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Impact of varying transfer velocity in the Probe Baltic Model

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Outline

- CO_2 and O_2 flux calculations
- The atmospheric concentration of CO_2
- The transfer velocity
- Results
- Summary and recommendations

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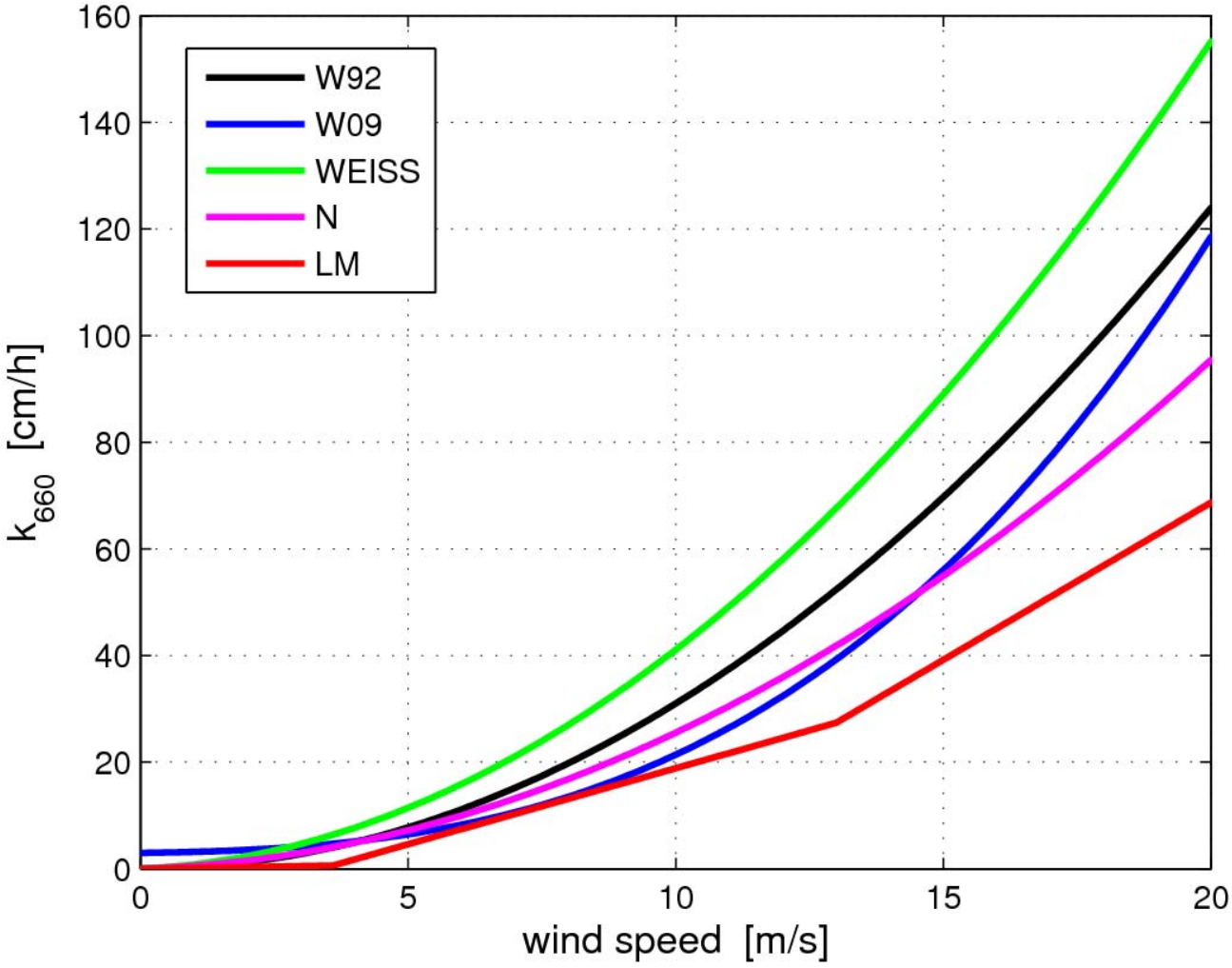
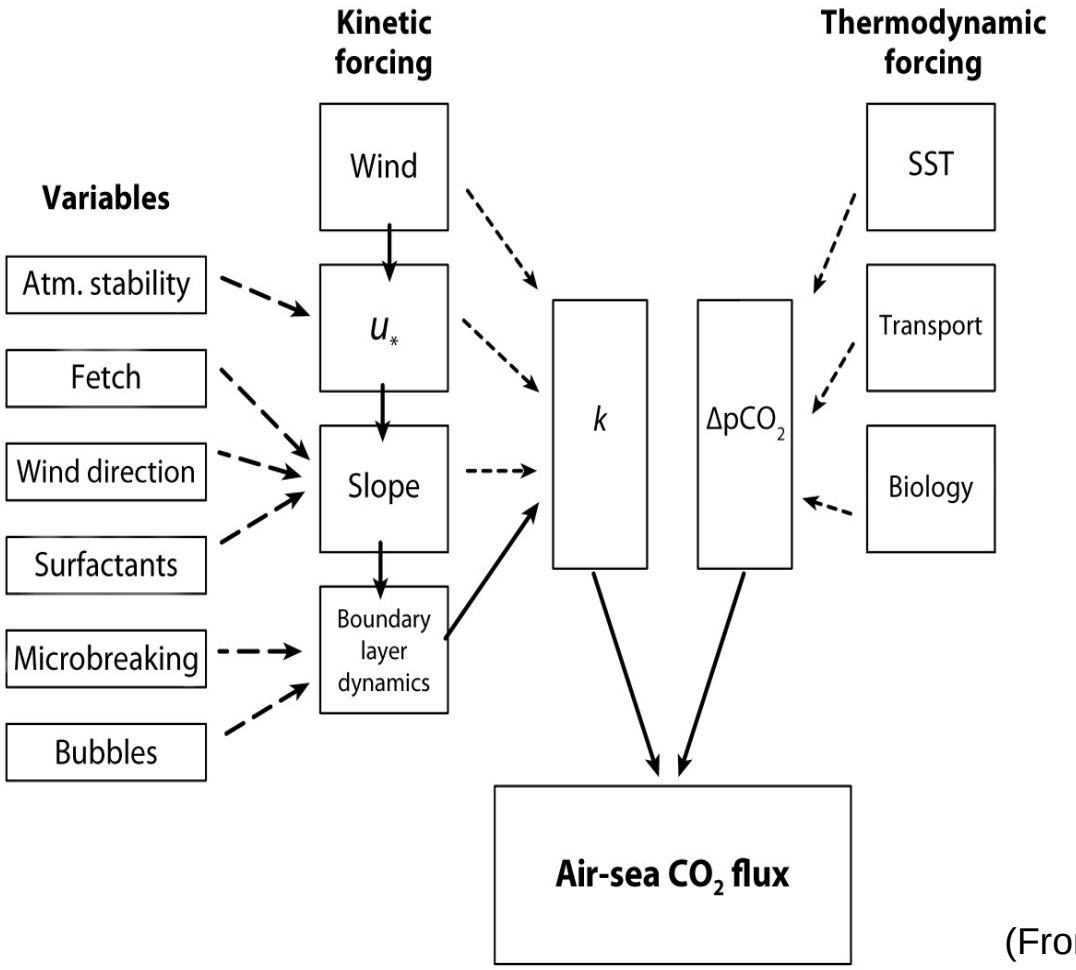
The transfer velocity



Processes influencing the air-sea exchange



(From Wanninkhof et al., 2009)

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The NOAA-COARE algorithm

Fairall et al. (2000):

$$k = \frac{u_*}{(r_w + r_a \alpha)}$$

- air- and water side resistance
- bubbles
- water side buoyancy effects

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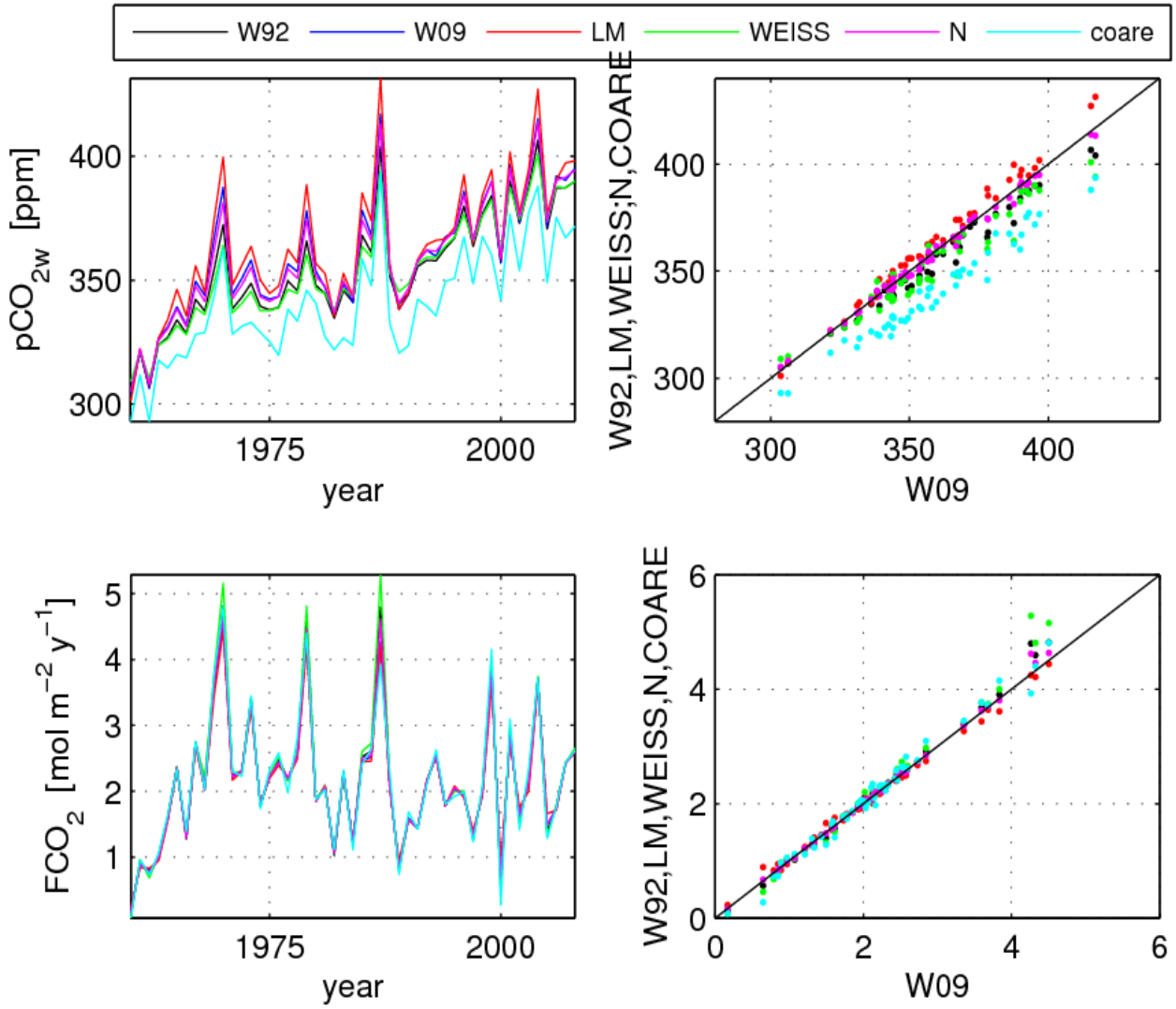
Results – CO_2 yearly mean



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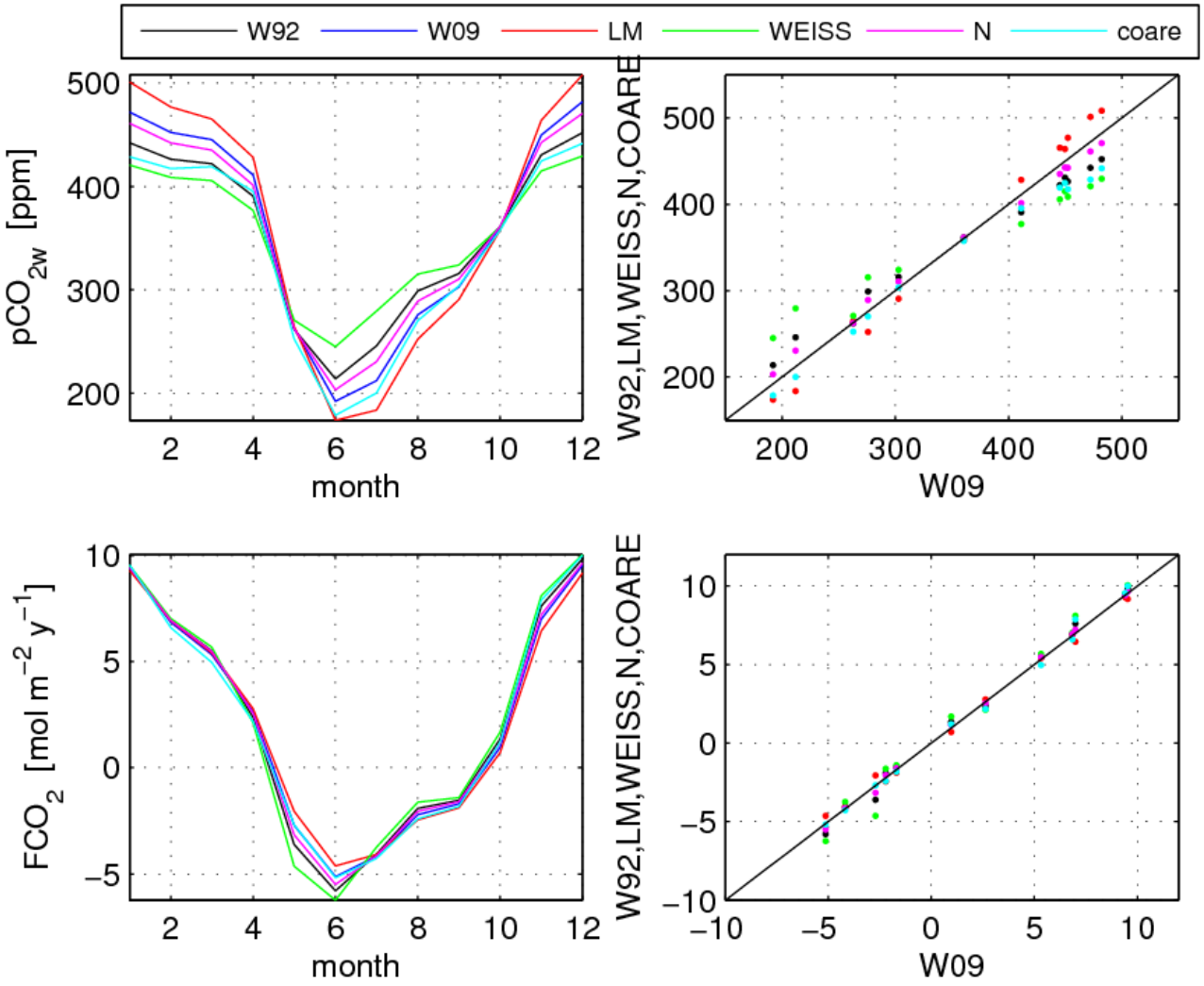
Results - CO_2 monthly mean



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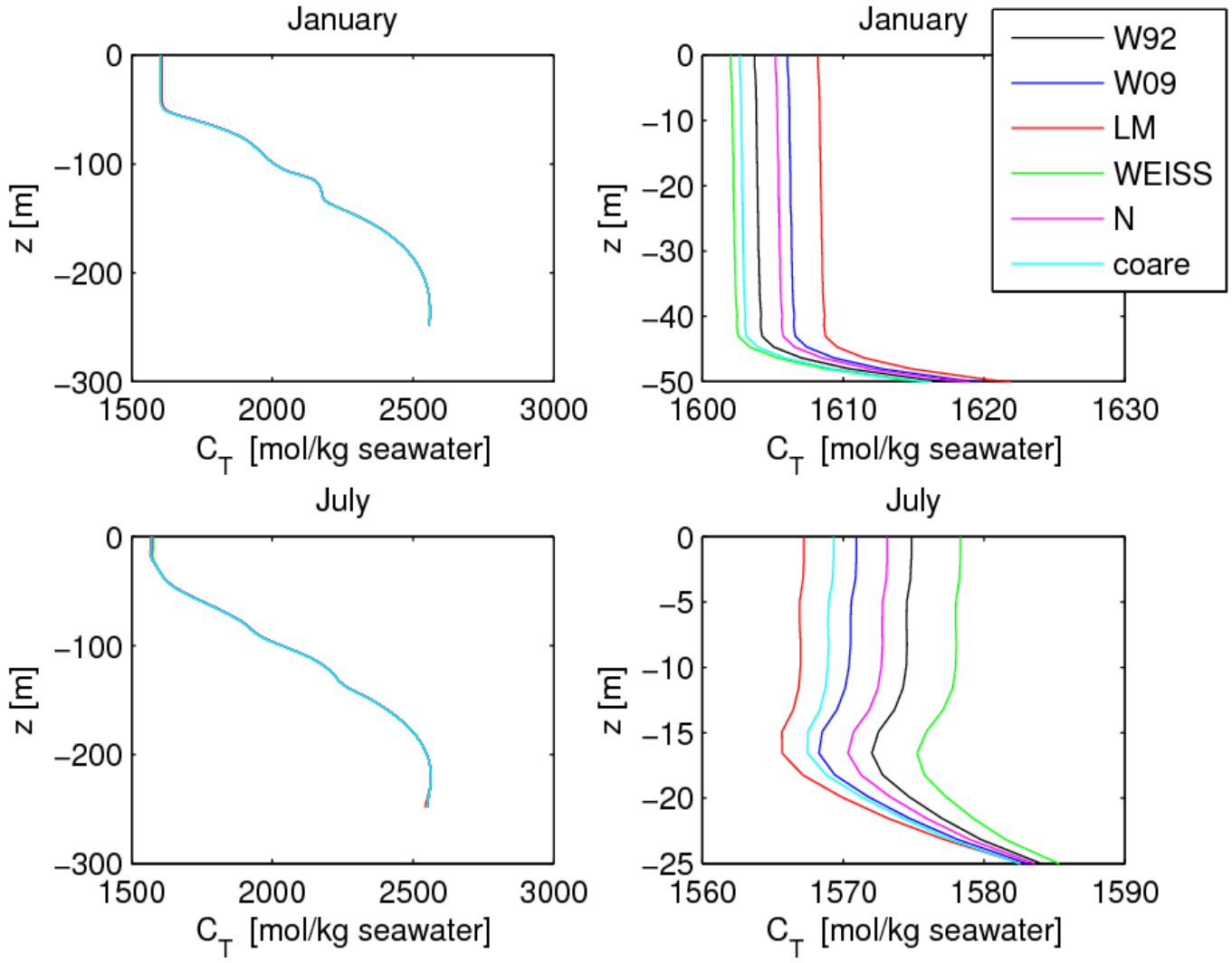
Results – C_T profiles



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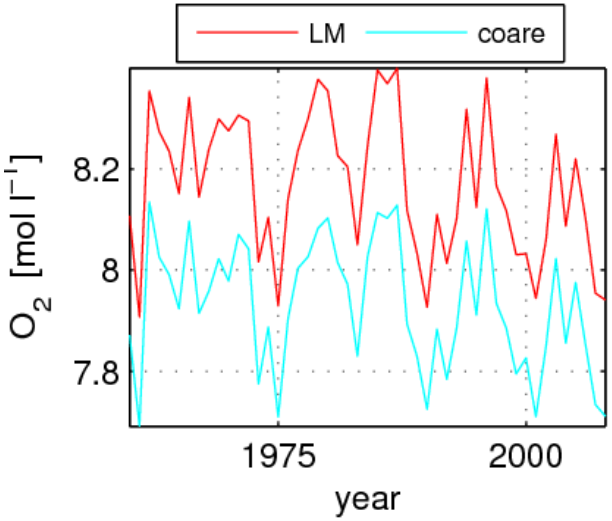
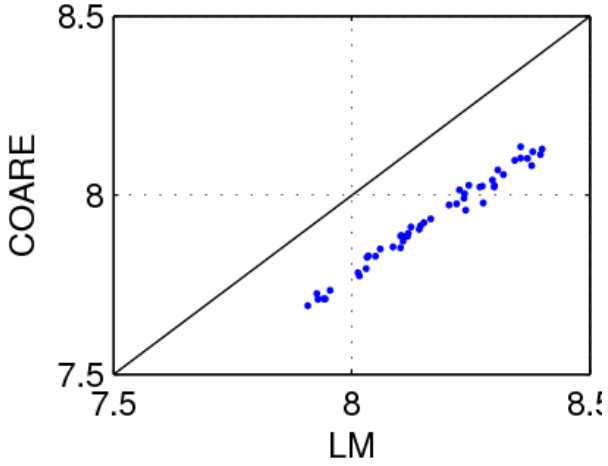
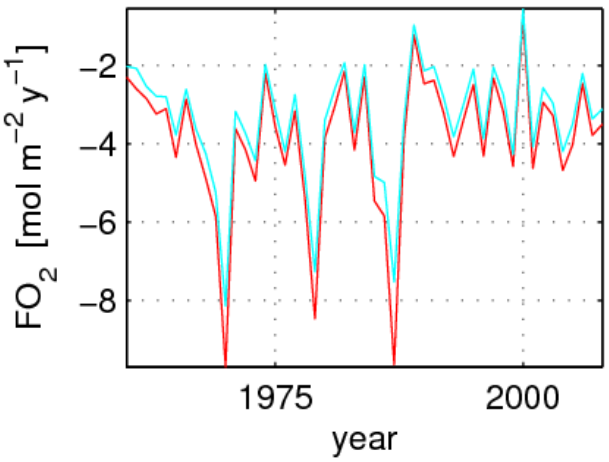
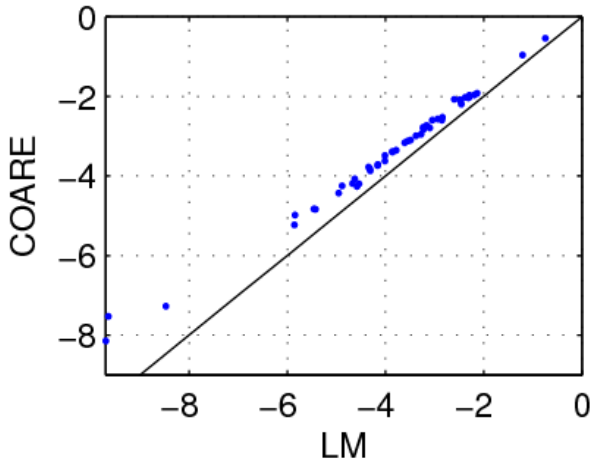
Results - O_2 yearly mean









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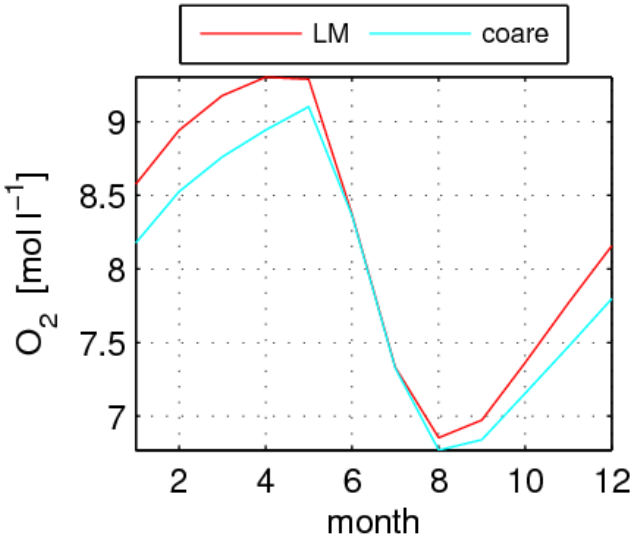
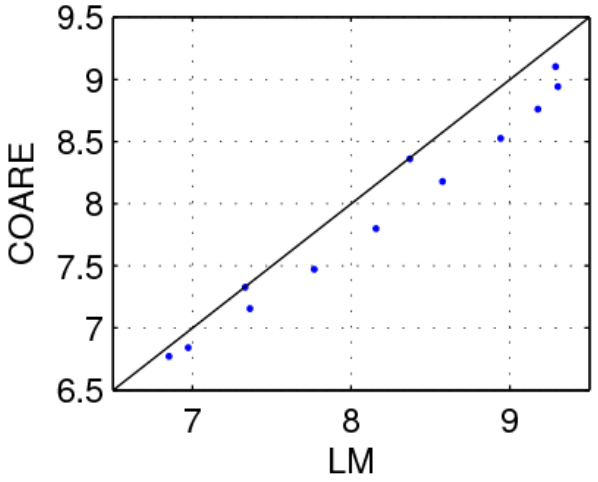
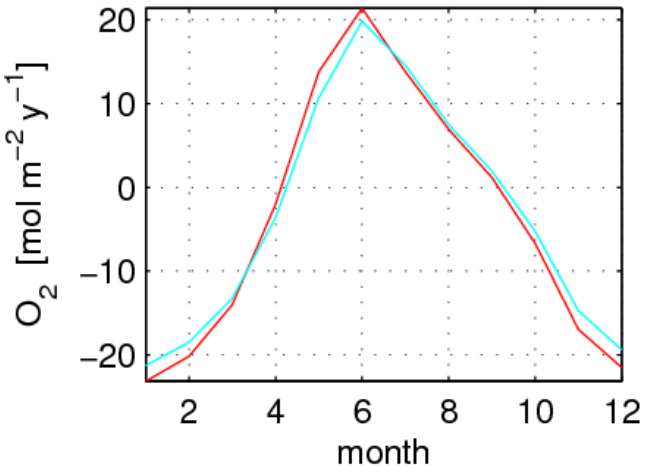
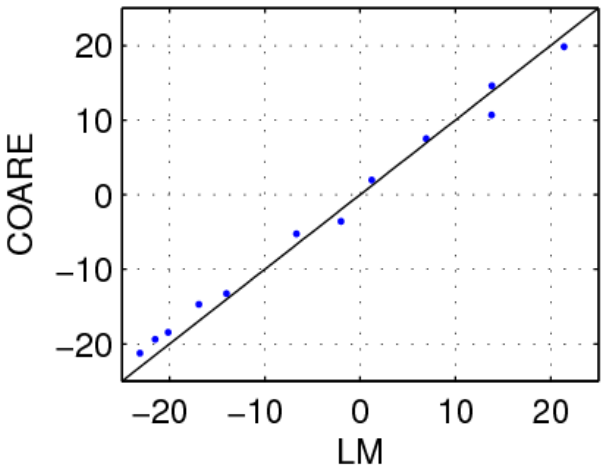
Results - O_2 monthly mean









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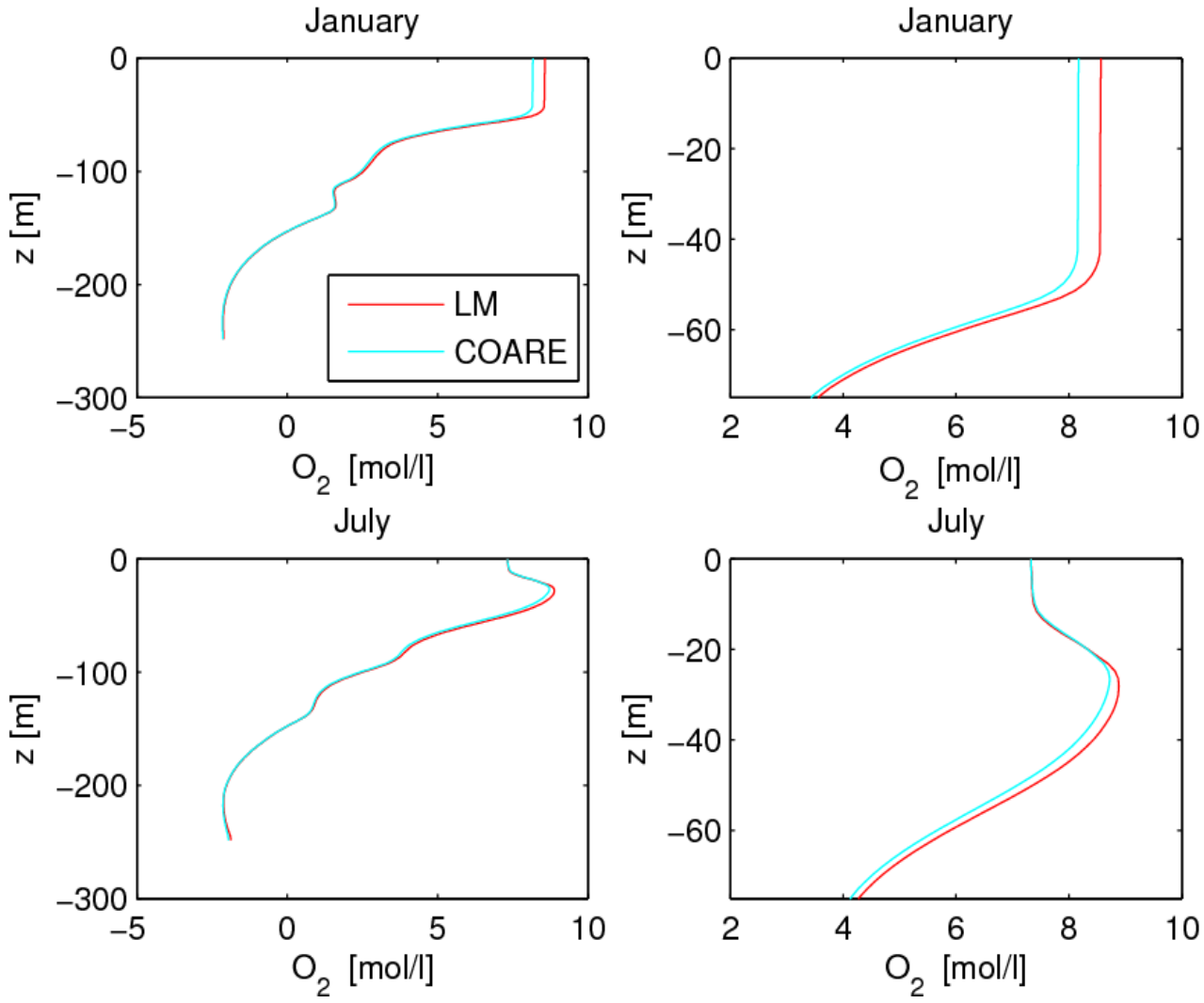
Results – O_2 profiles



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Summary and conclusions

- Using different parameterisations for the transfer velocity changes the pCO_{2w} values, while the CO_2 flux is almost unaffected.
- Down to a certain depth, the C_T values are different for different parameterisations.
- Using the COARE algorithm for oxygen transfer velocity instead of LM, changes the O_2 concentration while the flux is almost unaffected.

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Recommendations

- The parameterisation of Wanninkhof (2009) is to be perferred before Wanninkhof (1992).
- **Since the COARE algorithm is the more physical parameterisation of the transfer velocity, this parameterisation is recommended to be used in the Probe Baltic model**