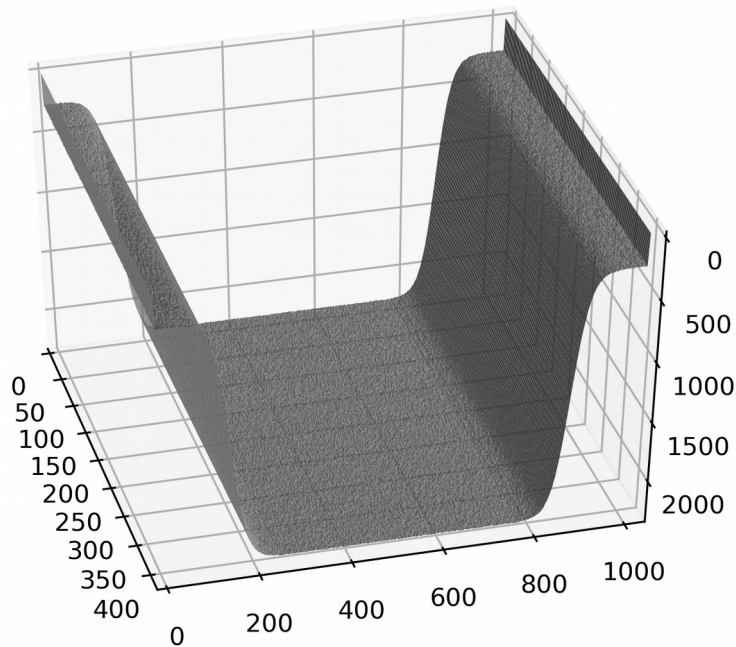


KeyCLIM WP3/6/7 updated plan on improved eddy processes

Alexi Nummelin and Pål Erik Isachsen



Situation today and original plan

- Today

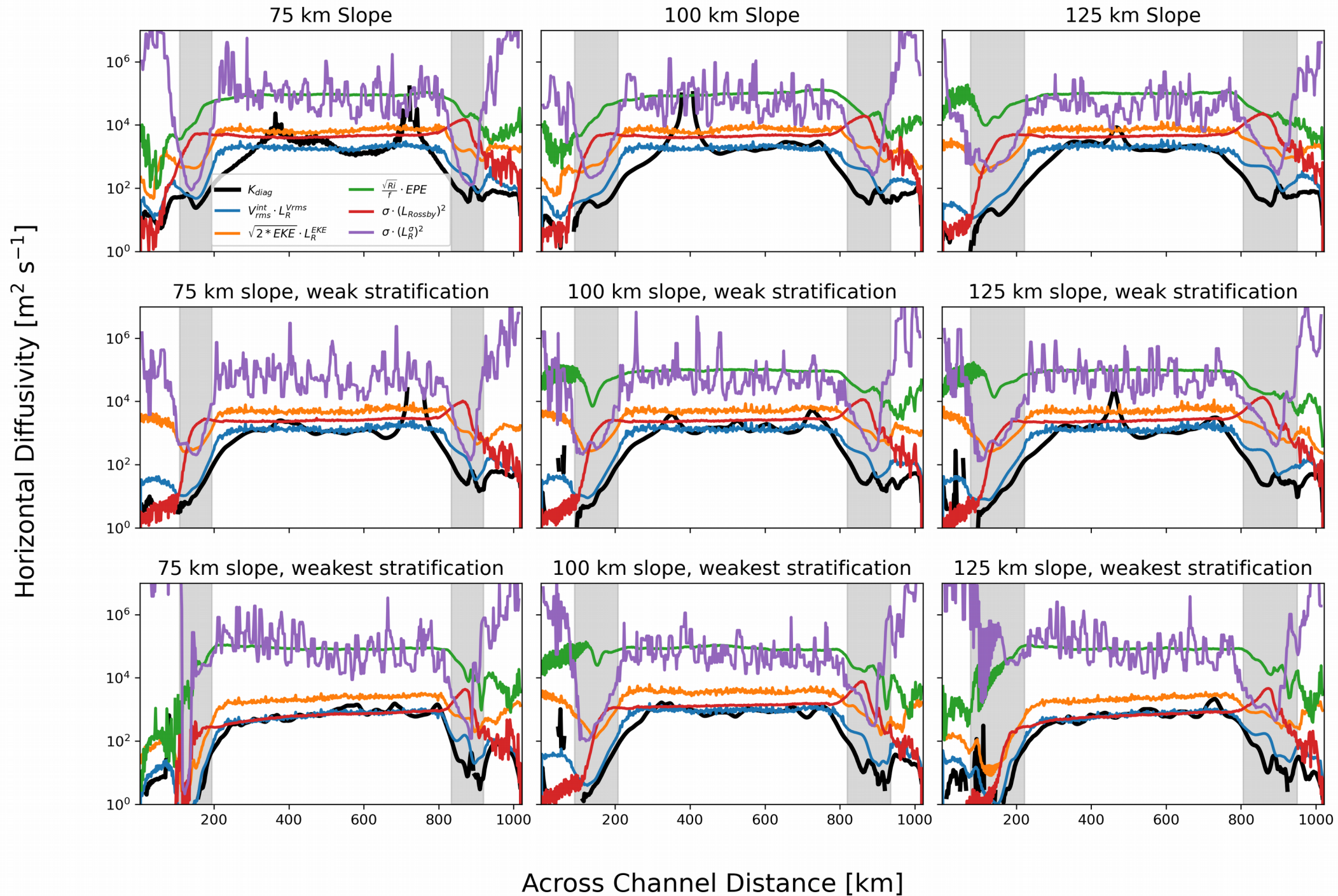
- Local GM-Redi approach following Eden and Greatbatch (2008)

- $\kappa = \sigma L^2$
 - Where σ is the Eady growth rate and L is a minimum of Rossby radius and Rhines scale (which depends on σ).
 - Additional mean flow suppression (Ferrari and Nikurashin type) and dependence on the grid scale (Hallberg, 2013)

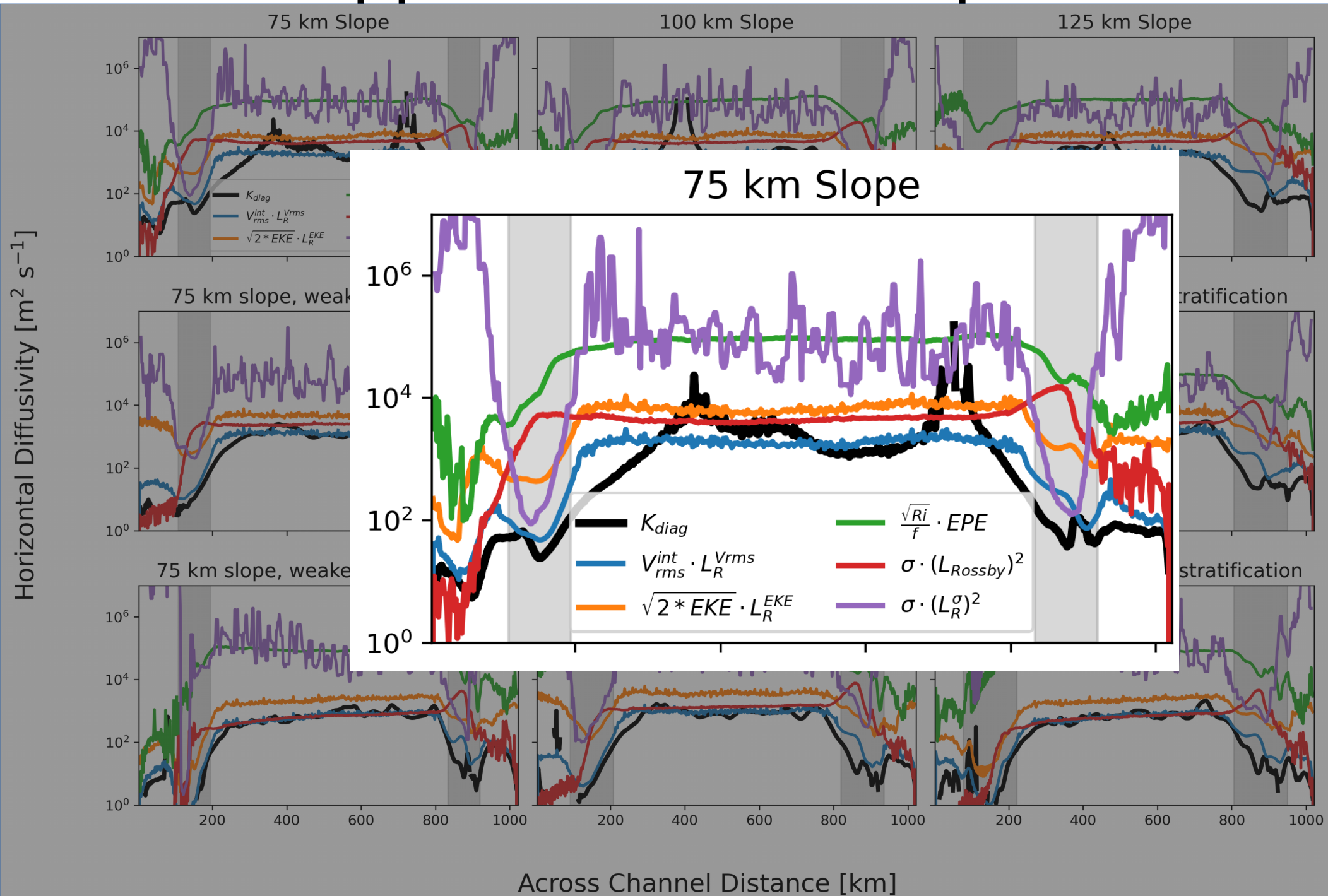
- Original plan

- **Task 3.2** (UiO, UNI) Eddy parametrization in the Arctic ocean : effect of (a) **topographic PV gradients** (b) **effect of sea ice drag in eddy parametrizations** c) **Assessment** of the subgrid effects of topography and sea ice on hydrography and circulation in the key region **in OMIP sensitivity experiments and in WP6 coupled simulations.**
 - D3.2 Assessment report (c) M30
 - **Task 6.1 Provide coupled simulations with eddy parameterization (Yanchun)**
 - D6.1 CMORized output by M33
 - **Task 7.1 (UNI, UiO) Analyse the effect of increased horizontal resolution (MH version) and enhanced parameterization of mesoscale eddies (WP6).**
 - D7.1 report on eddy parameterization impact M36

Suppression over slopes

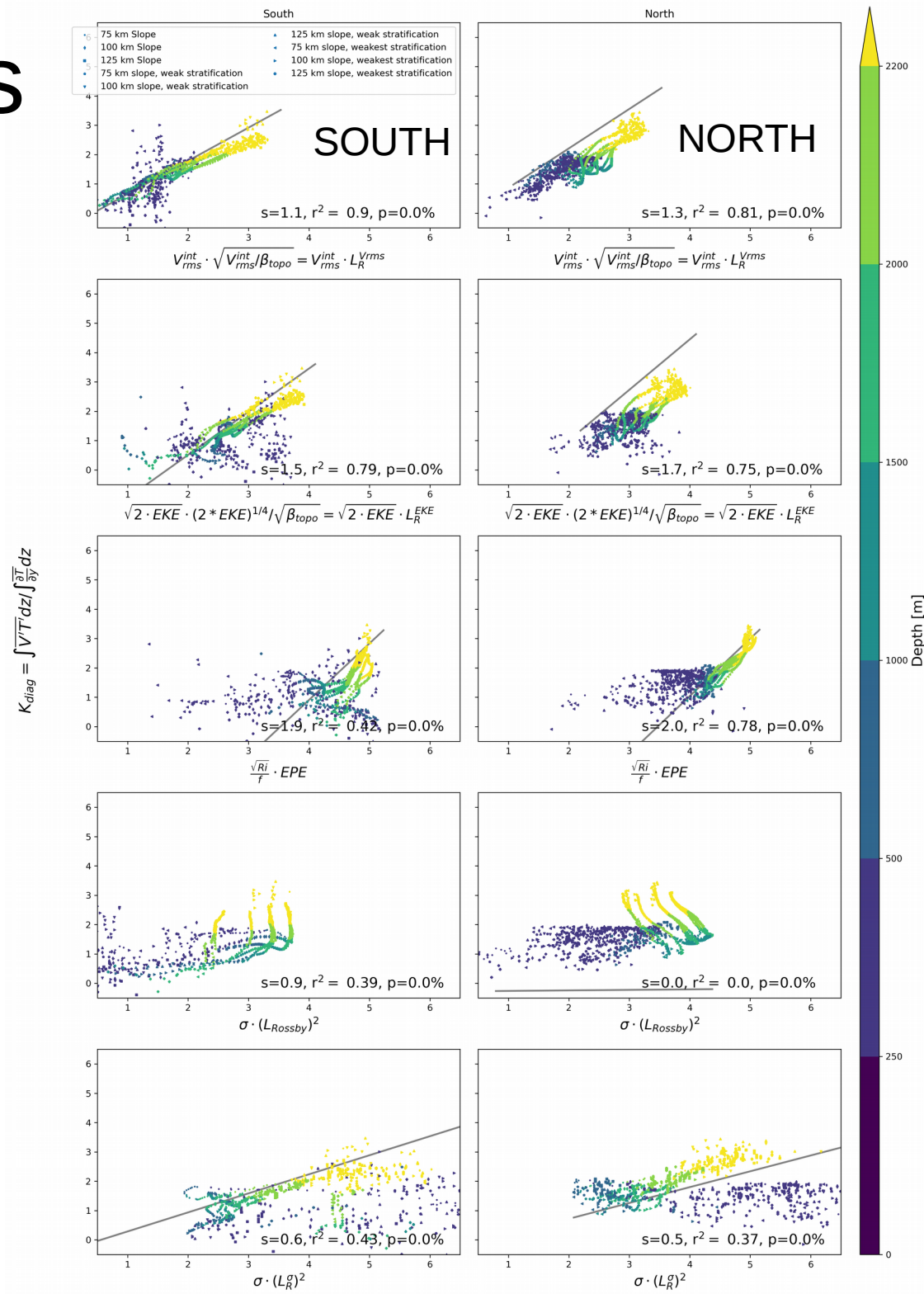


Suppression over slopes



Fit over the slopes

- $V_{rms} L_R$ works the best, $EKE^{1/2} L_R$ is reasonably good and GEOMETRIC scaling ($Ri^{1/2} EPE/f$) is well correlated in the north, but too large and not adequate in the south.
 - Some motivation for prognostic EKE equation – not trivial.
 - L_R works better than
 - Eady growth rate with L_R captures the suppression over the slopes (L_{rossby} does not capture this qualitative behavior there)
- Next steps:
 1. Implement L_R [and a possibly modified velocity scale] to BLOM
 2. Move from local to a depth integrated approach
 3. Test in coarse resolution channel (June-July)
 4. Test in OMIP (August-September?)
 5. Green light for T6.1 coupled simulations



Suggested parameterization and modified plan

- Suggestion
 - **Integrated** GM-Redi approach following Eden and Greatbatch (2008)
 - $\kappa = U L$
 - Where U is a measure of depth-averaged velocity fluctuations and L is a minimum of Rossby radius, normal and topographic Rhines scale (+friction scale?).
 - Could add a structure function to control U(z) profile
 - Mean flow suppression:
 - Assess if still adequate
 - Integrated approach also here
 - Dependence on the grid scale (Hallberg, 2013) – keep.
- Modified plan
 - **Task 3.2** (UiO, UNI) Eddy parameterization in the Arctic ocean : effect of (a) **topographic PV gradients** (b) ~~effect of sea ice drag in eddy parameterizations~~ c) **Assessment** of the subgrid effects of topography and sea ice on hydrography and circulation in the key region **in OMIP sensitivity experiments** and in WP6 coupled simulations (relation to T7.1?).
 - **D3.2 Assessment report** (c) ~~M30~~ **M33**
 - **Task 6.1 Provide coupled simulations with eddy parameterization (Yanchun)**
 - **D6.1 CMORized output** by ~~M33~~ **M36**
 - **Task 7.1 (UNI, UiO) Analyse the effect of increased horizontal resolution (MH version + MX?) and enhanced parameterization of mesoscale eddies (WP6).**
 - **D7.1 report on enhanced resolution and eddy parameterization impact** ~~M36~~ **M39**