

Sensitivity Study

November 30, 2021

1 Sensitivity Study

2 1) Sensitivity to removal of mixing terms

Reference level: 2000 | Upper Bound: 1000 | Lower Bound: 4000

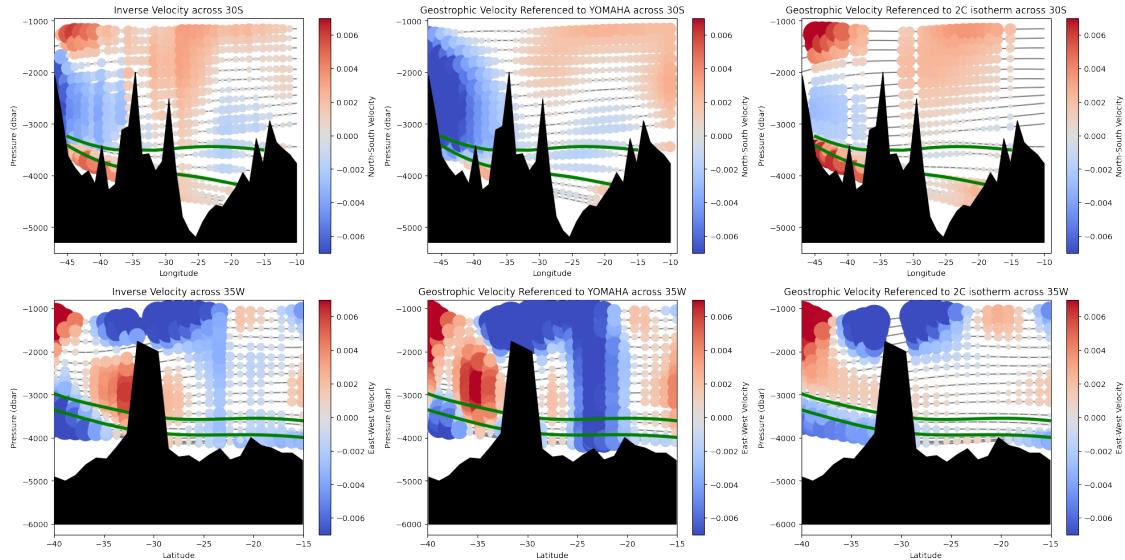
mixing: False

Condition: 226.35284200159282 | Error: 2695.9738061604994

Morris et al. mixing budgets

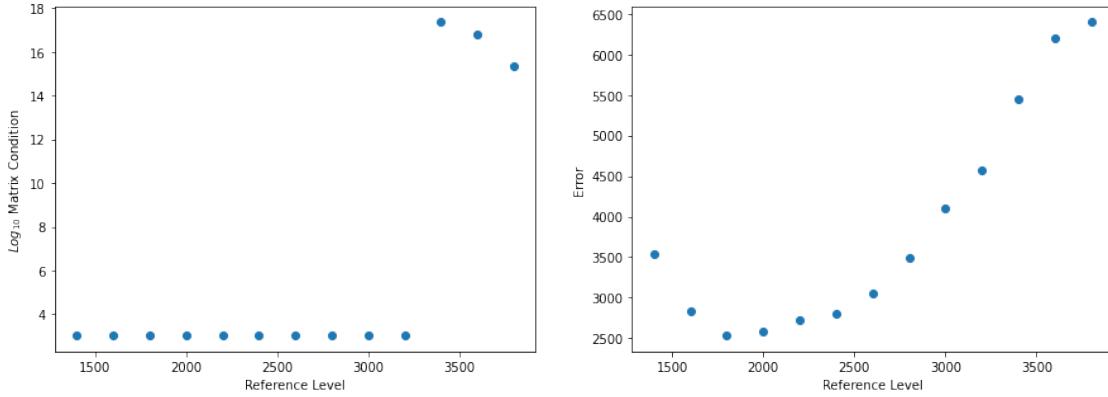
Zenk 1999 Blend: 2.748e-04 2.801e-04 3.270e-04

Zenk 1993 Blend: 2.516e-04 2.653e-04 3.240e-04



3 2.) Sensitivity to initial reference surface.

Condition increases by order of magnitude after the 3200 dbar surface due to the Mid Atlantic Ridge separating the eastern part of the domain from the western part at this depth.



3.1 Inverse solution referenced to 1400 dbar

Reference level: 1400 | Upper Bound: 1000 | Lower Bound: 4000

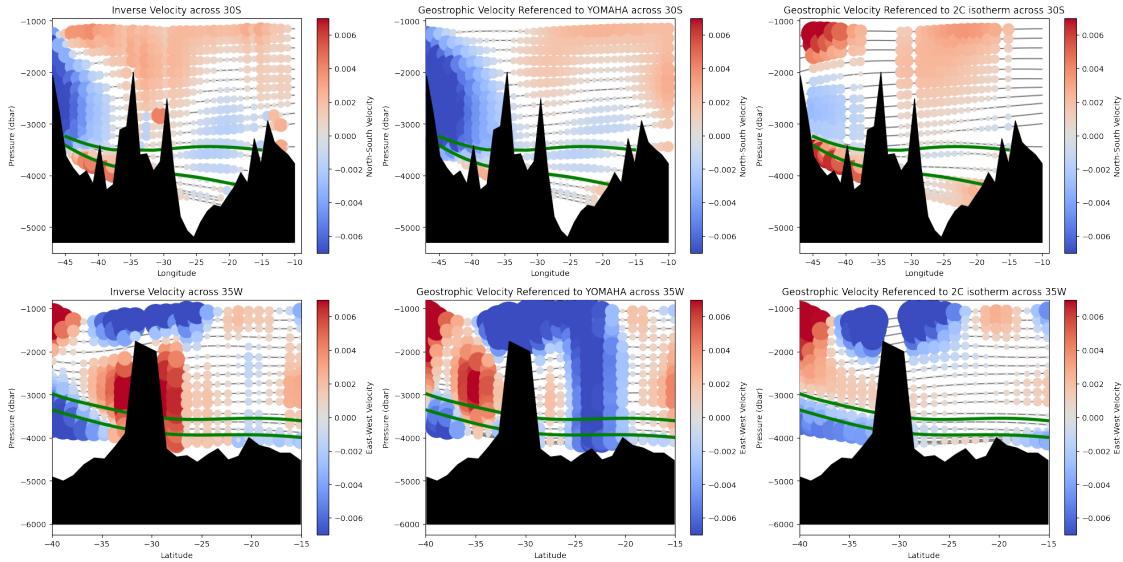
mixing: False

Condition: 1028.3640283750751 | Error: 3533.938473527853

Morris et al. mixing budgets

Zenk 1999 Blend: 2.637e-04 2.748e-04 3.270e-04

Zenk 1993 Blend: 2.297e-04 2.510e-04 3.090e-04



3.2 Inverse solution referenced to 3200 dbar

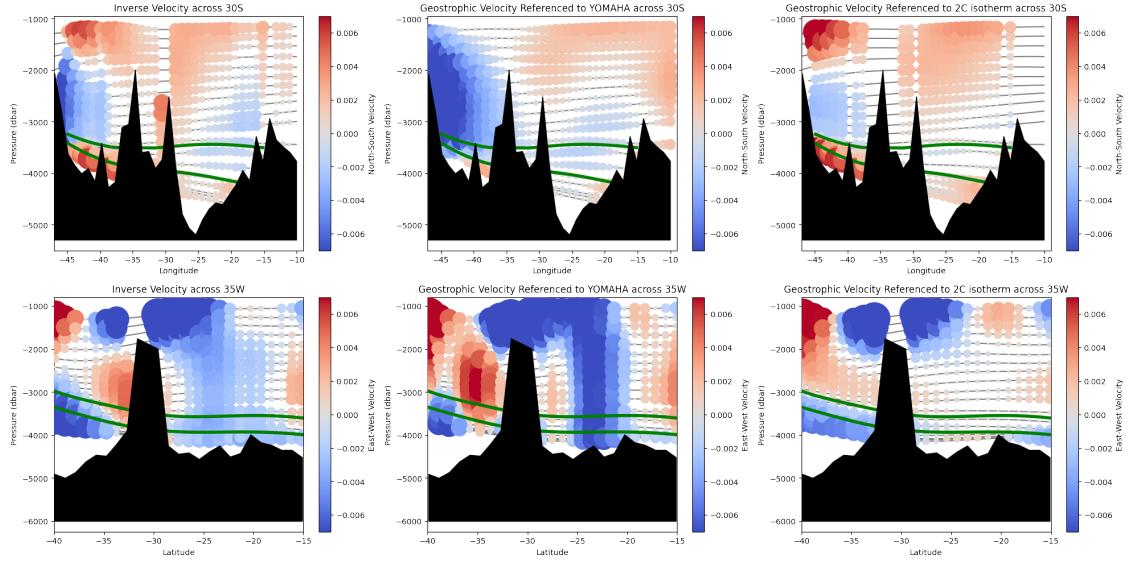
Reference level: 3200 | Upper Bound: 1000 | Lower Bound: 4000

mixing: False

Condition: 1028.31328287914 | Error: 4579.6008533947825

Morris et al. mixing budgets

Zenk 1999 Blend:	2.737e-04	2.793e-04	3.270e-04
Zenk 1993 Blend:	2.447e-04	2.608e-04	3.193e-04



4 3.) Sensitivity to Gaussian noise added to calculated neutral buoyant depths (pre-interpolation).

4.1 Noise with Standard deviation of 30 dbar

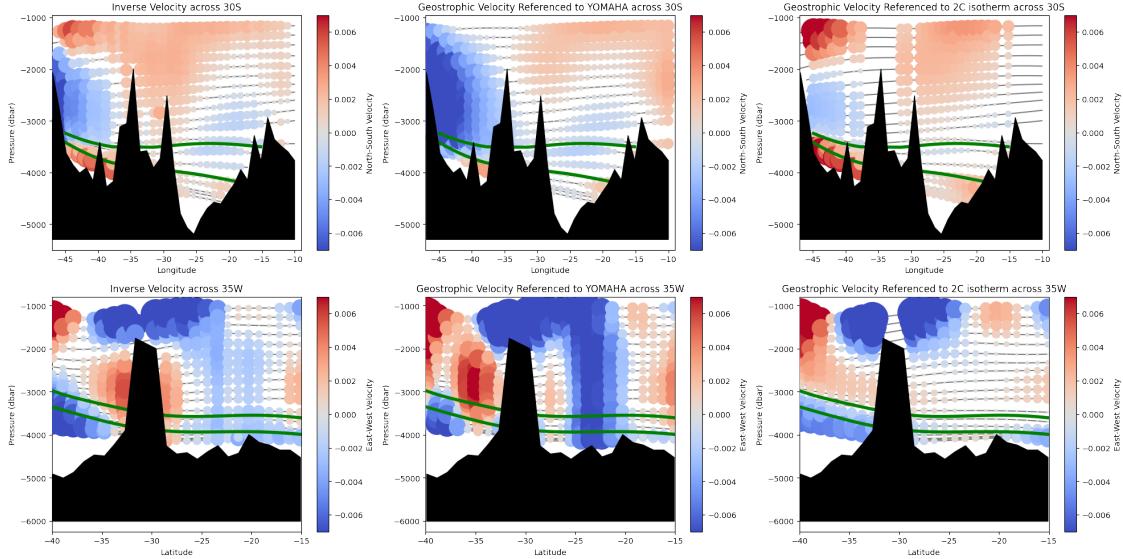
Reference level: 2000 | Upper Bound: 1000 | Lower Bound: 4000

mixing: False

Condition: 1397.1525121408547 | Error: 2588.1428606672

Morris et al. mixing budgets

Zenk 1999 Blend:	2.739e-04	2.791e-04	3.270e-04
Zenk 1993 Blend:	2.415e-04	2.587e-04	3.171e-04



4.2 Noise with Standard deviation of 90 dbar

Reference level: 2000 | Upper Bound: 1000 | Lower Bound: 4000

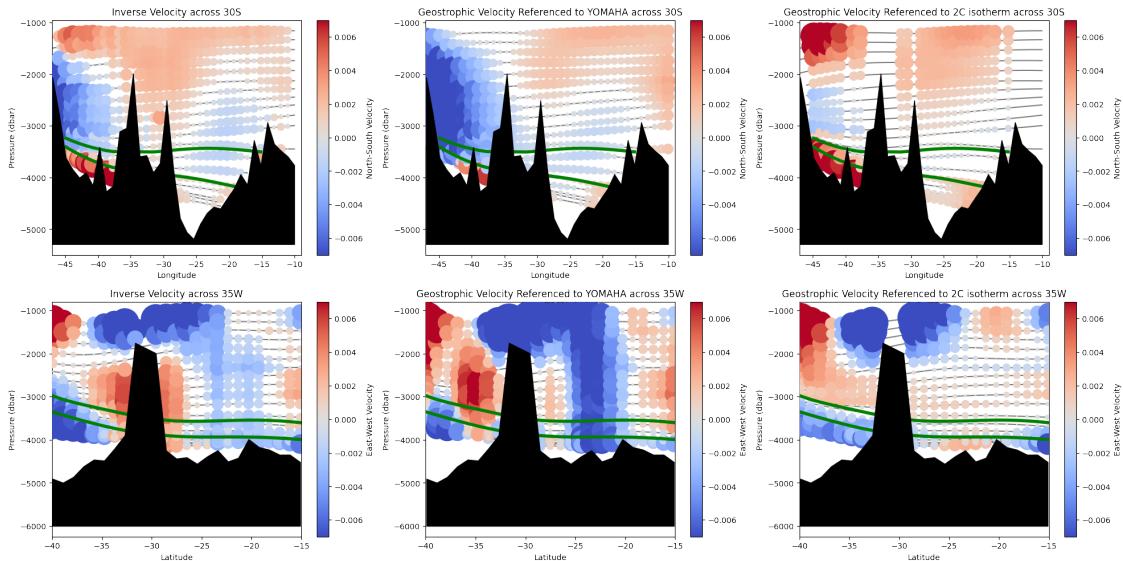
mixing: False

Condition: 862.4028186010887 | Error: 2463.0620230784825

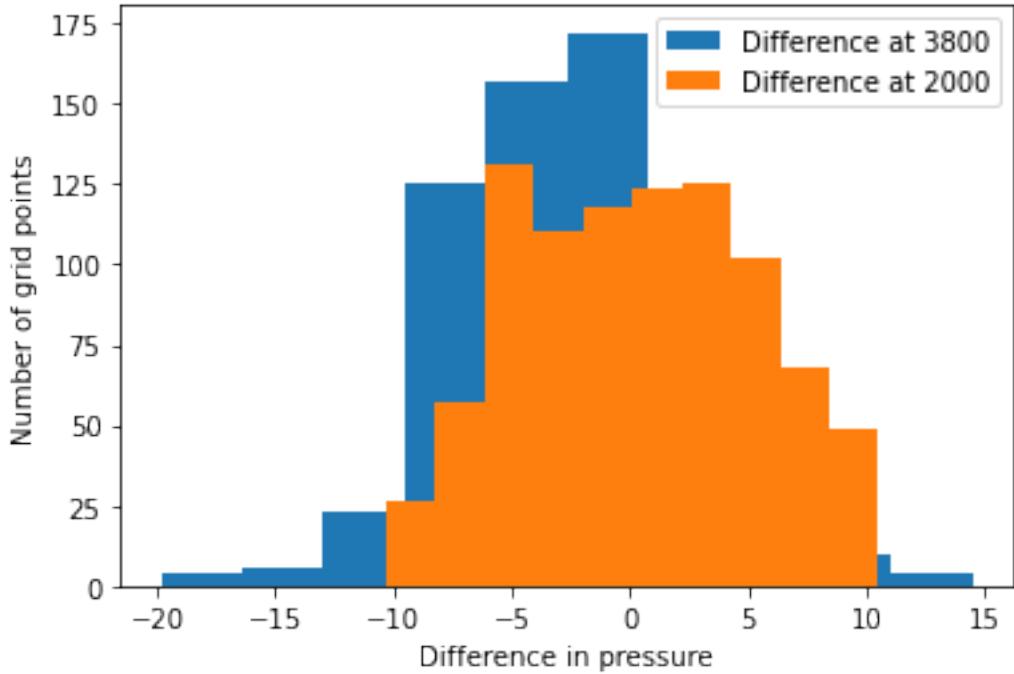
Morris et al. mixing budgets

Zenk 1999 Blend: 2.686e-04 2.779e-04 3.270e-04

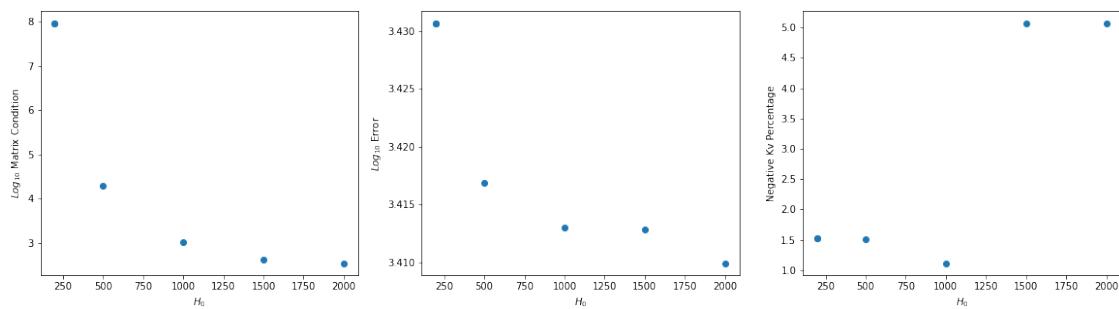
Zenk 1993 Blend: 2.387e-04 2.568e-04 3.152e-04



4.3 Difference along surfaces between surfaces with 90 dBar standard deviation of noise added and those without (post-interpolation)



5 4) Sensitivity to bottom roughness decay scale



5.1 Roughness scale of 500 dBar

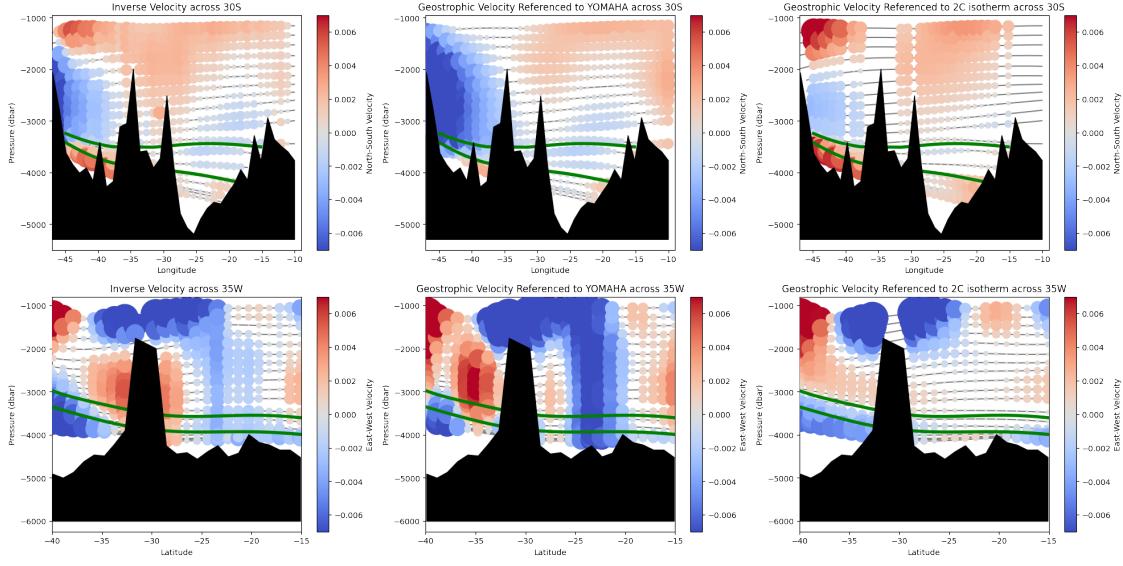
Reference level: 2000 | Upper Bound: 1000 | Lower Bound: 4000
mixing: False

Condition: 20196.47696813807 | Error: 2611.1657329965487

Morris et al. mixing budgets

Zenk 1999 Blend:	2.715e-04	2.783e-04	3.270e-04
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Zenk 1993 Blend:	2.403e-04	2.579e-04	3.163e-04
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5.2 Roughness scale of 2000 dBar

Reference level: 2000 | Upper Bound: 1000 | Lower Bound: 4000

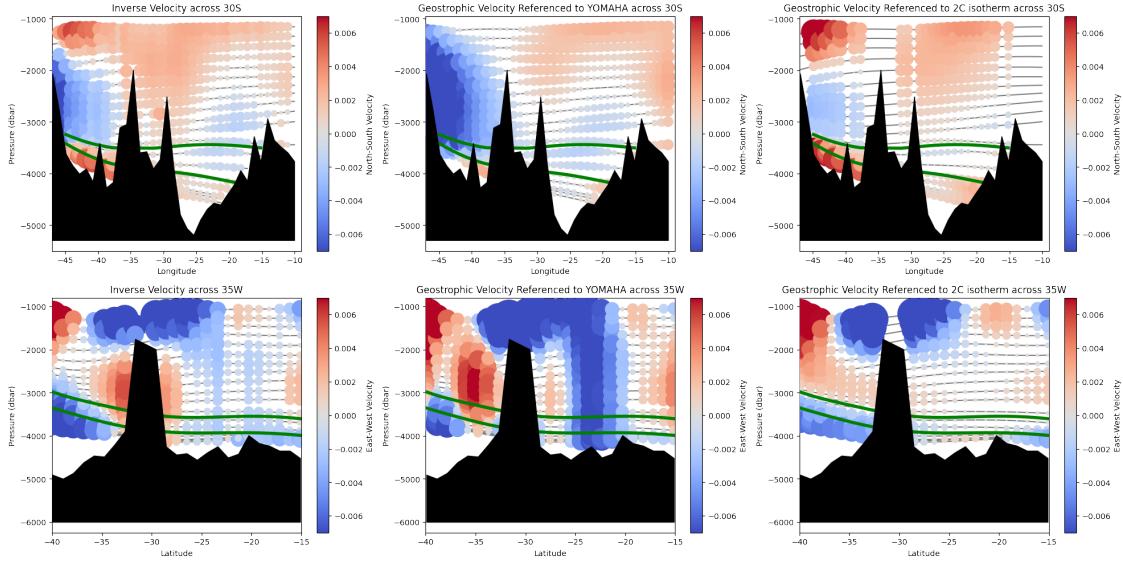
mixing: False

Condition: 352.1865778864097 | Error: 2569.962717088747

Morris et al. mixing budgets

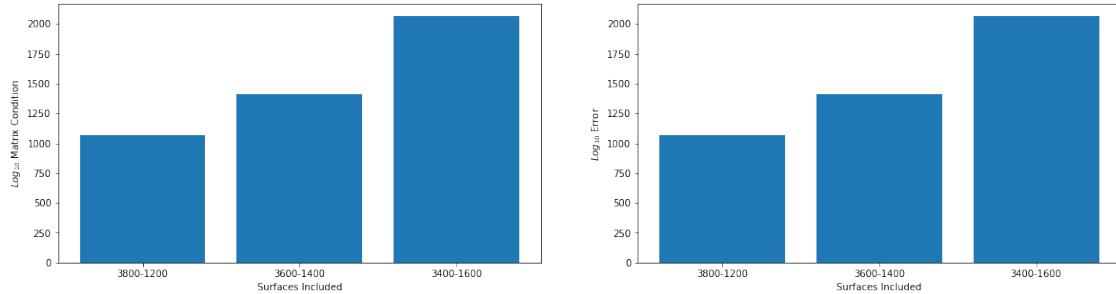
Zenk 1999 Blend: 2.736e-04 2.792e-04 3.270e-04

Zenk 1993 Blend: 2.457e-04 2.615e-04 3.200e-04



6 4) Sensitivity to including fewer surfaces

6.1 Changes in error and condition



6.2 Circulation including surfaces from 3800 to 1200 (note: Run 0 uses 1000-4000)

Reference level: 2000 | Upper Bound: 1200 | Lower Bound: 3800

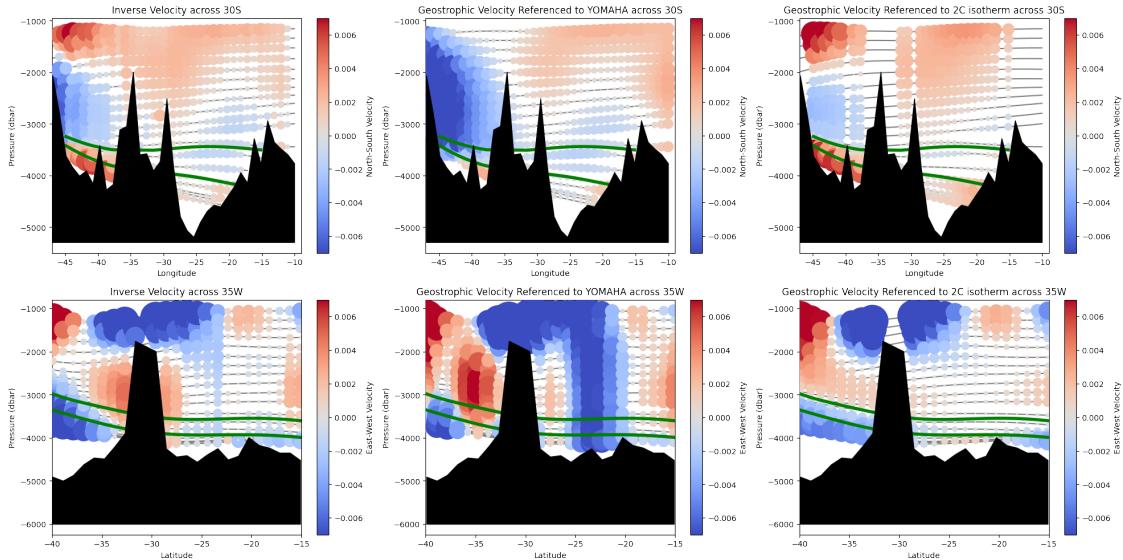
mixing: False

Condition: 1071.9161216033904 | Error: 1880.6672962644016

Morris et al. mixing budgets

Zenk 1999 Blend: 2.717e-04 2.784e-04 3.270e-04

Zenk 1993 Blend: 2.410e-04 2.583e-04 3.167e-04



6.3 Circulation including surfaces from 3400 to 1600 (note: Run 0 uses 1000-4000)

Reference level: 2000 | Upper Bound: 1600 | Lower Bound: 3400

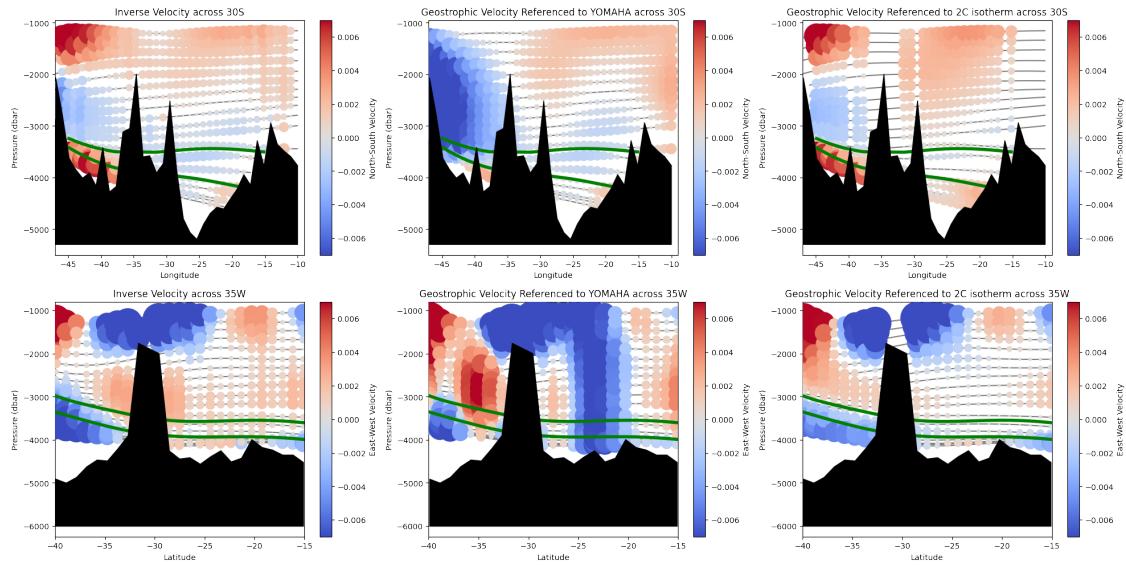
mixing: False

Condition: 2066.3311370206993 | Error: 908.6501488484263

Morris et al. mixing budgets

Zenk 1999 Blend: 2.669e-04 2.764e-04 3.270e-04

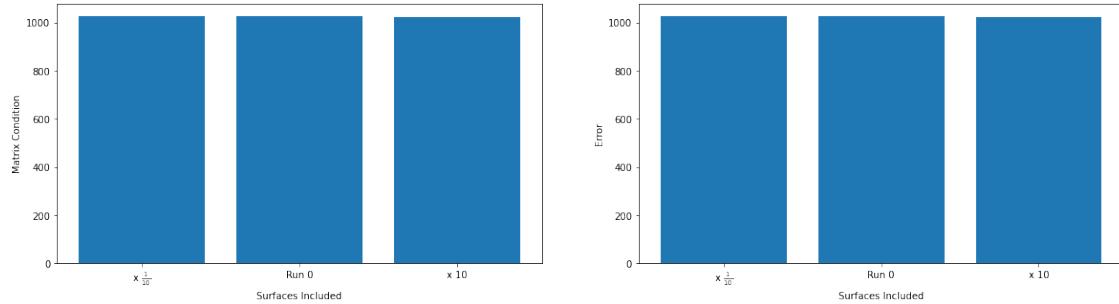
Zenk 1993 Blend: 2.299e-04 2.511e-04 3.092e-04



7 4) Sensitivity to mixing column weighting

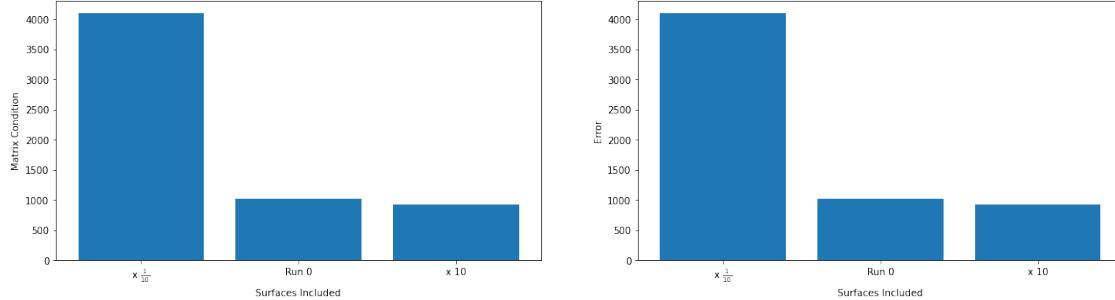
7.1 Sensitivity to change in Kv_0

`Text(0, 0.5, 'Error')`



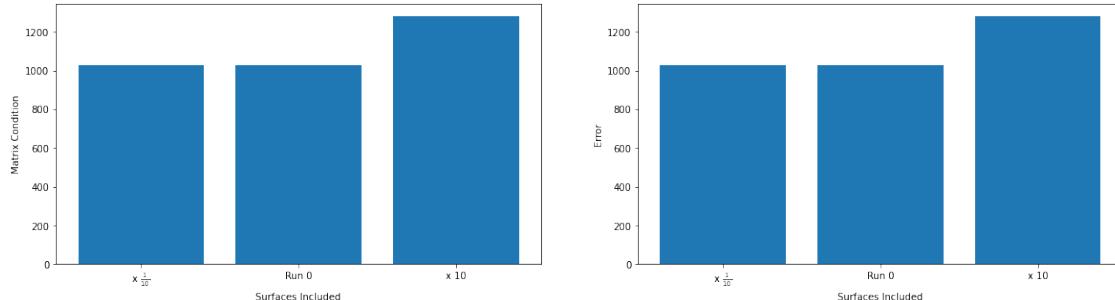
7.2 Sensitivity to change in Kv_b

Text(0, 0.5, 'Error')



7.3 Sensitivity to change in K_h

Text(0, 0.5, 'Error')



8 5) Sensitivity to choosing a reference station at 24W, 22S

Reference level: 2000 | Upper Bound: 1000 | Lower Bound: 4000

mixing: False

Condition: 670.6017955885757 | Error: 2205.793747624185

Morris et al. mixing budgets

Zenk 1999 Blend: 2.572e-04 2.683e-04 3.270e-04

Zenk 1993 Blend: 2.506e-04 2.646e-04 3.233e-04

