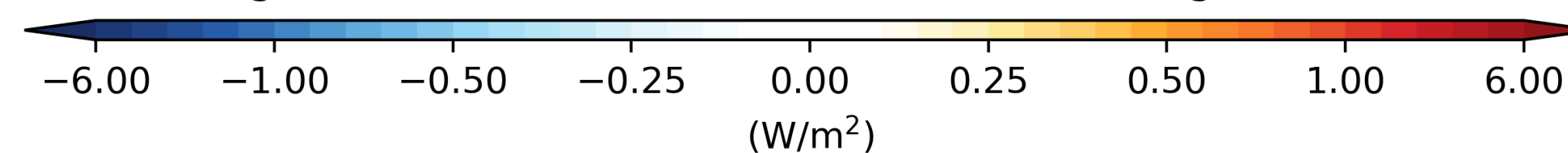
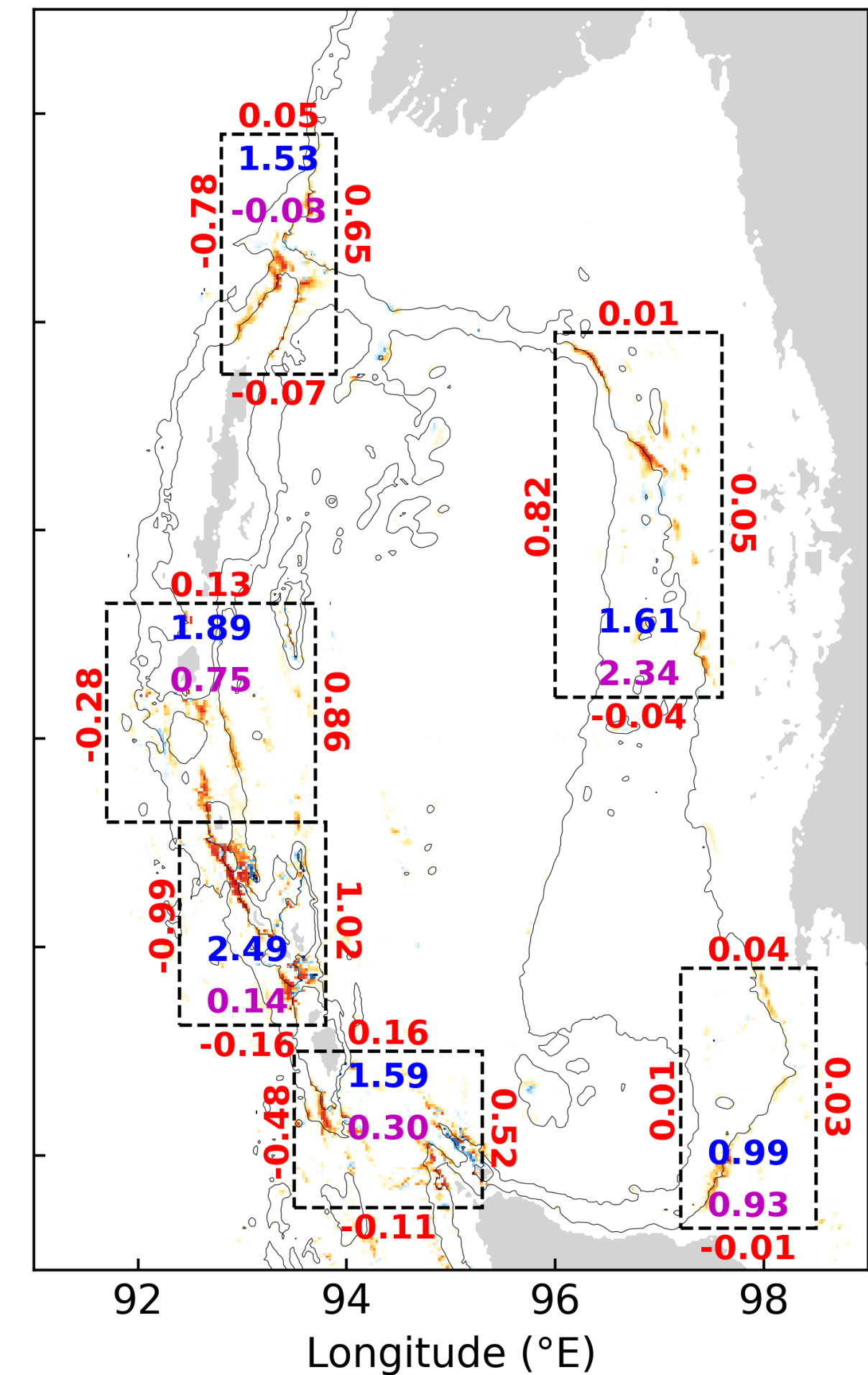
(b) End-century SSP1-2.6



(c) End-century SSP2-4.5

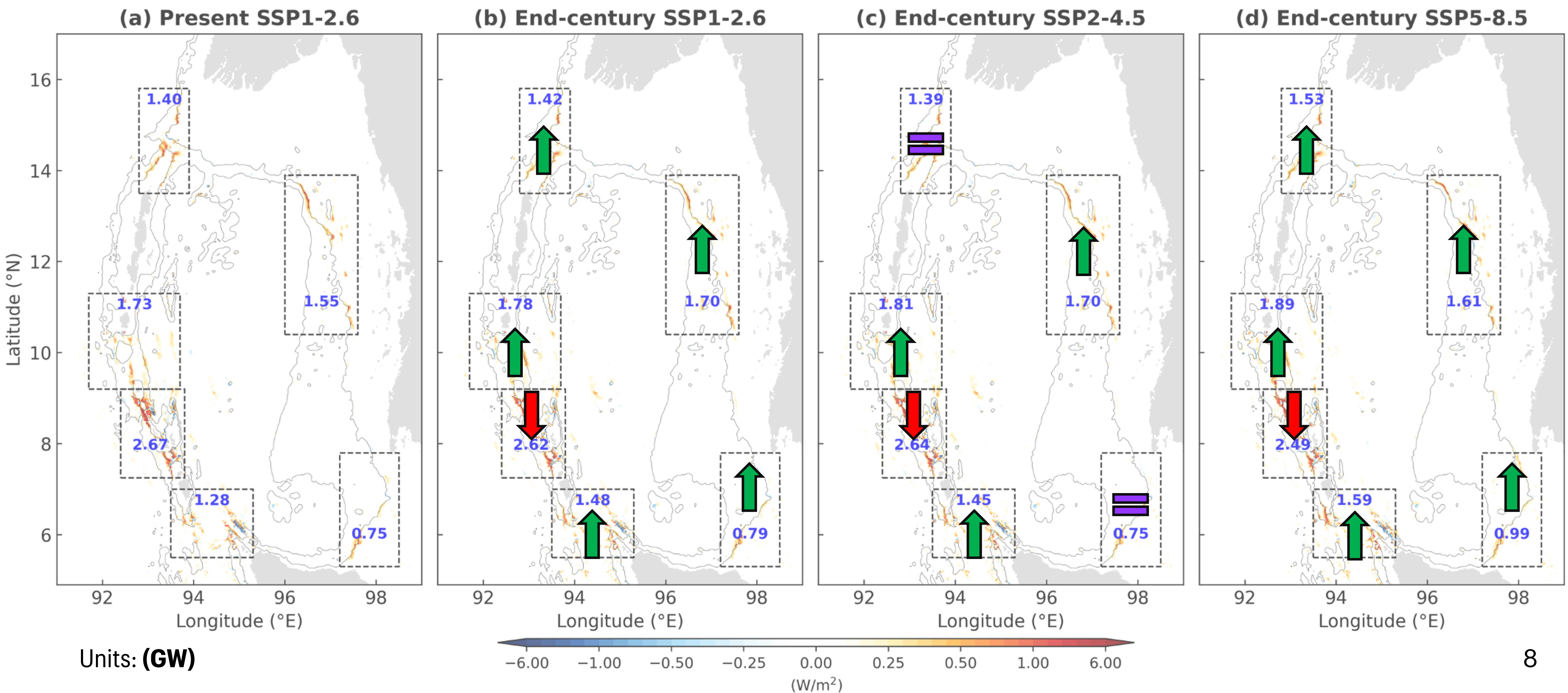


(d) End-century SSP5-8.5



Generation of Internal Tides

$\langle DIS_{bc} \rangle = \langle \textcolor{blue}{Conv} \rangle - \langle Div_{bc} \rangle$  increase  decrease  no change



Dissipation of Internal Tides

$$\langle DIS_{bc} \rangle = \langle Conv \rangle - \langle Div_{bc} \rangle$$

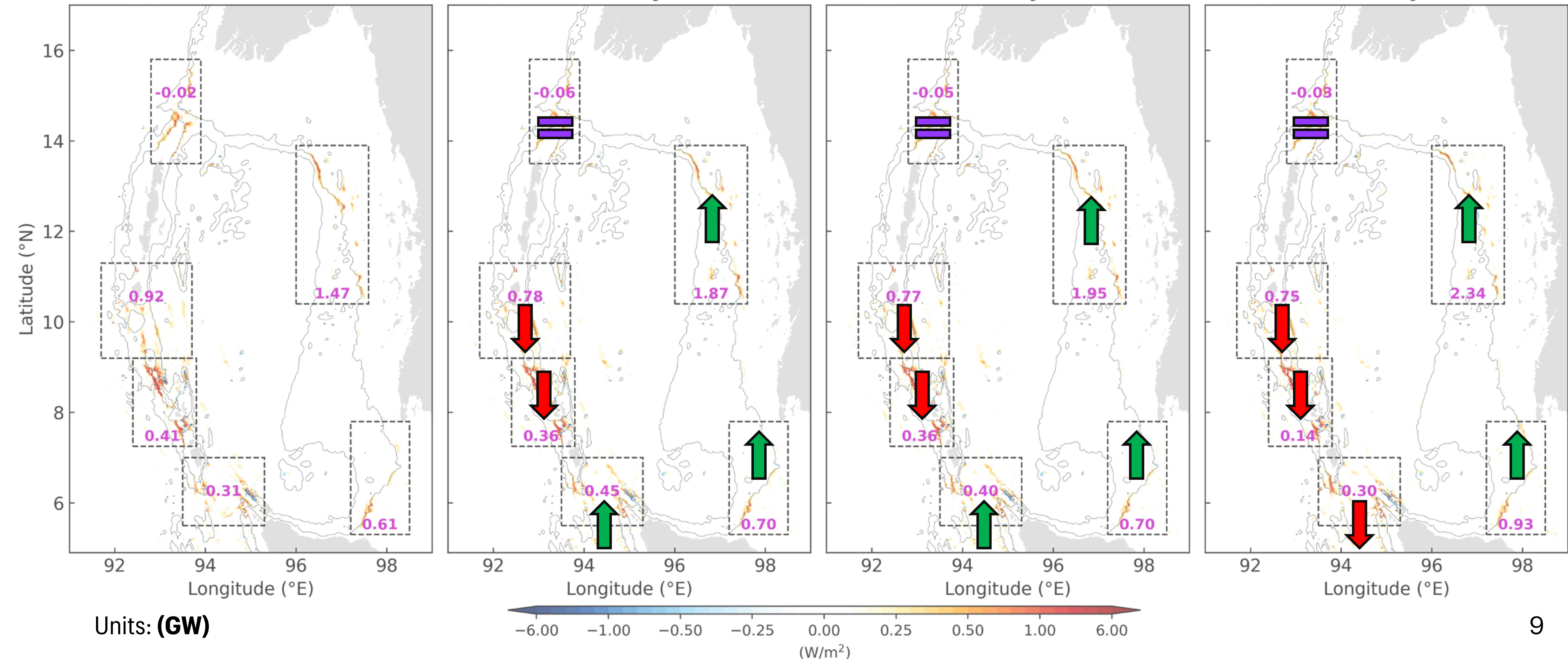
↑ increase ↓ decrease = no change

(a) Present SSP1-2.6

(b) End-century SSP1-2.6

(c) End-century SSP2-4.5

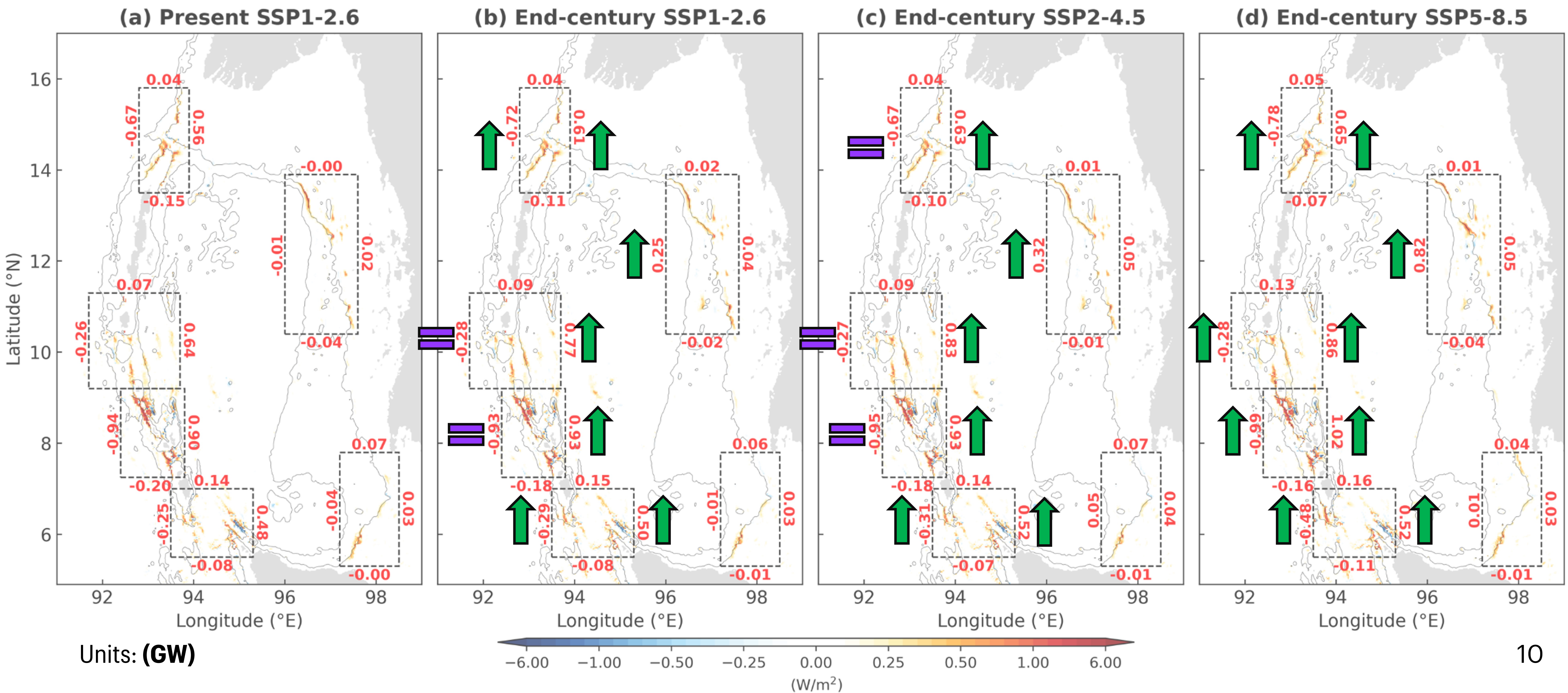
(d) End-century SSP5-8.5



Propagation of Internal Tides

$$\langle DIS_{bc} \rangle = \langle Conv \rangle - \langle Div_{bc} \rangle$$

↑ increase ↓ decrease = no change

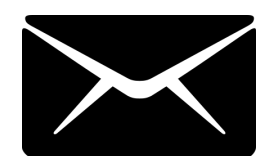


Conclusions

Stratification is projected to increase by **5.8% - 11.8% from the end of 19th century to the end of 21st century**

Internal tide propagation could increase by **8%-18% into the Andaman Sea and by **4.2%-19.2%** into the Bay of Bengal**

Could enhance the health and development of **Coral Reefs and help them survive bleaching events**



yadidyabadarvada@gmail.com



@yadidya_b