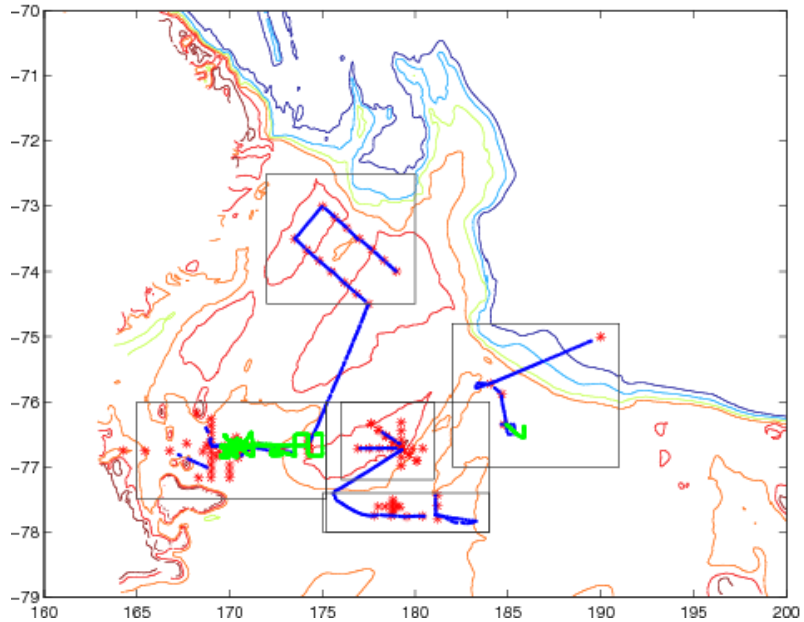
Ross Sea Length Scale from Observations

Introduction

- Use Conservative Temperature and potential density
- Use CTD, MVP and VPR observations
- Use 6 subsets of observations:

Ross Sea areas



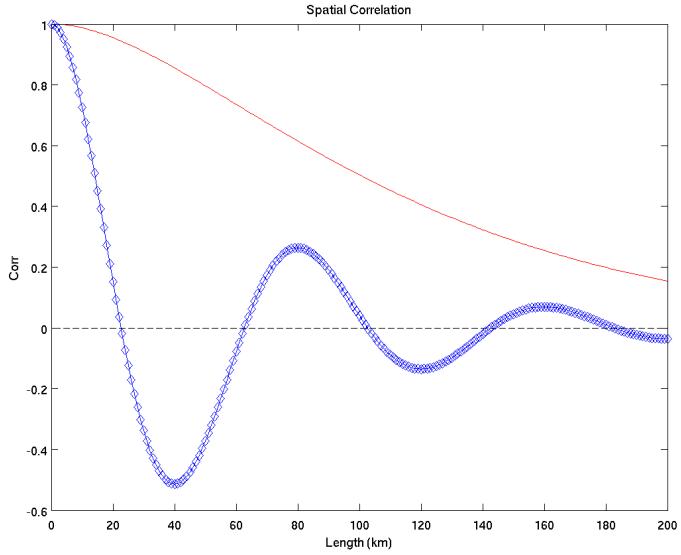
- Southwest Ross Sea: Shelf water, sea ice melting
- Southeast Ross Sea: Shelf water, Ice shelf water
- Ross Ice Shelf: Ice shelf water, eddies
- Ross Bank:
- Northwest Ross Sea: Joides Trough
- Northeast Ross Sea: first eddies

Structure Function

Spatial Structure function

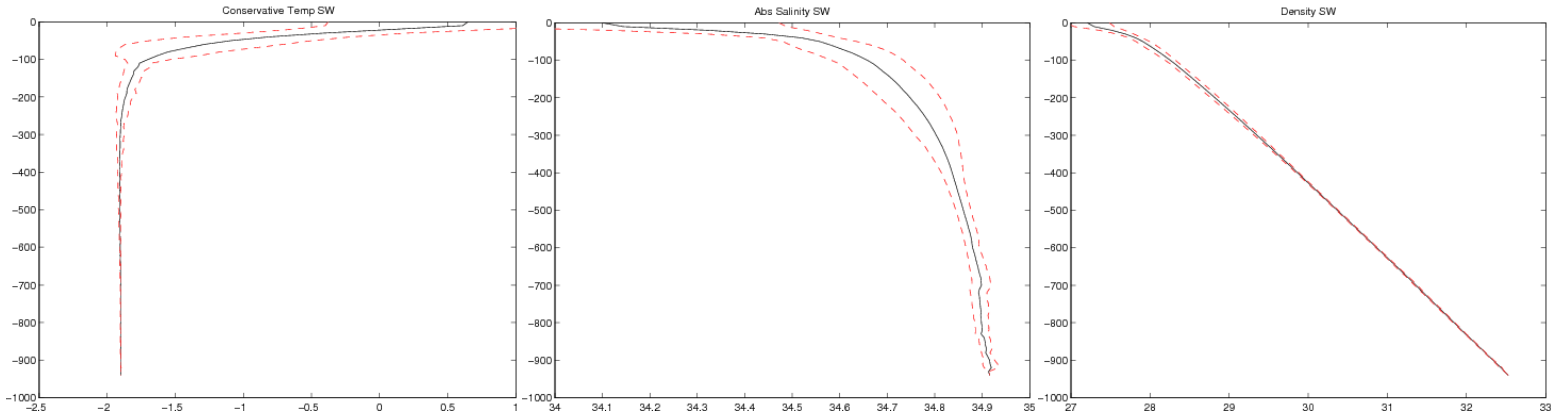
- Spatial lagged correlation
- Remove the mean and a linear trend in longitude
- Collect correlations by 1 km bins based on distance
- Assume isotropic structure
- Bootstrap estimate for variabililty (blue dashed lines)

Structure Functions: examples

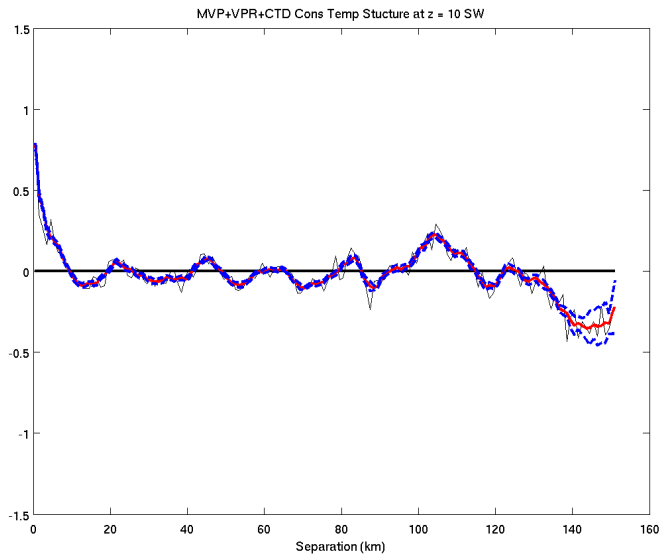


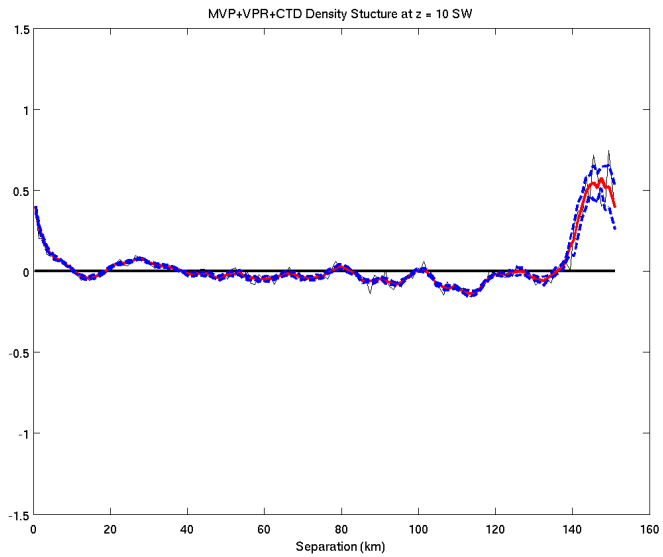
If eddy structure is regular (periodic-alternating) in one direction, then a lag of 1 eddy diameter will result in a correlation of -1. So, the first zero crossing is about 0.5 eddy diameters.

Southwest Ross Sea area: avg conditions

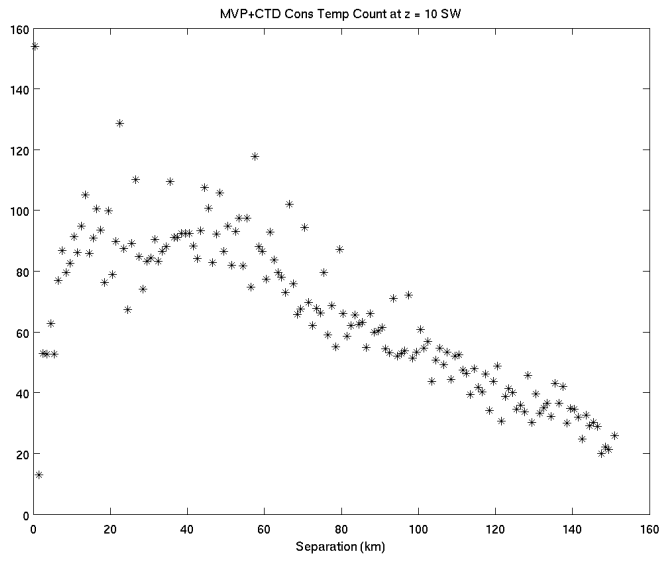


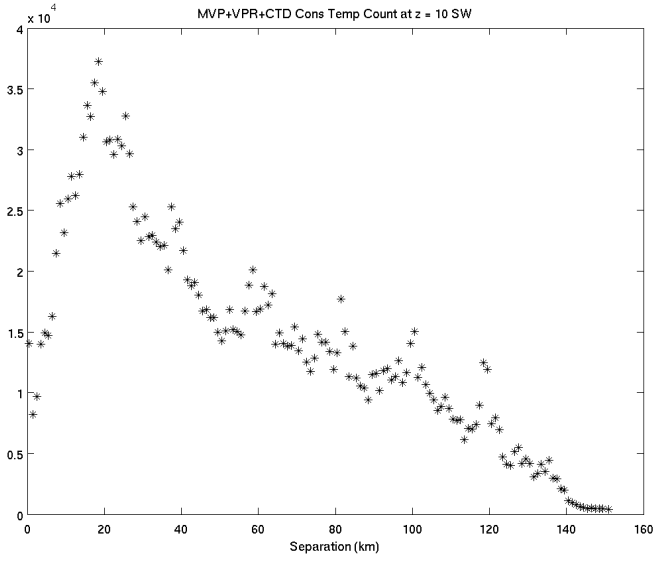
Southwest Ross Sea area: T and σ at 10 m: MVP+VPR+CTD



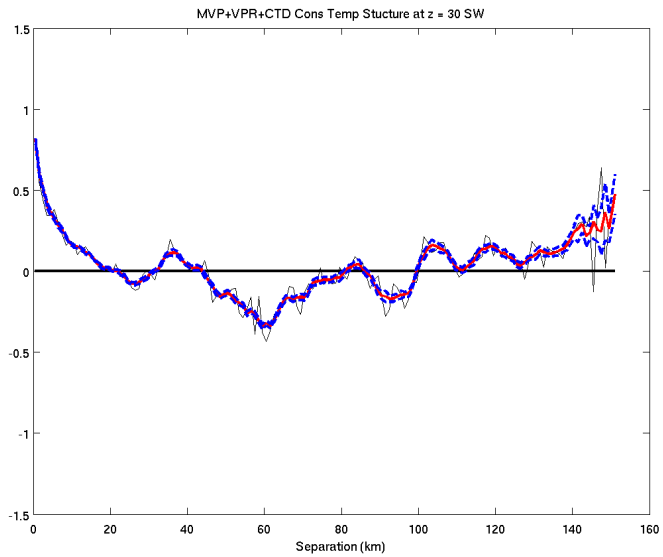


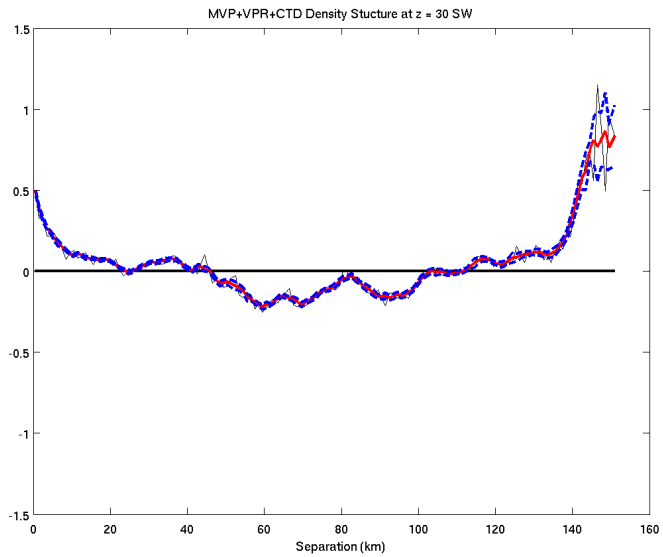
Southwest Ross Sea area: count at 10 m: MVP+CTD(+VPR)



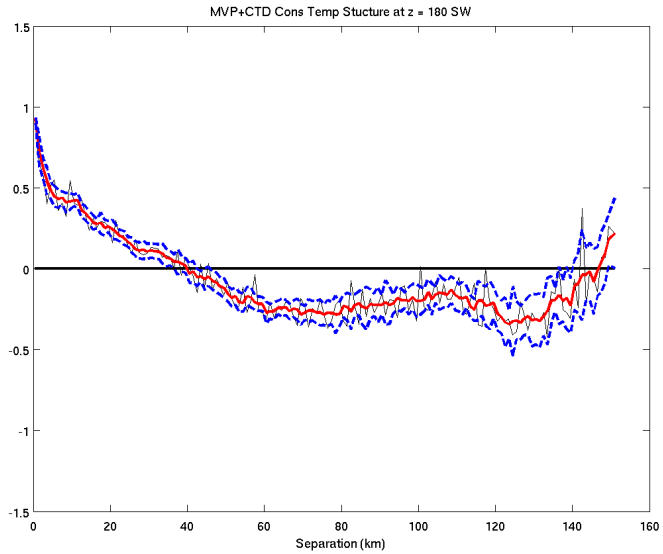


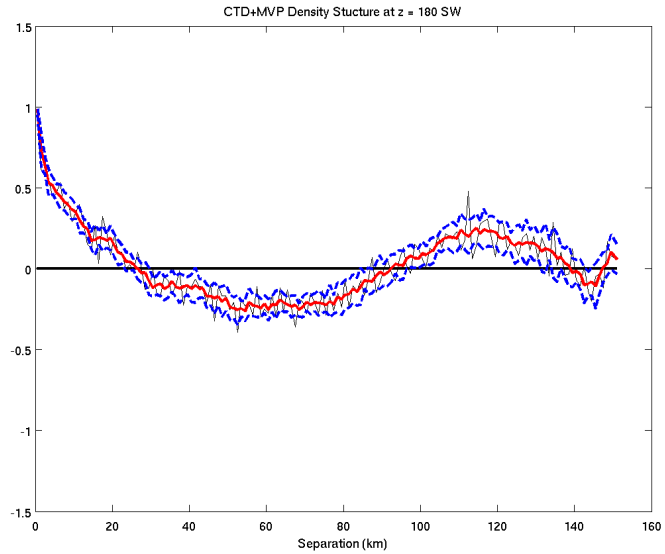
Southwest Ross Sea area: T and σ at 30 m: MVP+VPR+CTD



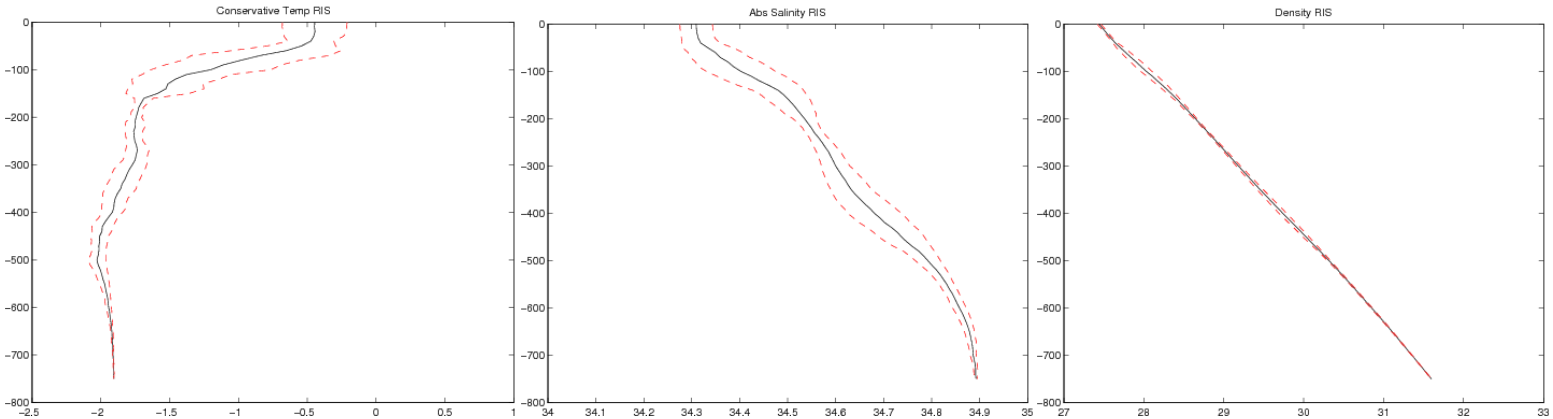


Southwest Ross Sea area: T and σ at 180 m: MVP+CTD

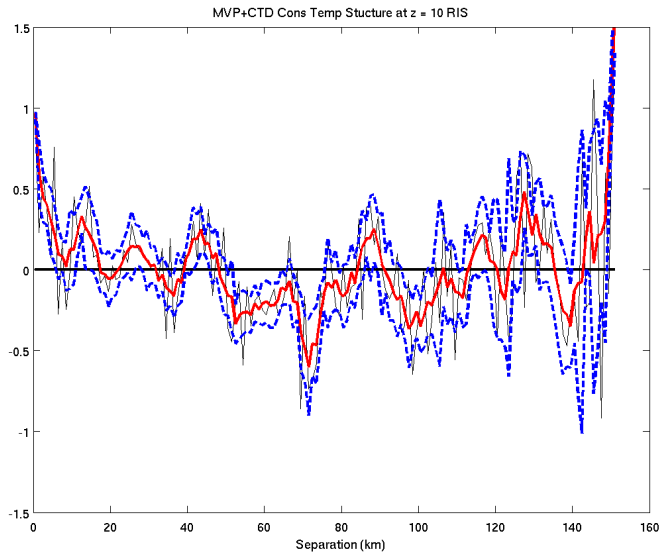


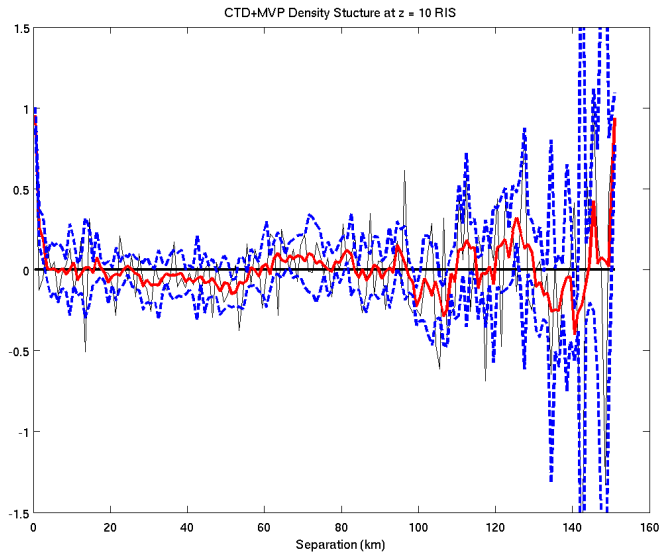


Ross Ice Shelf area: avg conditions

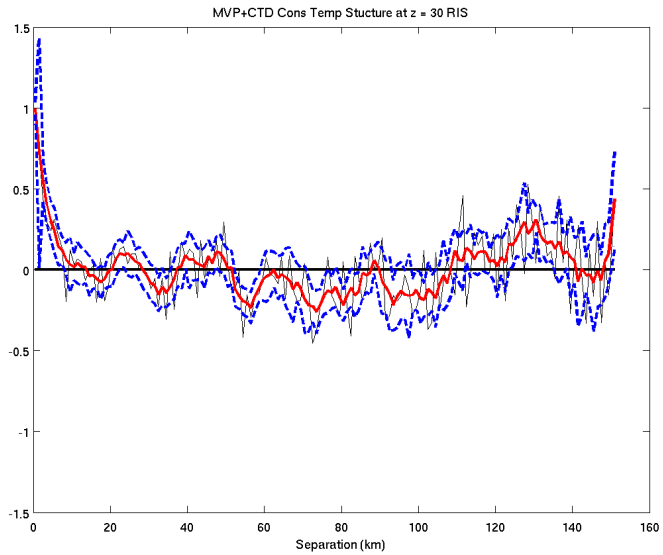


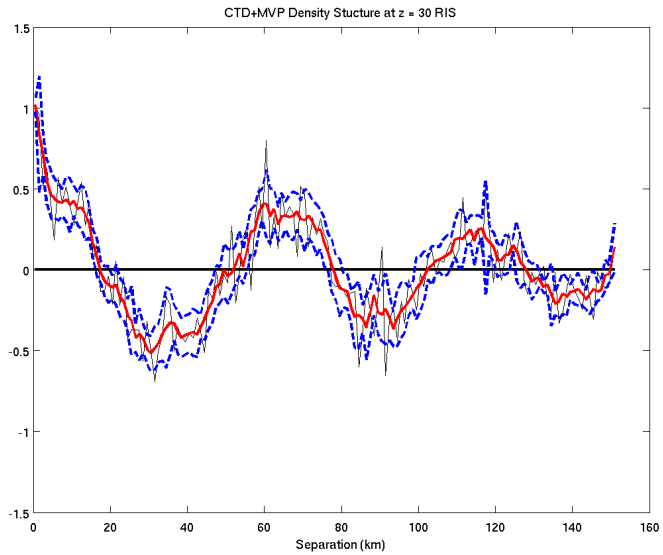
Ross Ice Shelf area: T and σ at 10 m: MVP+CTD



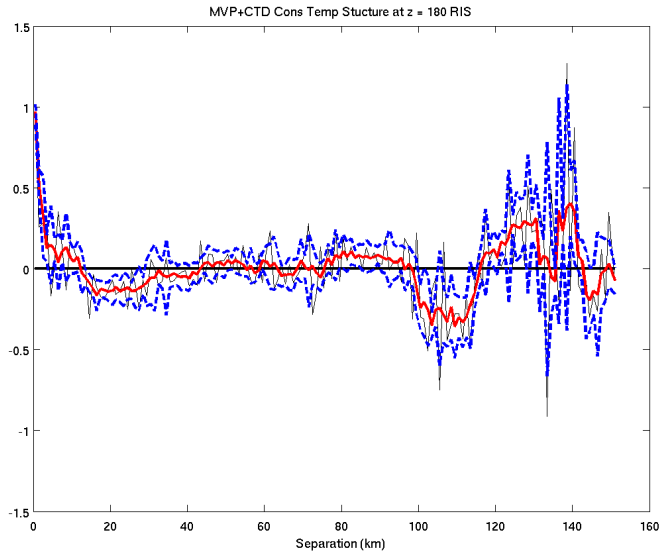


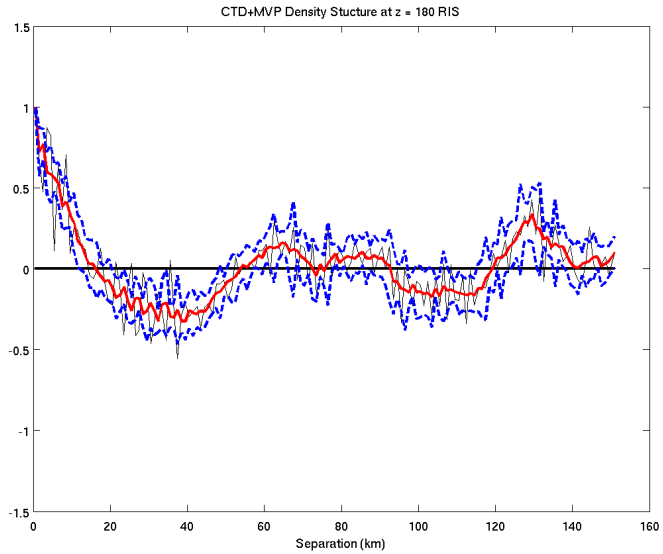
Ross Ice Shelf area: T and σ at 30 m: MVP+CTD



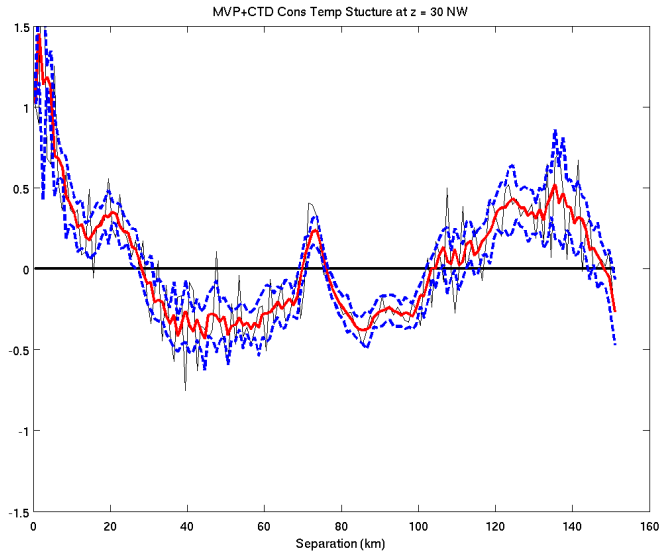


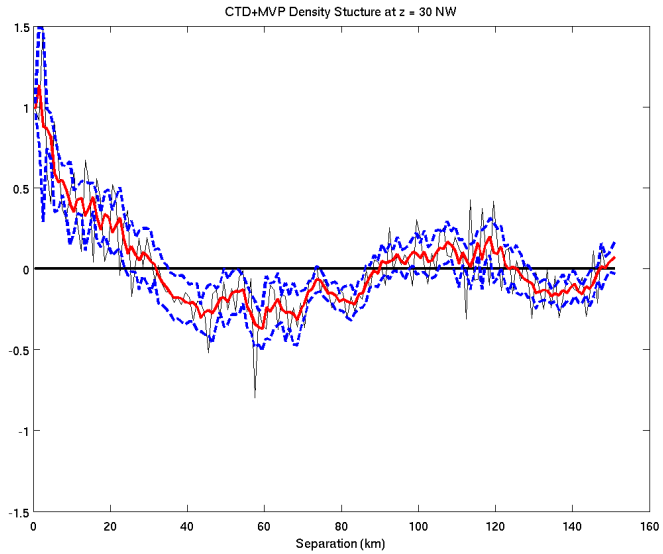
Ross Ice Shelf area: T and σ at 180 m: MVP+CTD



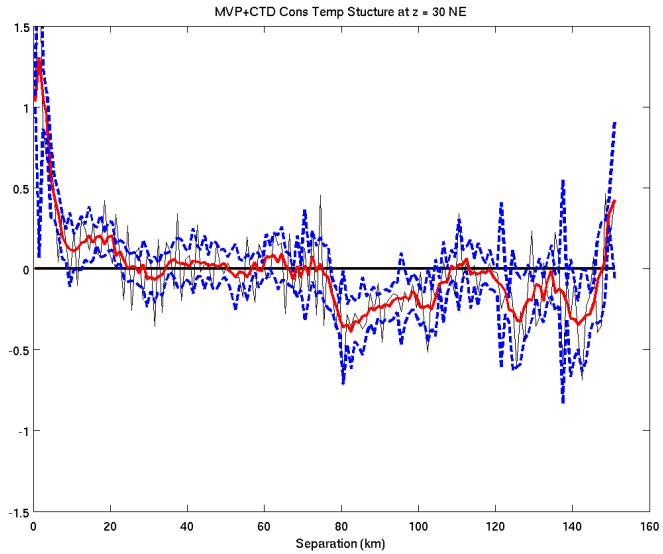


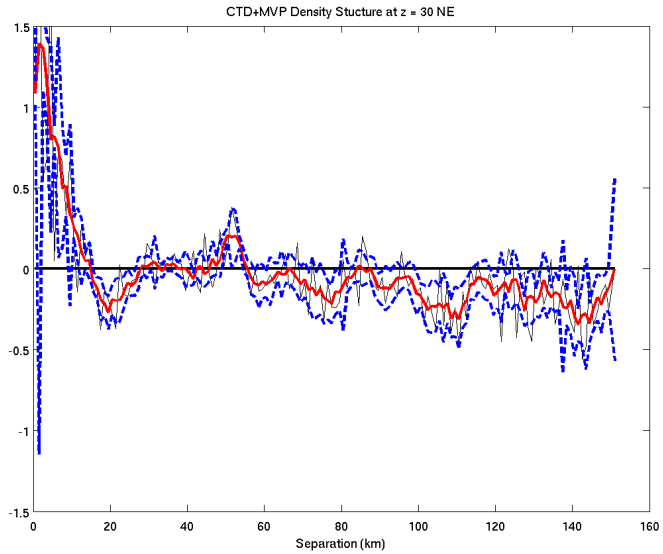
Joides area: T and σ at 30 m: MVP+CTD



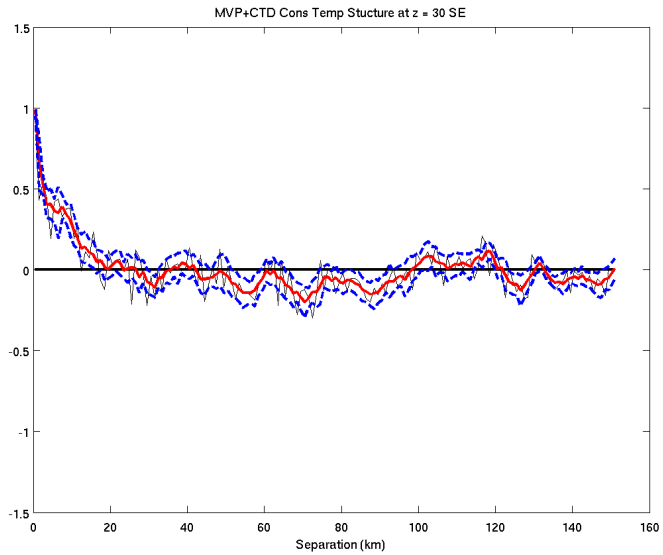


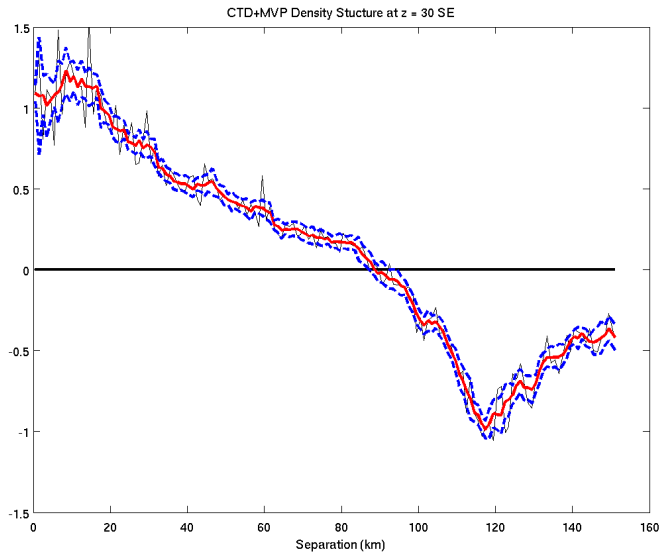
Eastern area: T and σ at 30 m: MVP+CTD



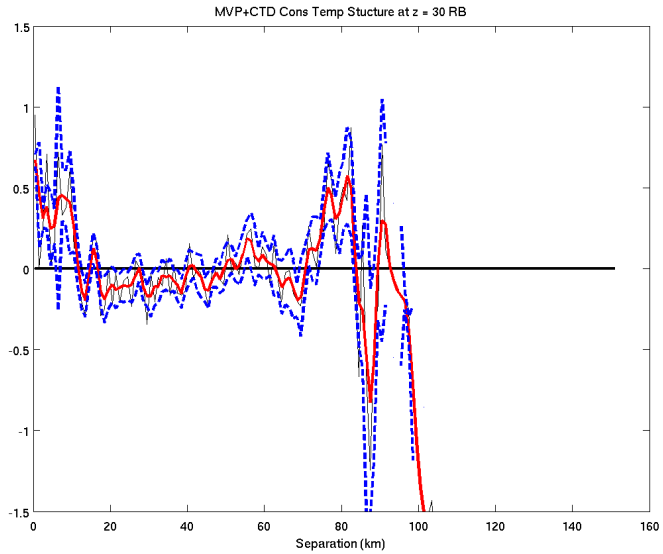


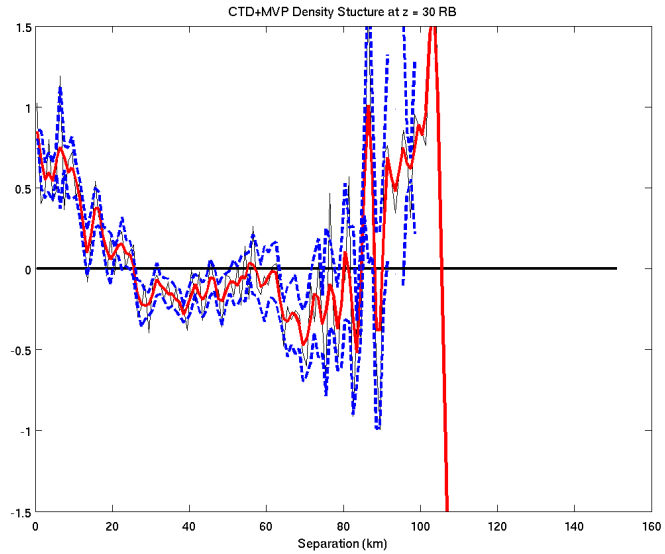
Southeastern area: T and σ at 30 m: MVP+CTD





Ross Bank area: T and σ at 30 m: MVP+CTD





Length Scale from observations: Conclusions

Conclusions

- Density has longer scales than temperature.
- Deeper scales are longer than near-surface scales.
- Decorrelation scale is 40+ km.
- Eddy diameters are 30-50 km

Need to do similar analysis in Ross model solution.