Notes on “2023 Mesoscale and Frontal-Scale Air-Sea Interactions Workshop”

# Basic Info

Website and Agenda: <https://usclivar.org/meetings/mesoscale-and-frontal-scale-agenda>

# Notes

**Core idea that interests me: mesoscale effect on subseasonal to climate time scale (upscale effect)**

### Lucas Laurindo (U Miami)

Heat flux:

1. The impact of resolution on thermal heat flux (THF): Kirtman et al (2012), Bishop et al (2017). He showed figures of correlation between THF and SST, THF and dSST/dt.
2. Atmoshperic response to mesoscale : Small and Masadek et al (2019), Small and Bryan et al (2019), Small et al (2020)
3. Timescale matters: Laurindo et al (2022)

Momentum flux:

1. Chelton et al (2011)
2. Schneider (2020) wind response to SST.
3. Influence: windstress curl and eddy energetics, low-level wind shear

Gas tracer flux:

### Niklas Schneider

* Some motive: strong temperature gradient implies strong convergence:
* Implication of mesoscale SST extended to large-amplitude wind divergence.
* Mid-latitude cyclone : O’neil et al (2017)
* Impulse response function: Matsunaga & Schneider (2022), Schneider (2020)

### Leah Johnson

The influence of horizontal density gradient on vertical diffusivity

2-level Decomposition:

(a = along-front)

(t = turbulence)

TEND = EKMAN + EDDY + MIXING

EBF = Ekman buoyancy flux = Along front + Submesoscale + turbulence

This work is very related to Fox-Kemper 2008

Turbulence dissipation rate :

### Hiasashi Nakamura

* Correlation between SST and THF (thermal heat flux) = ocean dynamics
* Something about “Pressure adjustment mechanism”

Text, letter

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* SST might be essential for Southern Annular Mode (SAM)
* Ocean moisture and blocking
* Small et al. (2008) Air-sea interactions

### Thomas Spengler

Ogawa & Spengler (2019)

Tsopouridis, Spensberger & Spengler

!!! Cyclone intensification does not care SST front !!!

SST downstream of the front feeds the cyclone (Bui & Spengler 2021)

### Xiaqi Wang

Frenger et al. 2013

SST variability v.s. rainfall variability

SST anomaly analysis

Small scale SST => High penetration vertically (500hPa)

Pablo Fernandez (ENS): Latent heat flux coupling to the small-scale ocean

Christopher Zappa: Observation of mean and wave orbital flows in the ocean’s upper centimeter

### Reneult

Chelton et al 2010

Available potential energy (APE) => EKE => atmosphere

Current feedback = sink of APE from eddies to atmosphere

\* Eddy work: FeKe =  (strictly!)

Renault et al. 2016

Stabilization of WBC

### (Luna) Yue Bai

Letter

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Heat flux as a function of wind stress curl and crosswind SST gradient

Crosswind SST gradient modifies wind stress curl

GOES/MIT coupled simulation

### Thomas (WHOI)

*(I really like this work)*

Coherent Rings

Eddy maintenance

Use satellite data to verify idealized simulation!!!

### Helene

CMIP6 & plan for CMIP7

Resolution hierarchies

### Abigail Bodner

Data-driven submesoscale param

Fox-Kempere et al 2008 “mixed-layer eddy parameterization”:

Bodner et al 2023: modified version

### Jacob Wenegrat

Definition of mesoscale

and

D’Asaro et al 2011:

Chor, Wenegrat, and Taylor (2022) JPO

Wenegrat 2023 : JPO

### Andrew Deimen, Tong Lee (Lightning poster)

SST heat budget

Similar work as AR forcing on ocean SST

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### Bia

Cronin et al. 2022

We should consider (Luna Bia’s work) current & thermal feedback together

SST front => current front (with wind input)

How Odysea do ocean current change

Torres et al 2022

GEOS/MITgcm Coupled global simulation

### Aneesh

Butterfly project

### Malcolm Robert

Coupling Coefficient (Putrasahan and Von … ?)

CMIP6 Hires MIP

Xiaoqi Wang’s talk

TAMU+NCAR

TEMPSET extremes 2.1

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