DIAGNOSING SPURIOUS DIAPYCNAL MIXING AND ITS SPATIAL DISTRIBUTION IN Z-COORDINATE OCEAN MODELS USING DISCRETE VARIANCE DECAY

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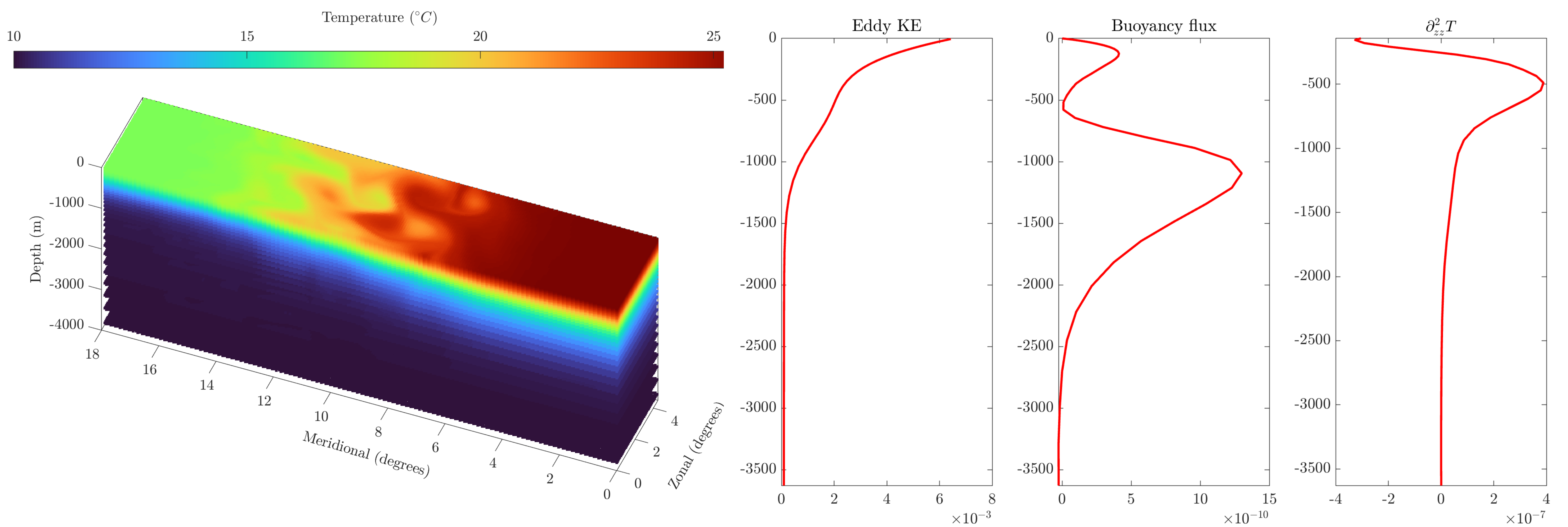
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Questions

Theory

$$\partial_t T^2 + \partial_x(uT^2 - \nu\partial_x T^2) = -2\nu(\partial_x T)^2$$

$$\chi^{\text{net}} = -\nabla \cdot F^{\text{2nd}} - \frac{1}{dt}[hT^2]_n^{n+1}$$
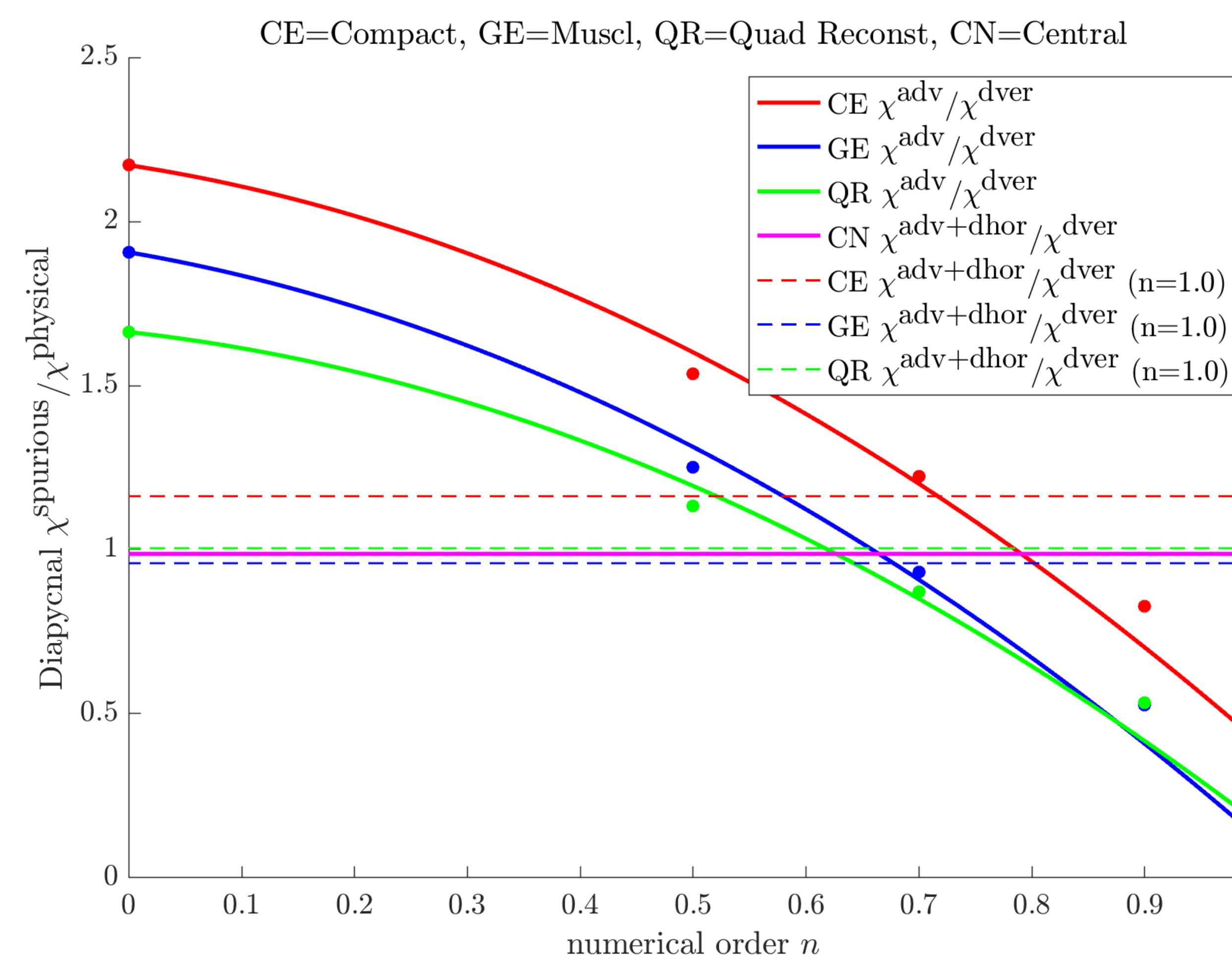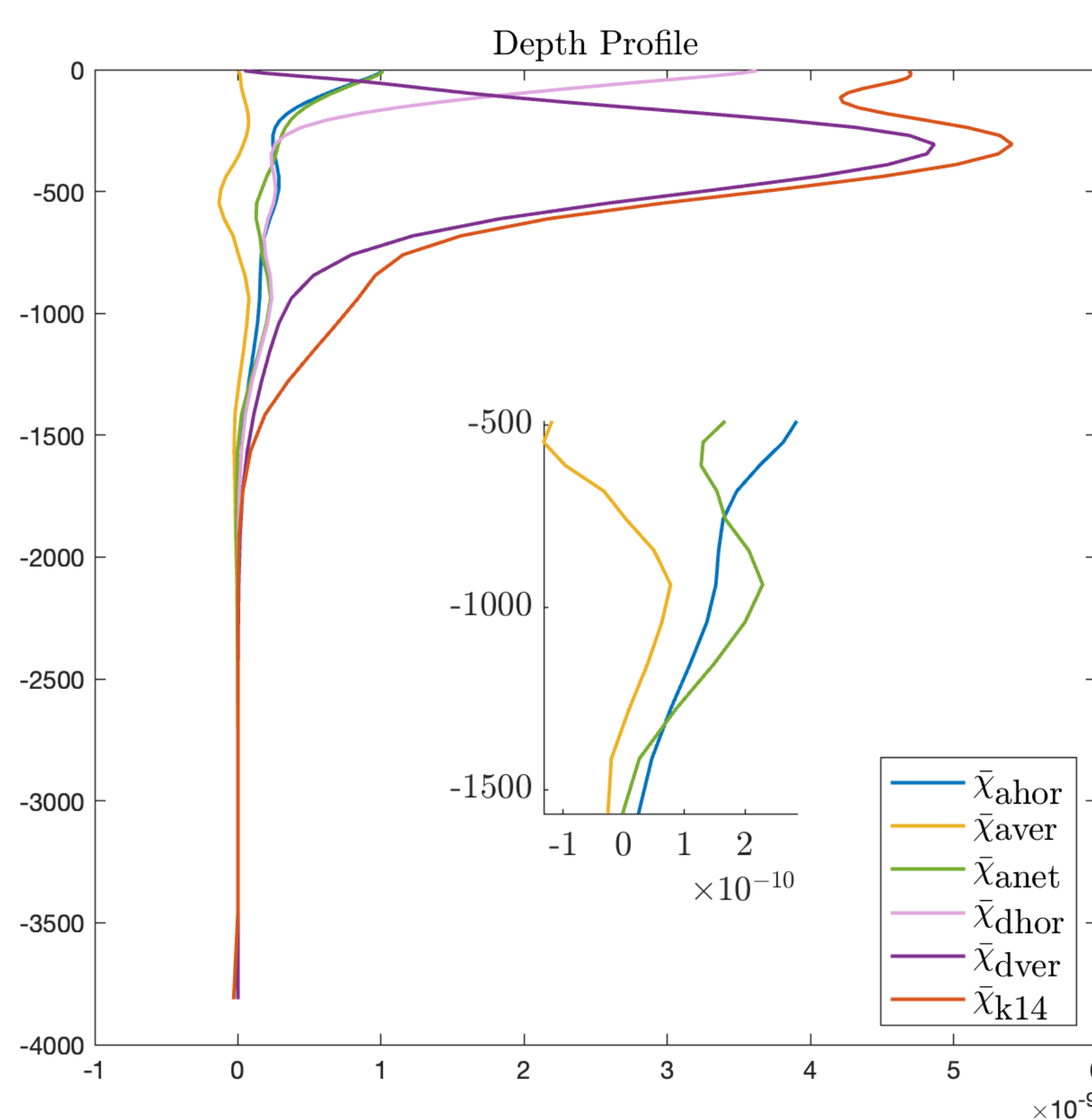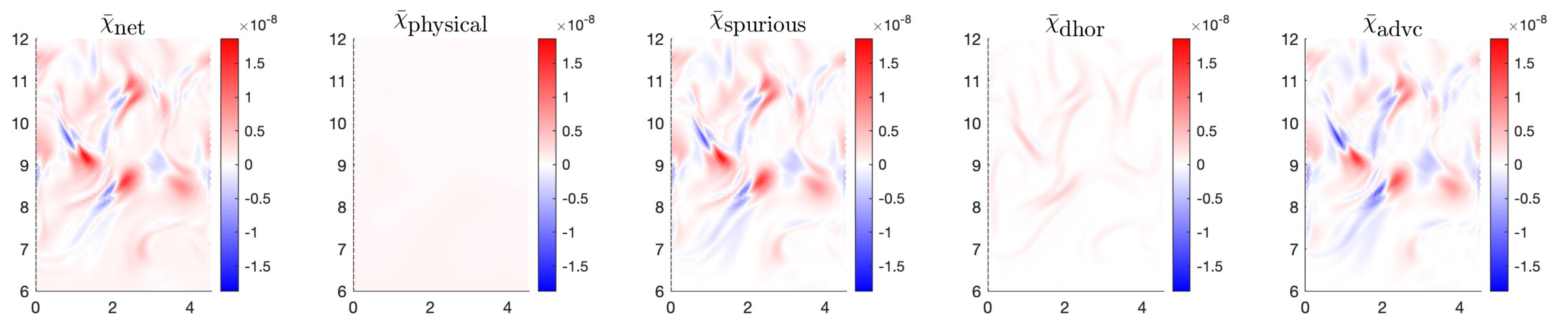
$$\chi^{\text{net}} = \chi_{\text{hor+ver}}^{\text{advc}} + \chi_{\text{hor+ver}}^{\text{diff}} = \chi_{\text{iso+dia}}^{\text{Physical}} + \chi_{\text{iso+dia}}^{\text{Spurious}}$$

1. What are these second moment fluxes F^{2nd} for processes like advection and diffusion?

2. How such processes individually contribute to net spurious diapycnal mixing $\chi_{\text{dia}}^{\text{net}}$?

3. How spurious diapycnal mixing from different advection schemes compare to physical mixing

Idealized Channel

Decomposition

CE=Compact, GE=Muscl, QR=Quad Reconst, CN=Central

Legend:
- CE $\chi^{\text{adv}}/\chi^{\text{dver}}$
- GE $\chi^{\text{adv}}/\chi^{\text{dver}}$
- QR $\chi^{\text{adv}}/\chi^{\text{dver}}$
- CN $\chi^{\text{adv+dhor}}/\chi^{\text{dver}}$
- CE $\chi^{\text{adv+dhor}}/\chi^{\text{dver}}$ (n=1.0)
- GE $\chi^{\text{adv+dhor}}/\chi^{\text{dver}}$ (n=1.0)
- QR $\chi^{\text{adv+dhor}}/\chi^{\text{dver}}$ (n=1.0)

References

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