

# Dynamical Evolution of Troughs and Ridges within Rossby Wave Packets: A Composite Study

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EGU 2020  
May 4-8 2020

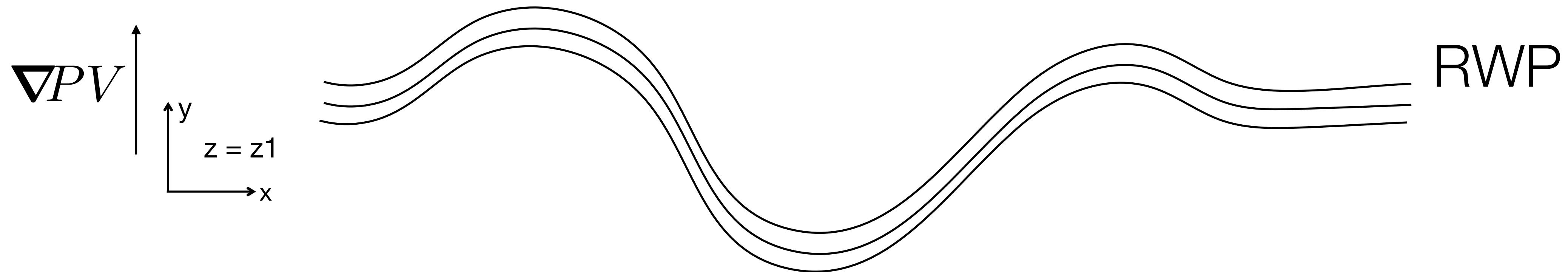
Franziska Teubler, Michael Riemer  
*Johannes Gutenberg-University Mainz*

[f.teubler@uni-mainz.de](mailto:f.teubler@uni-mainz.de)

# Conceptual view of mid-latitude dynamics

## Quantification of PV-thinking

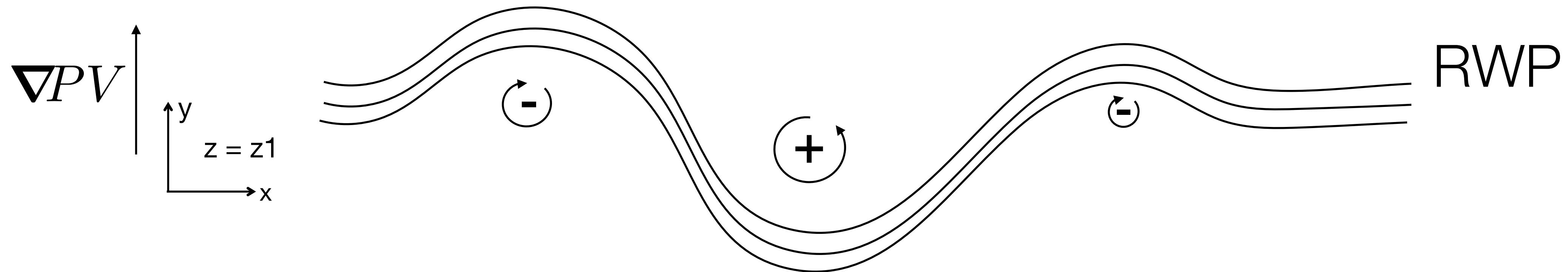
(Hoskins et al. 1985)



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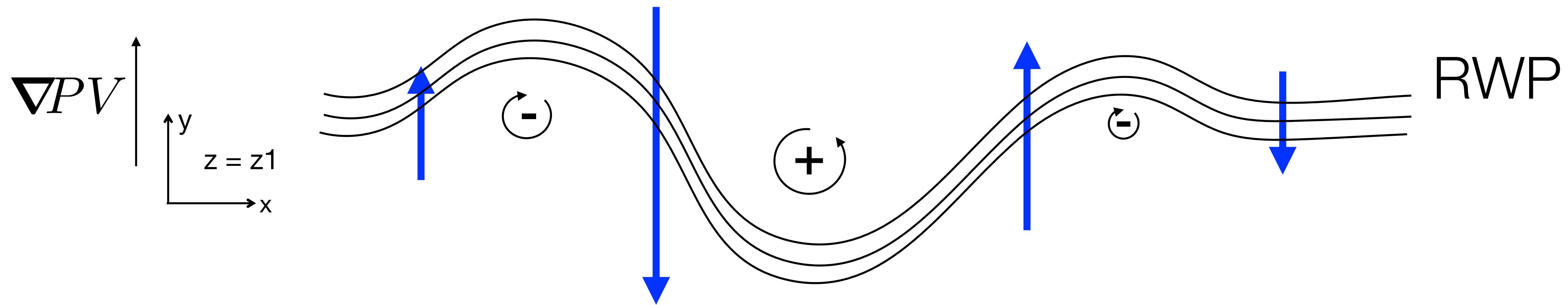
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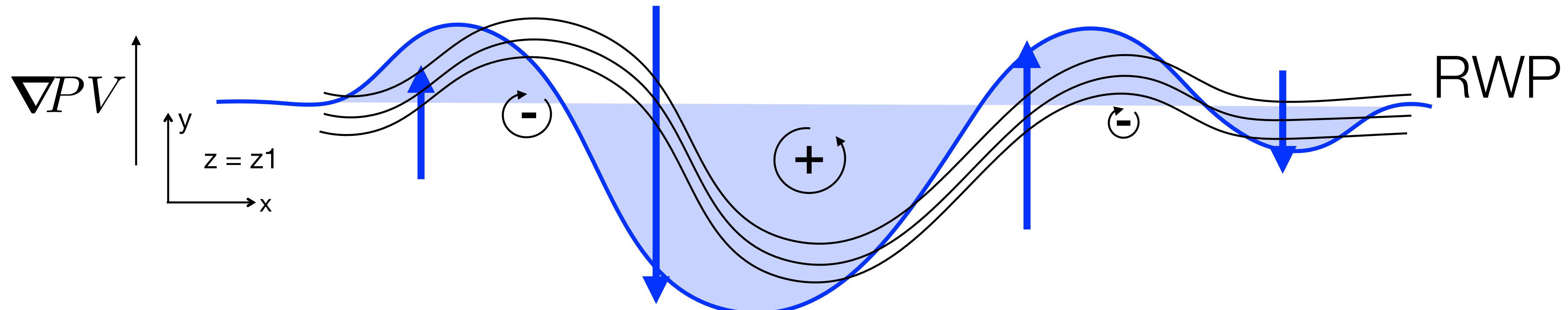
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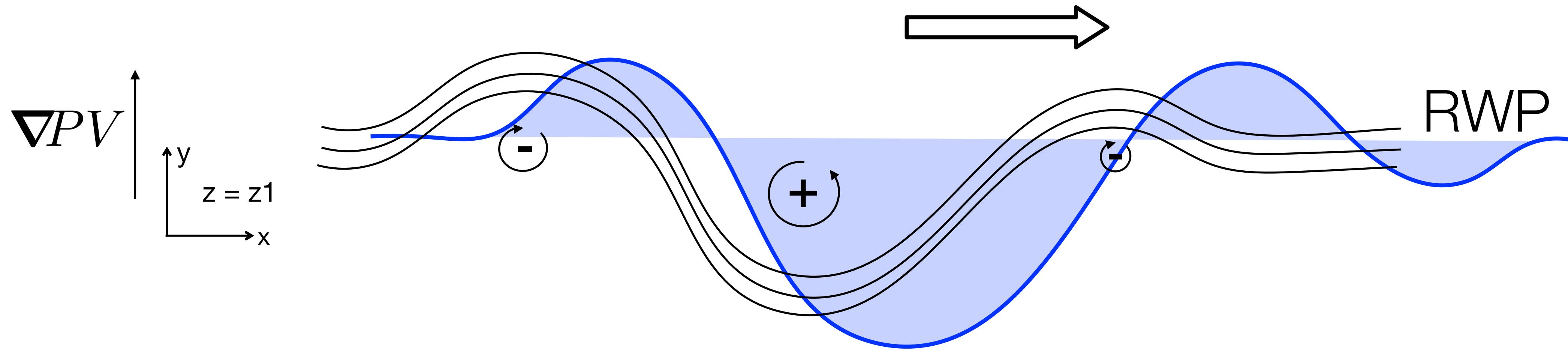
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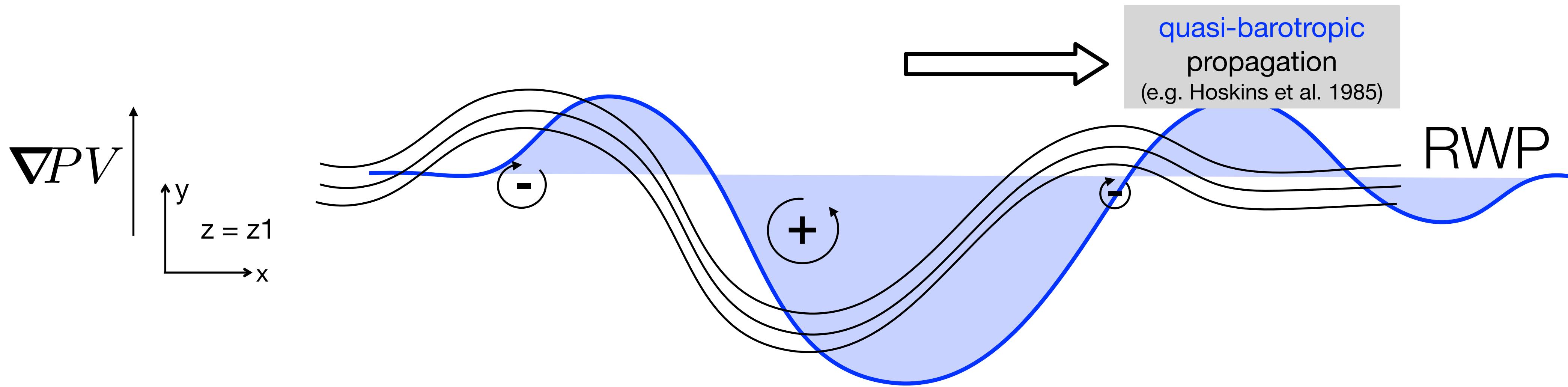
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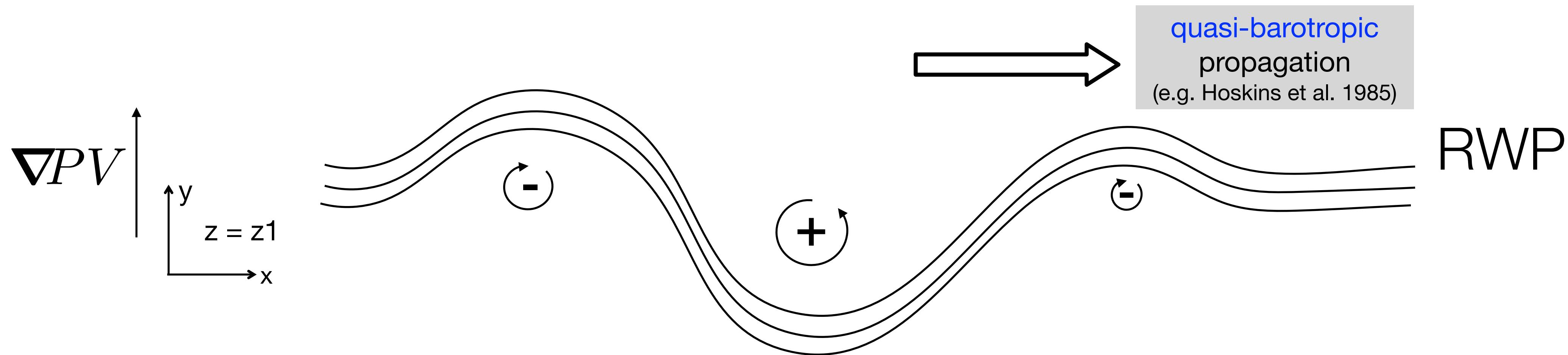
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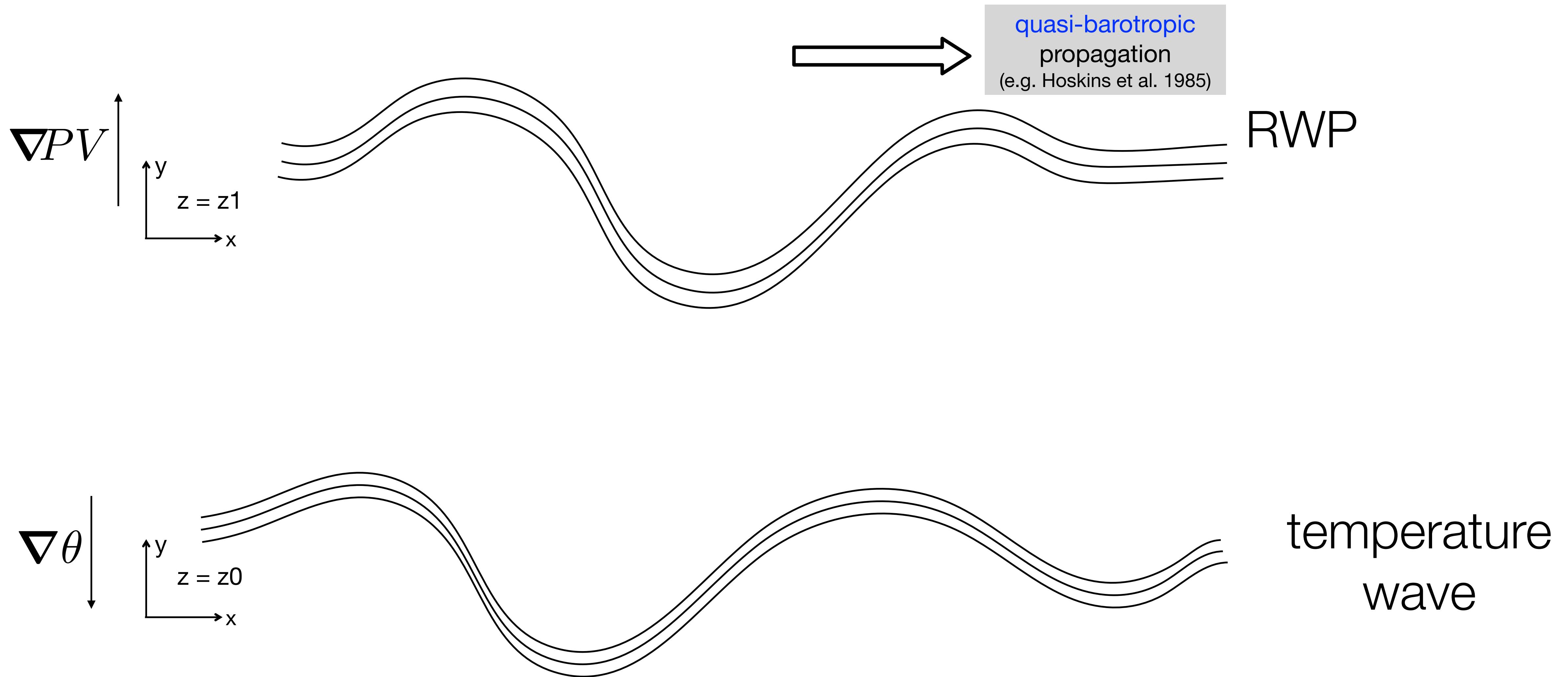
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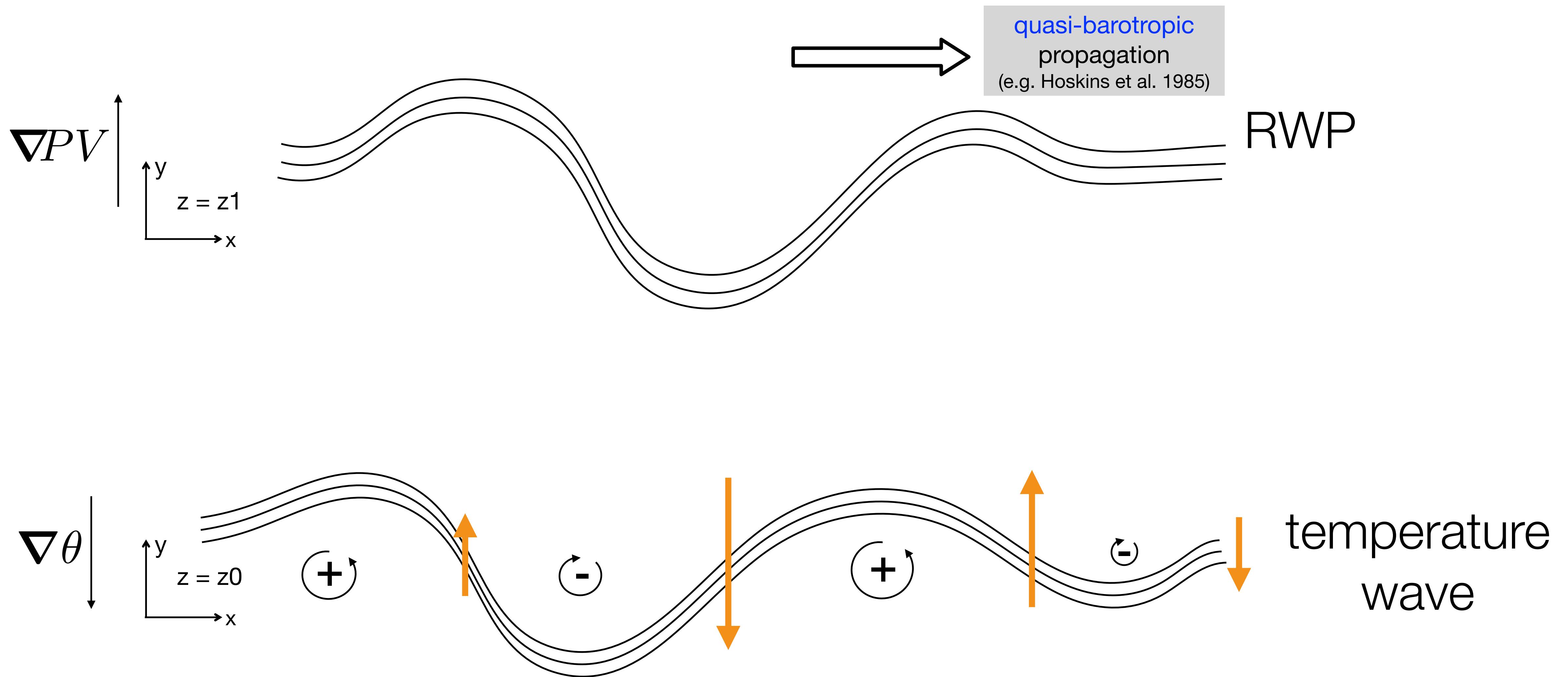
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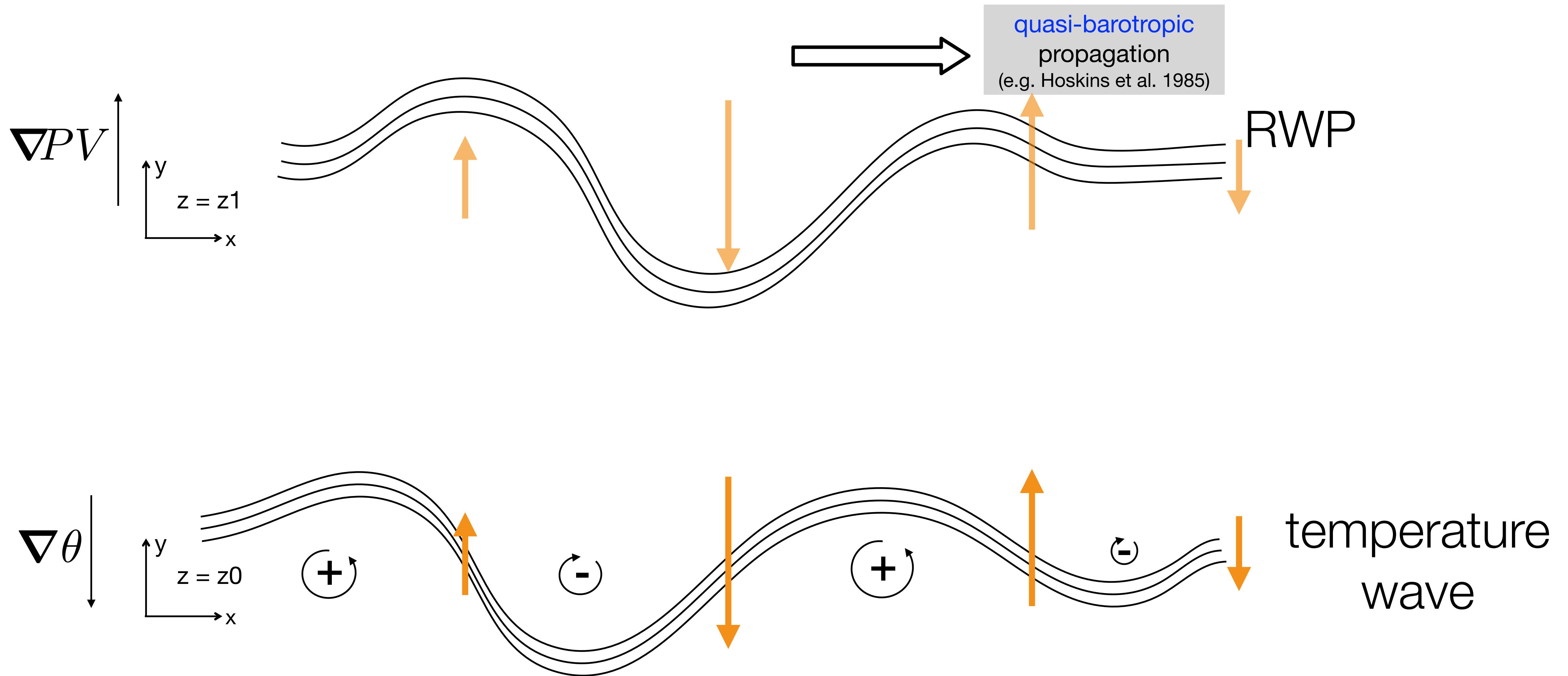
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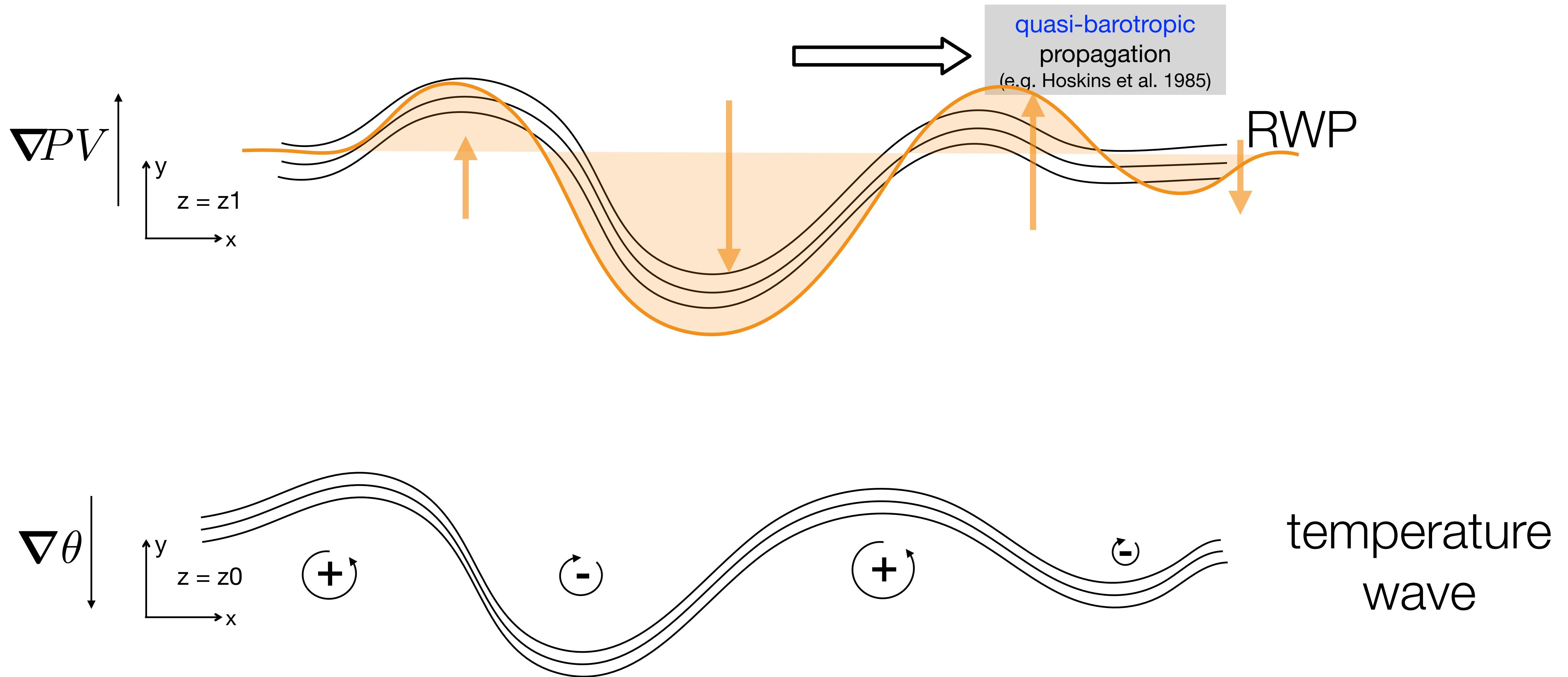
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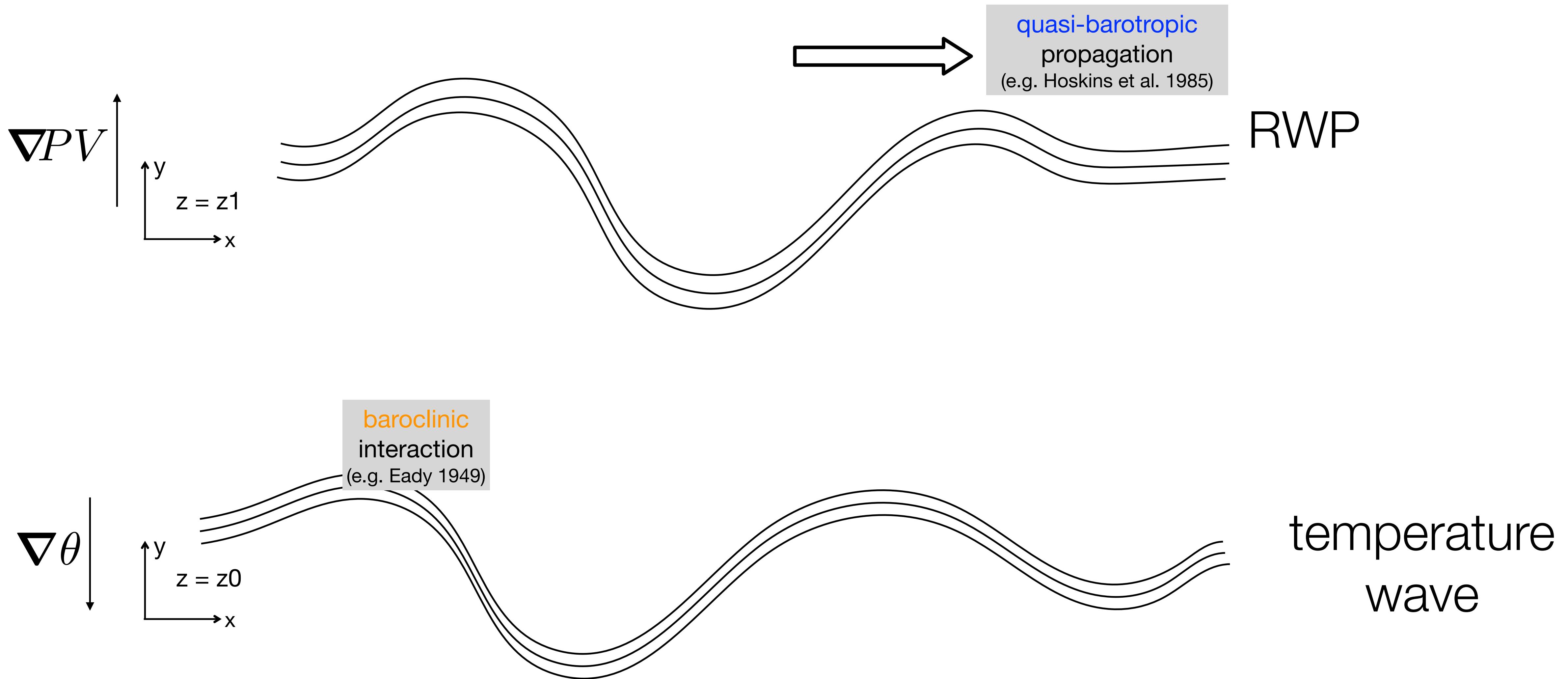
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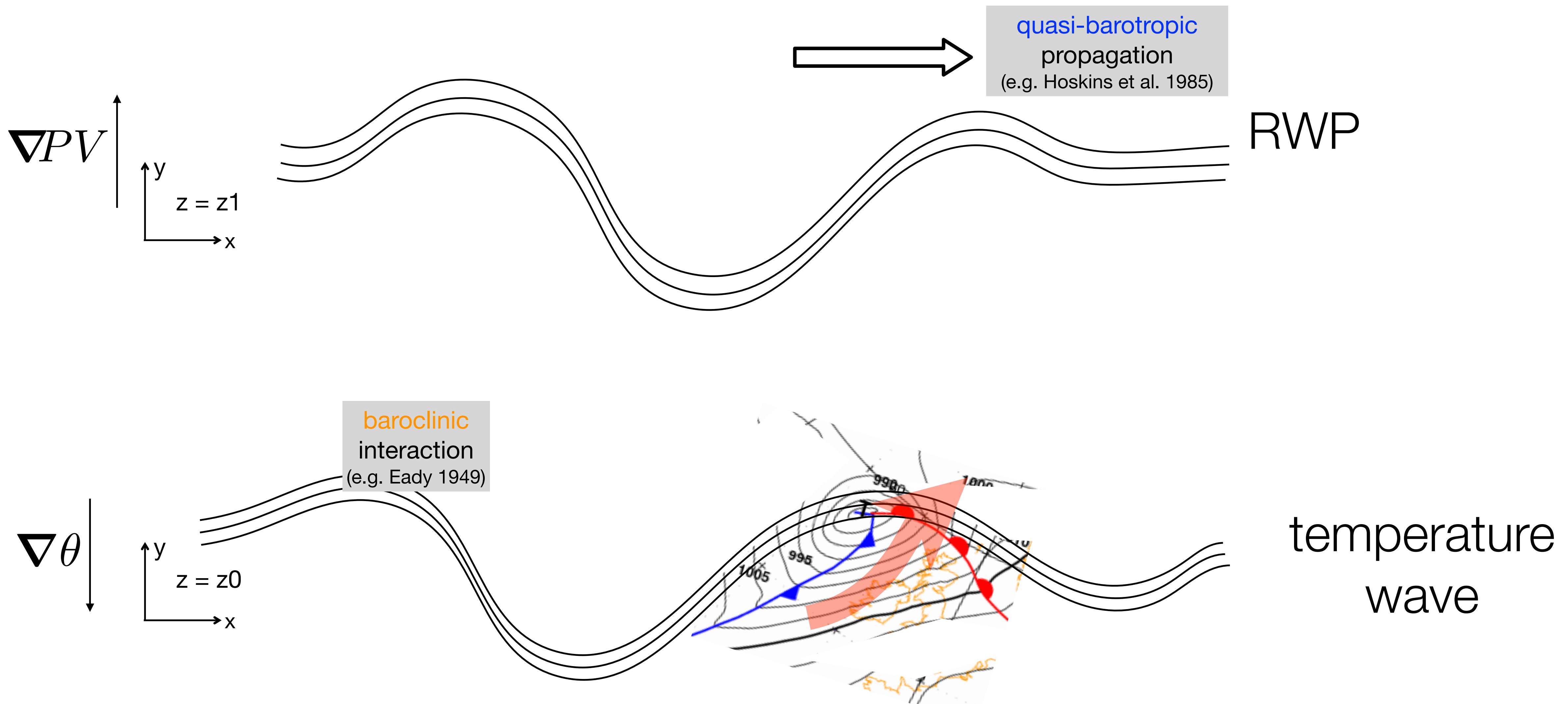
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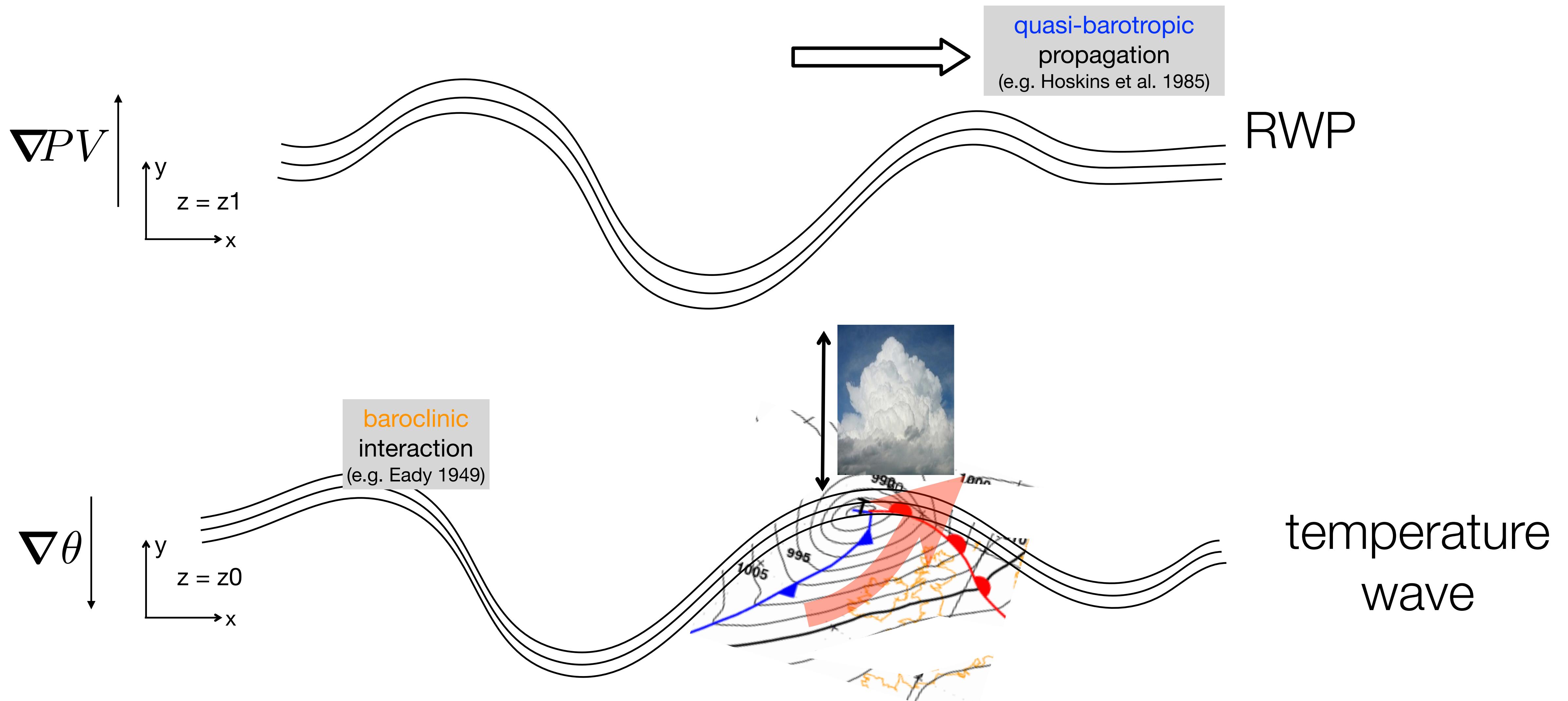
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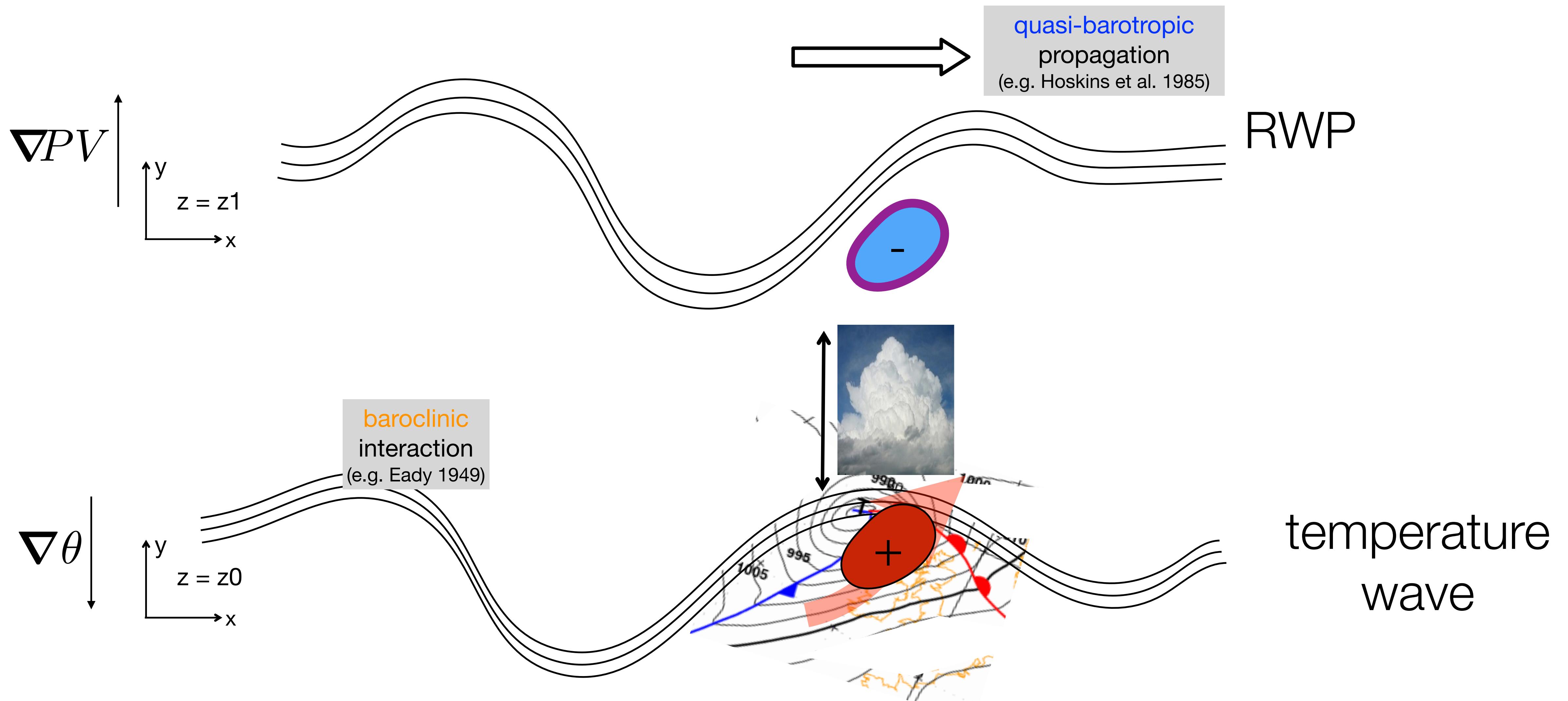
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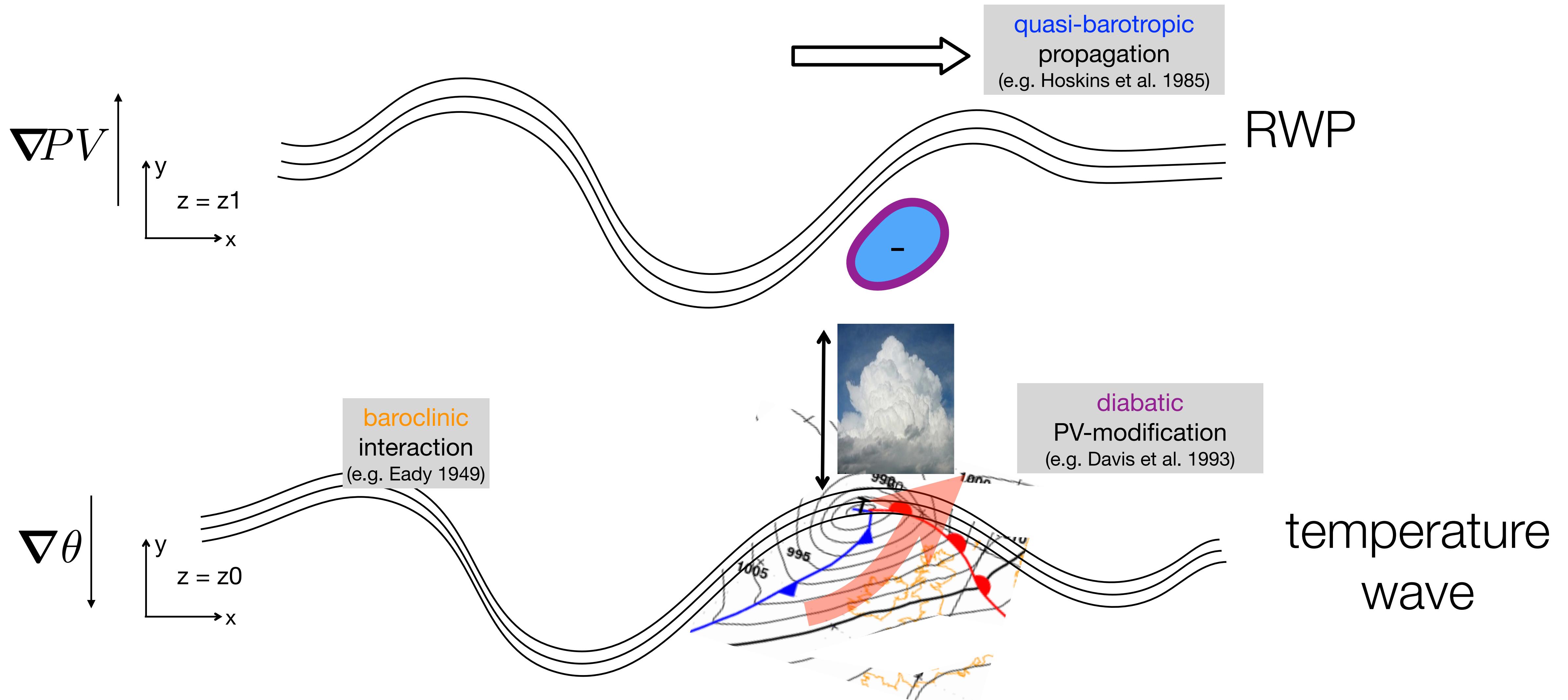
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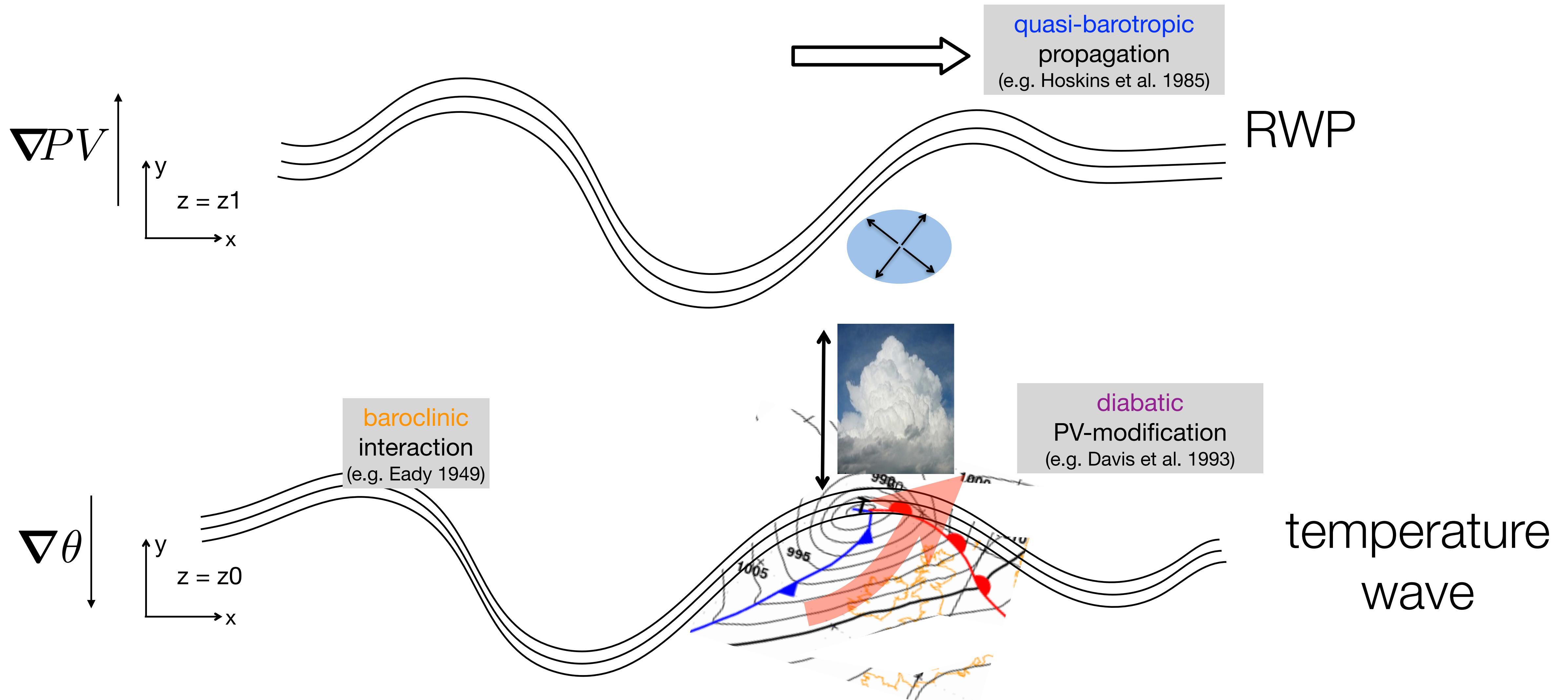
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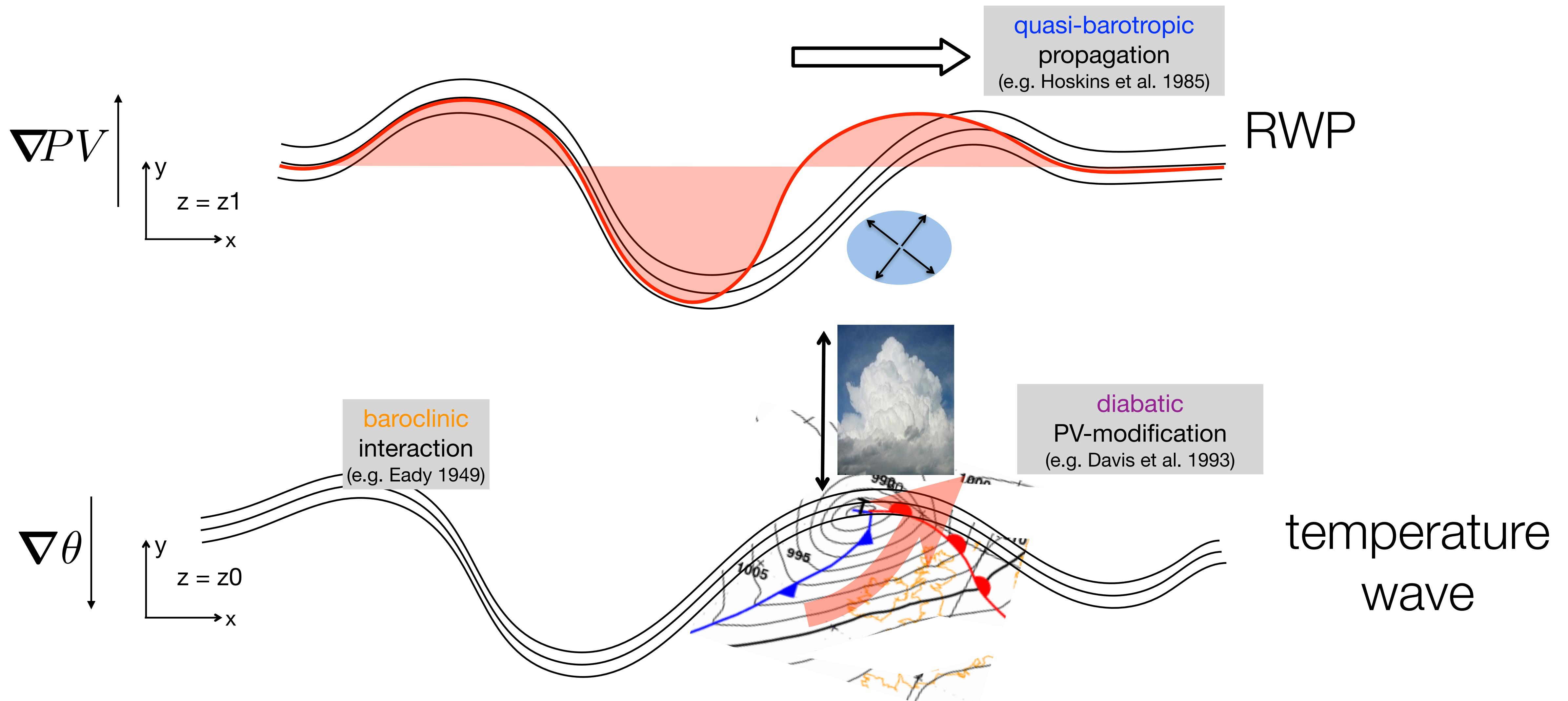
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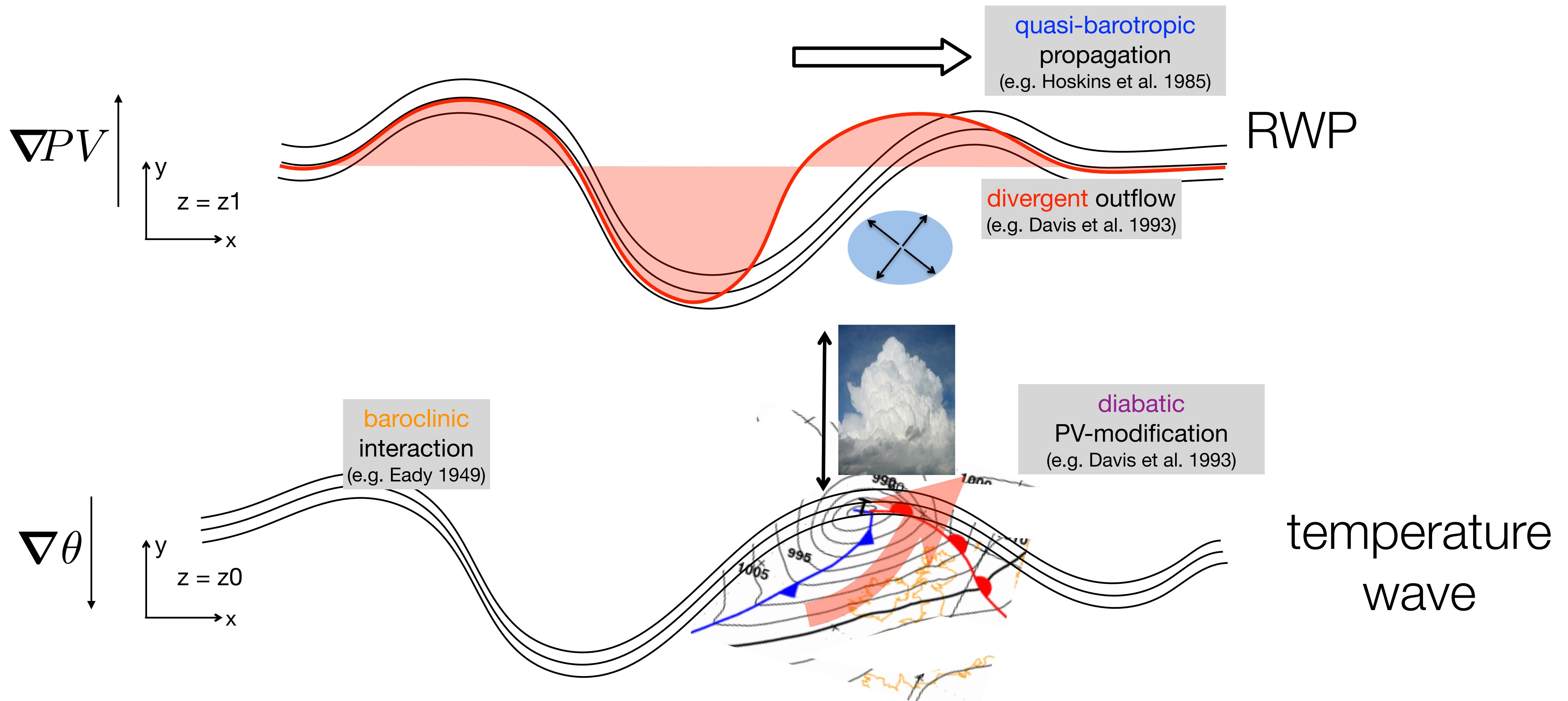
(Hoskins et al. 1985)

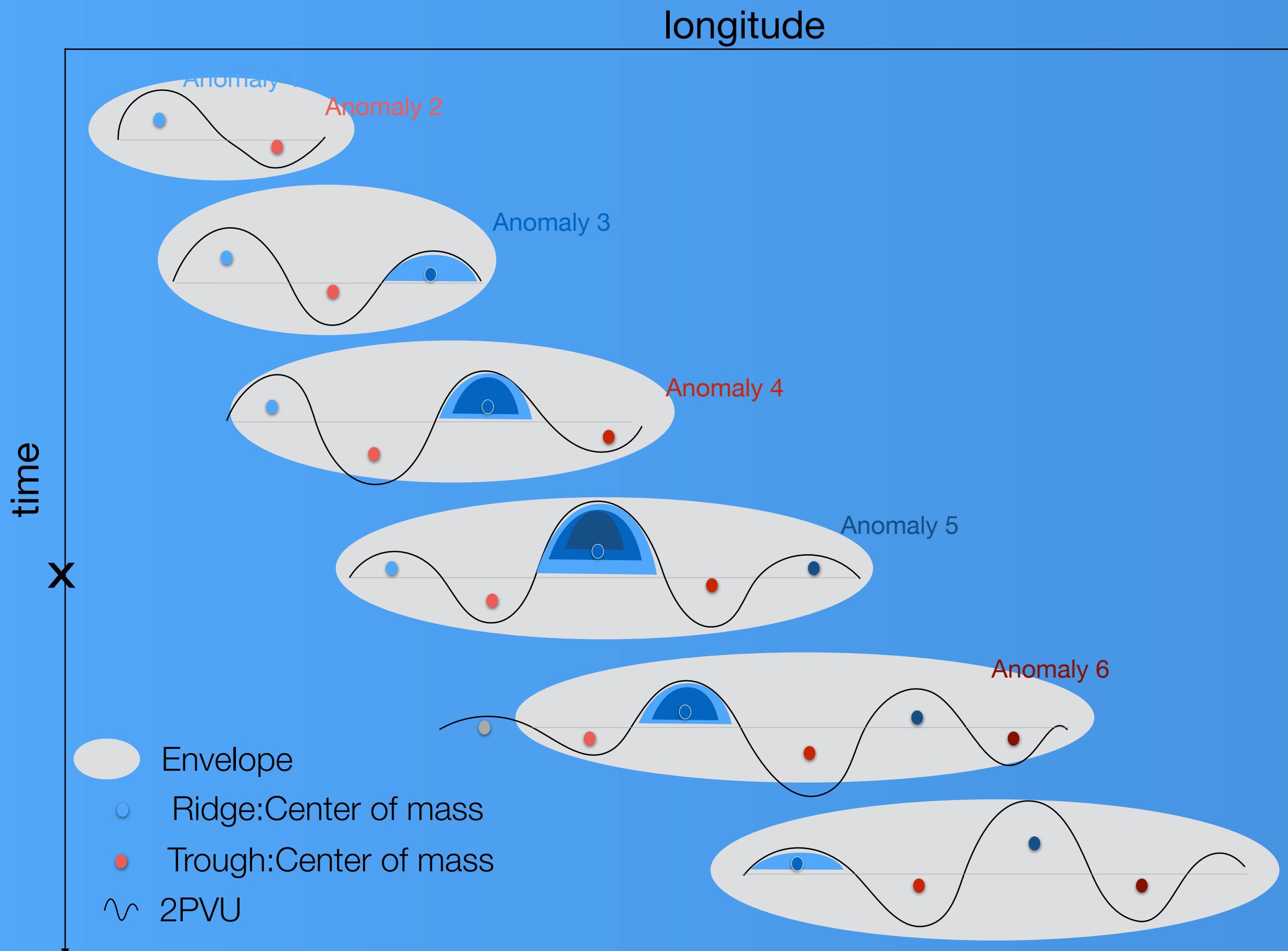


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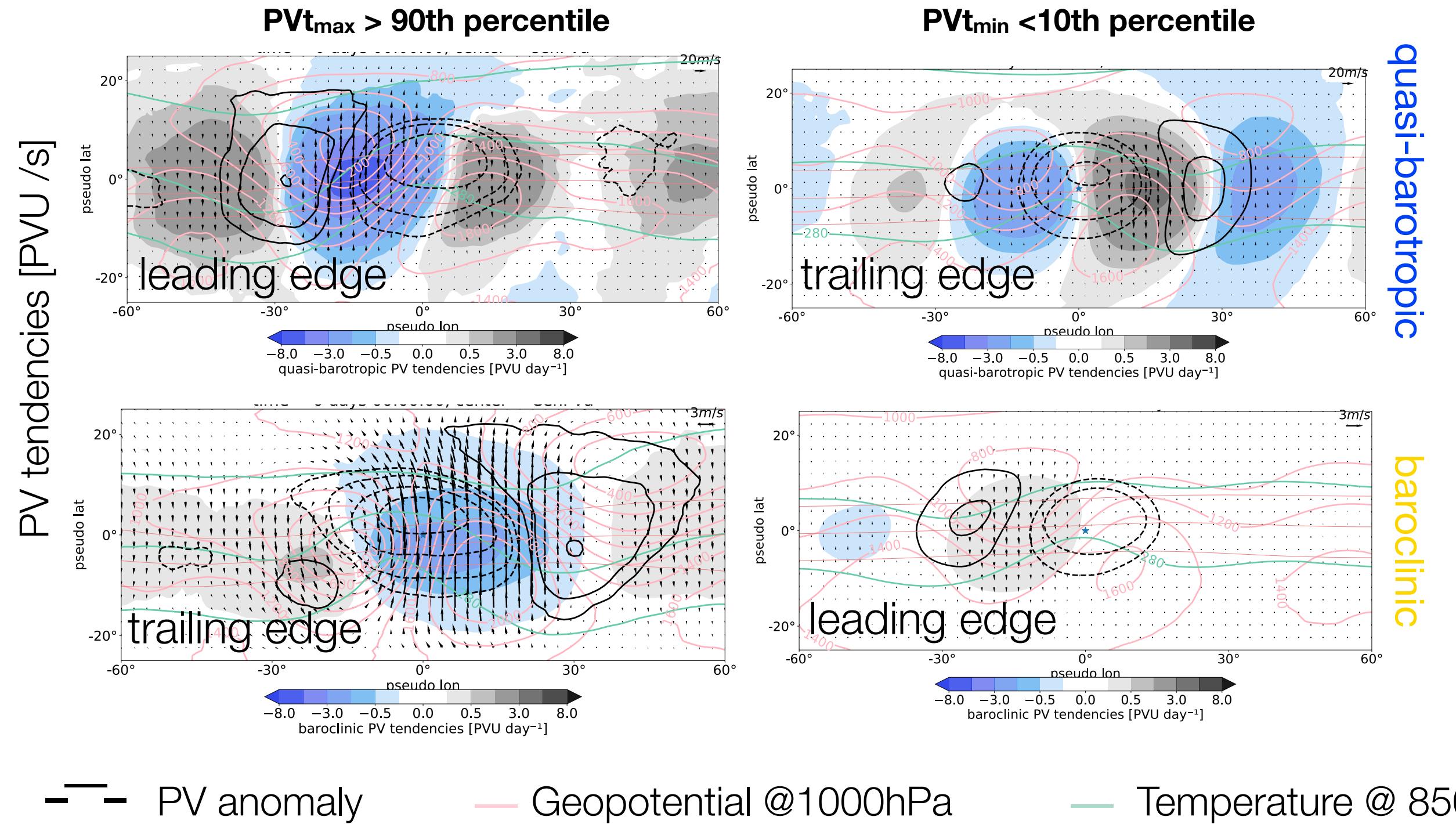
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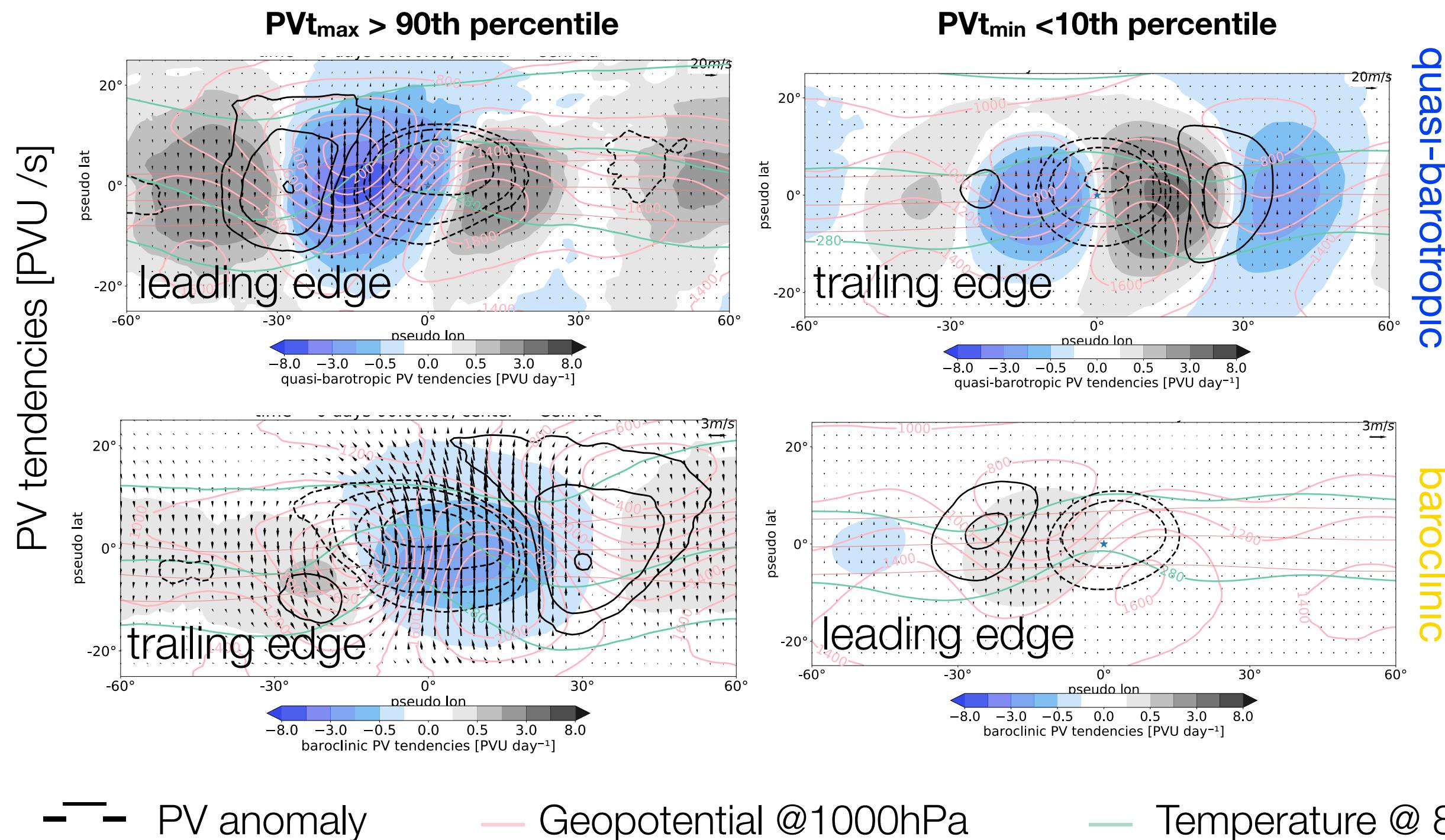
- Which aforementioned processes describe amplitude evolution of upper-level troughs and ridges?
- selects RWPs from Rossby Wave climatology based on envelopes from Wolf and Wirth 2017
- more than 7k RWPs investigated
- build composites of trough and ridge evolution within RWPs
- based on ERA5 with 3hourly resolution from 1979-2018

## spatial composites relative to ridge center



## temporal composite relative to time of max amplitude

## spatial composites relative to ridge center

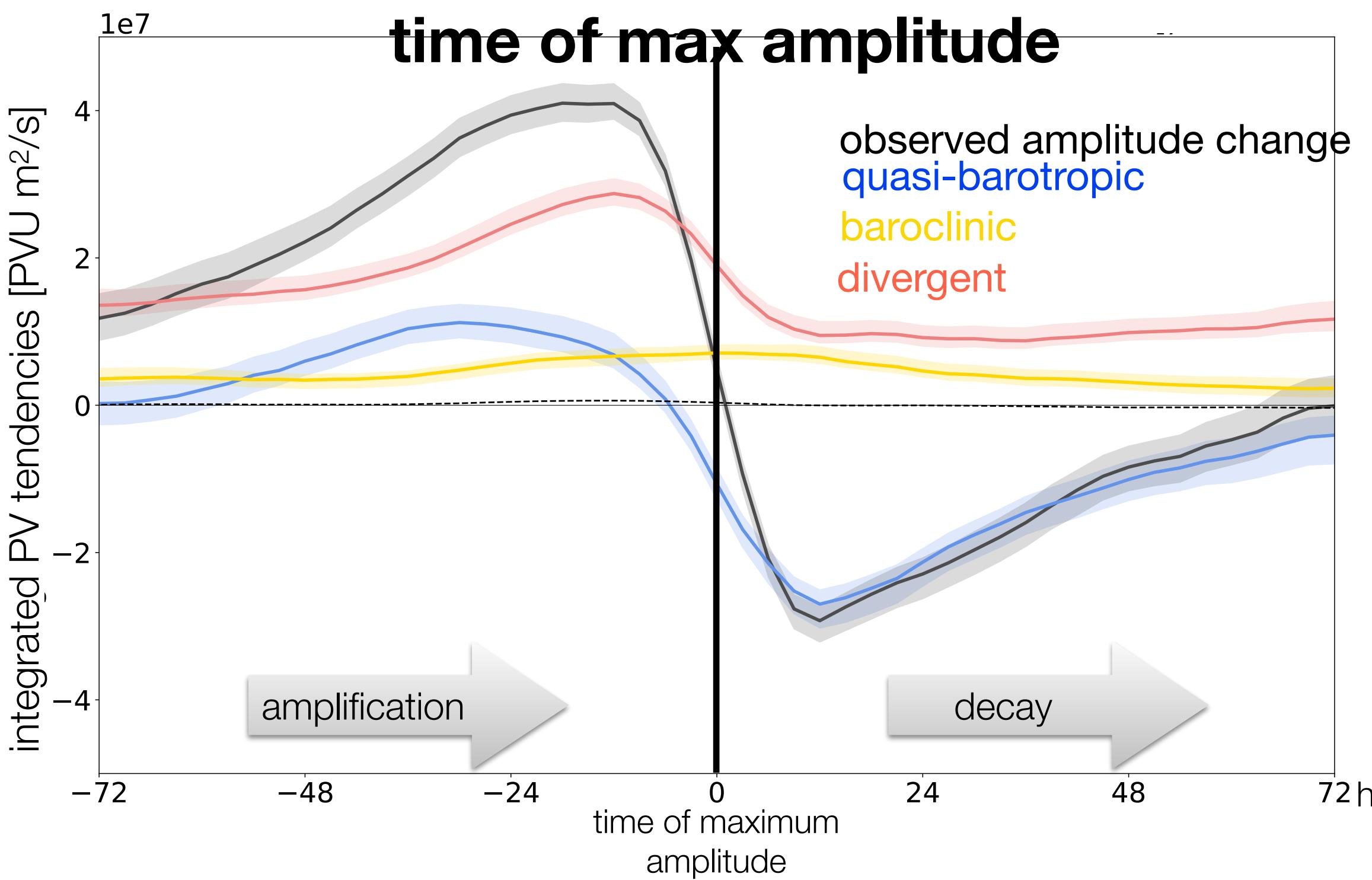


— PV anomaly

— Geopotential @ 1000hPa

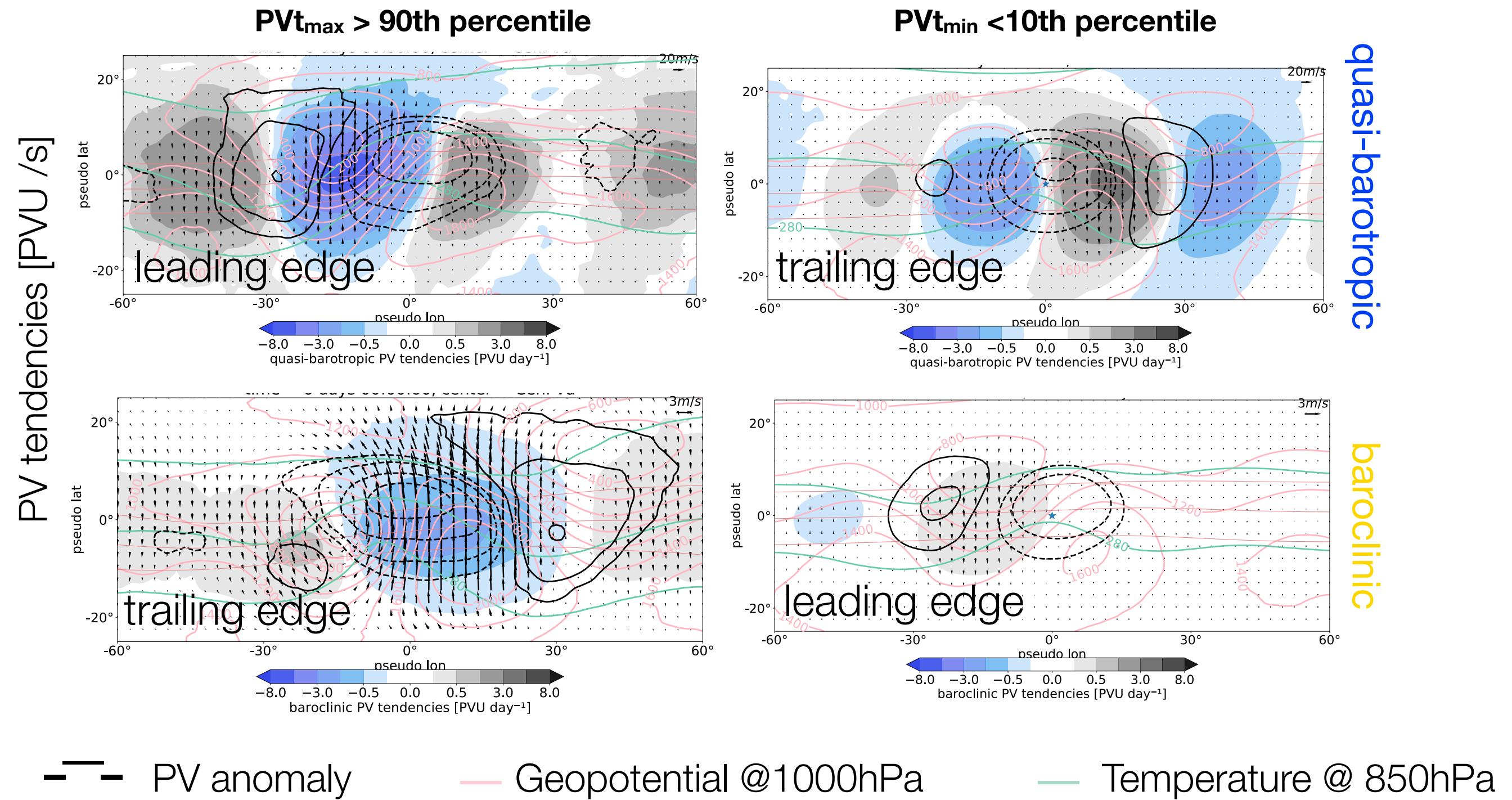
— Temperature @ 850hPa

## temporal composite relative to time of max amplitude

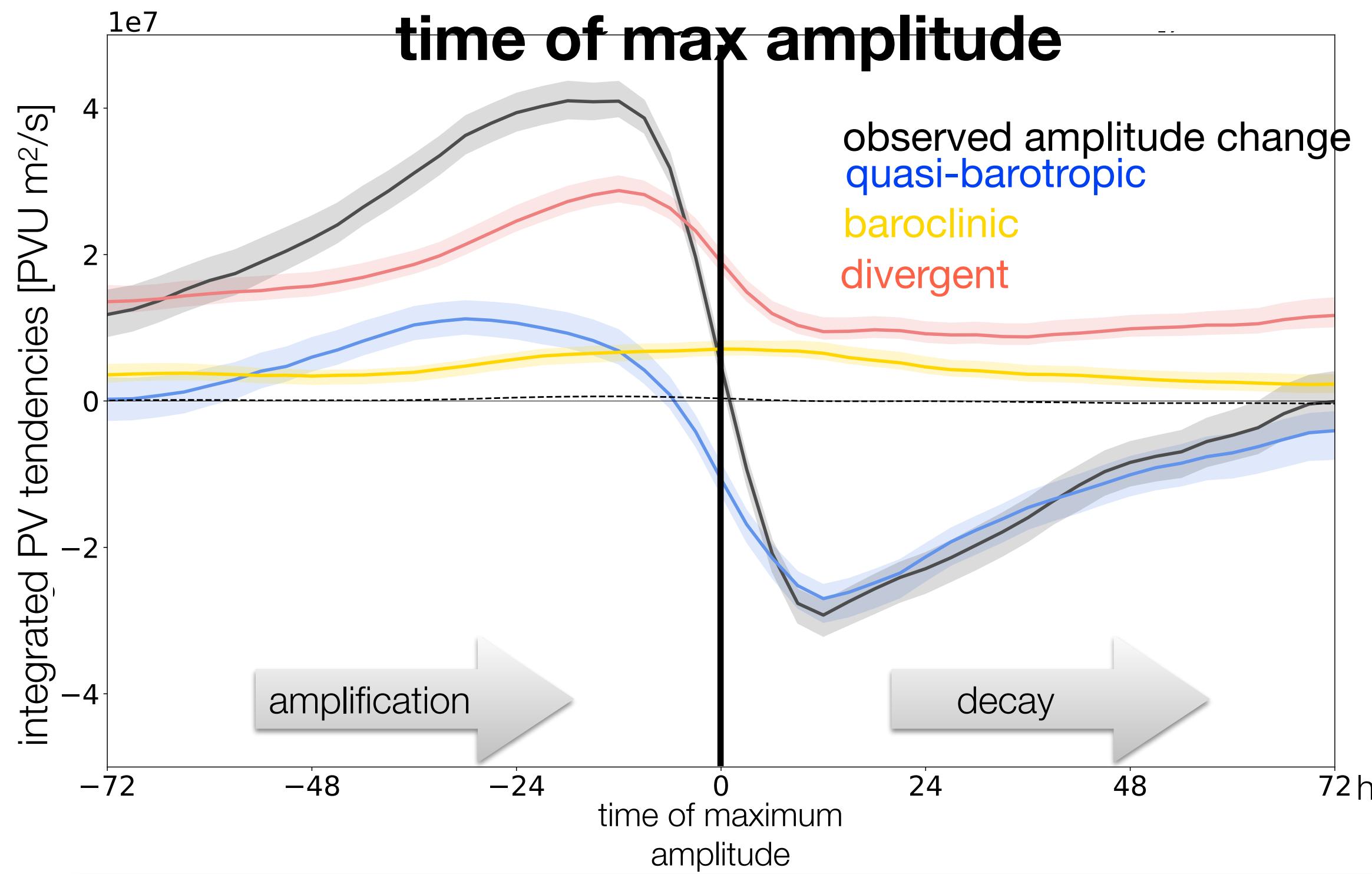


- baroclinic downstream development observed
- divergent outflow dominant in amplitude evolution

## spatial composites relative to ridge center

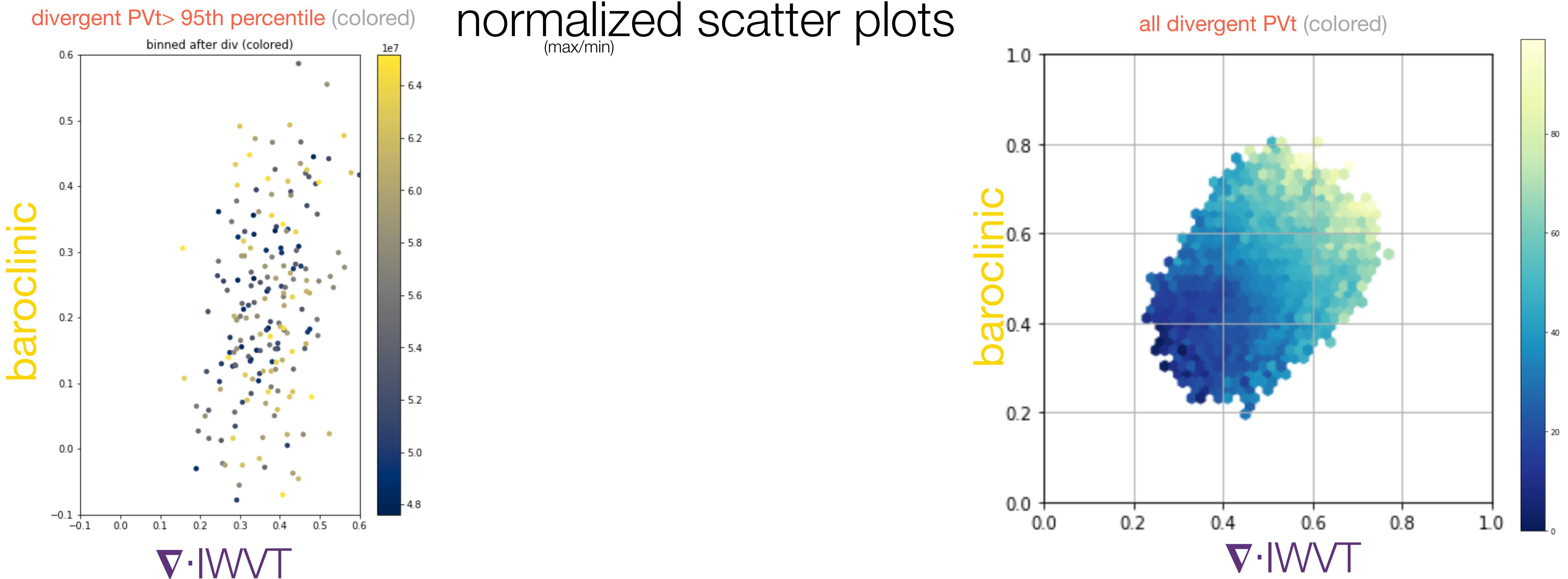


## temporal composite relative to time of max amplitude

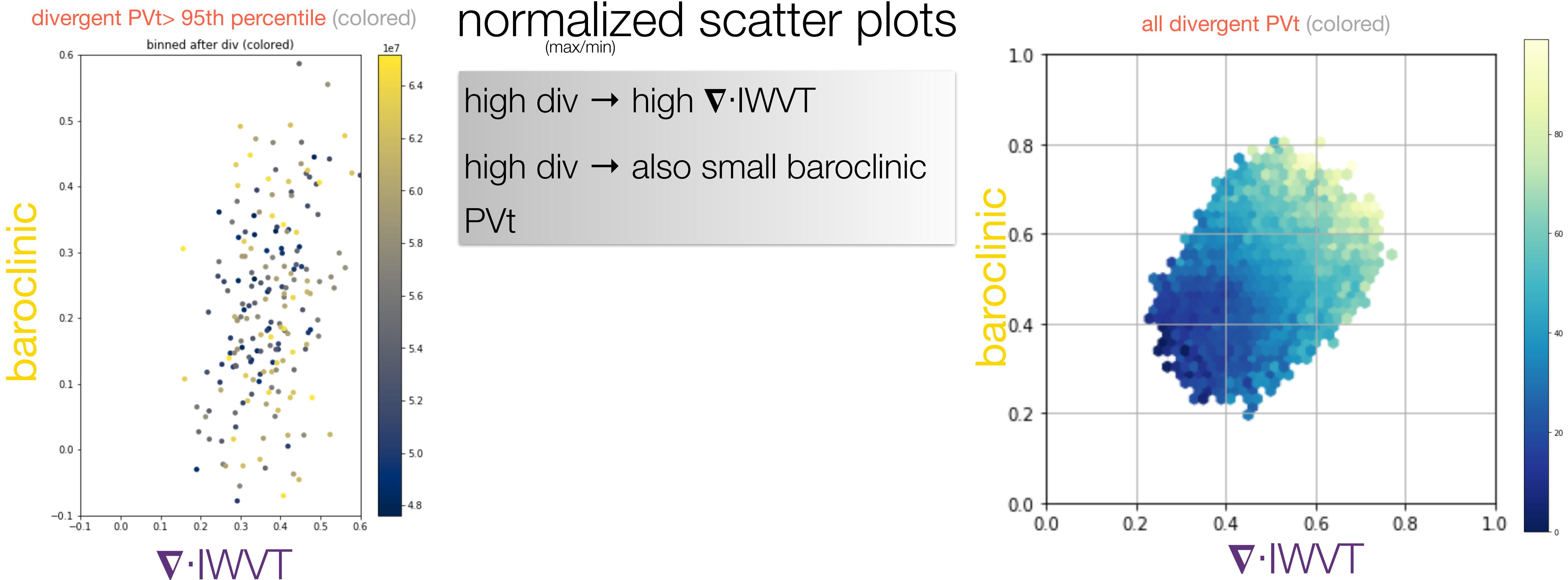


- baroclinic downstream development observed
- divergent outflow dominant in amplitude evolution
- high div outflow associated with high  $\nabla \cdot \text{IWVT}$  (integrated water vapor transport)
- quantification of importance of  $\nabla \cdot \text{IWVT}$ ?

# Relative importance of latent heat release on divergent outflow?



# Relative importance of latent heat release on divergent outflow?



# Relative importance of latent heat release on divergent outflow?

