Comparison of coastal and open ocean sea level trends

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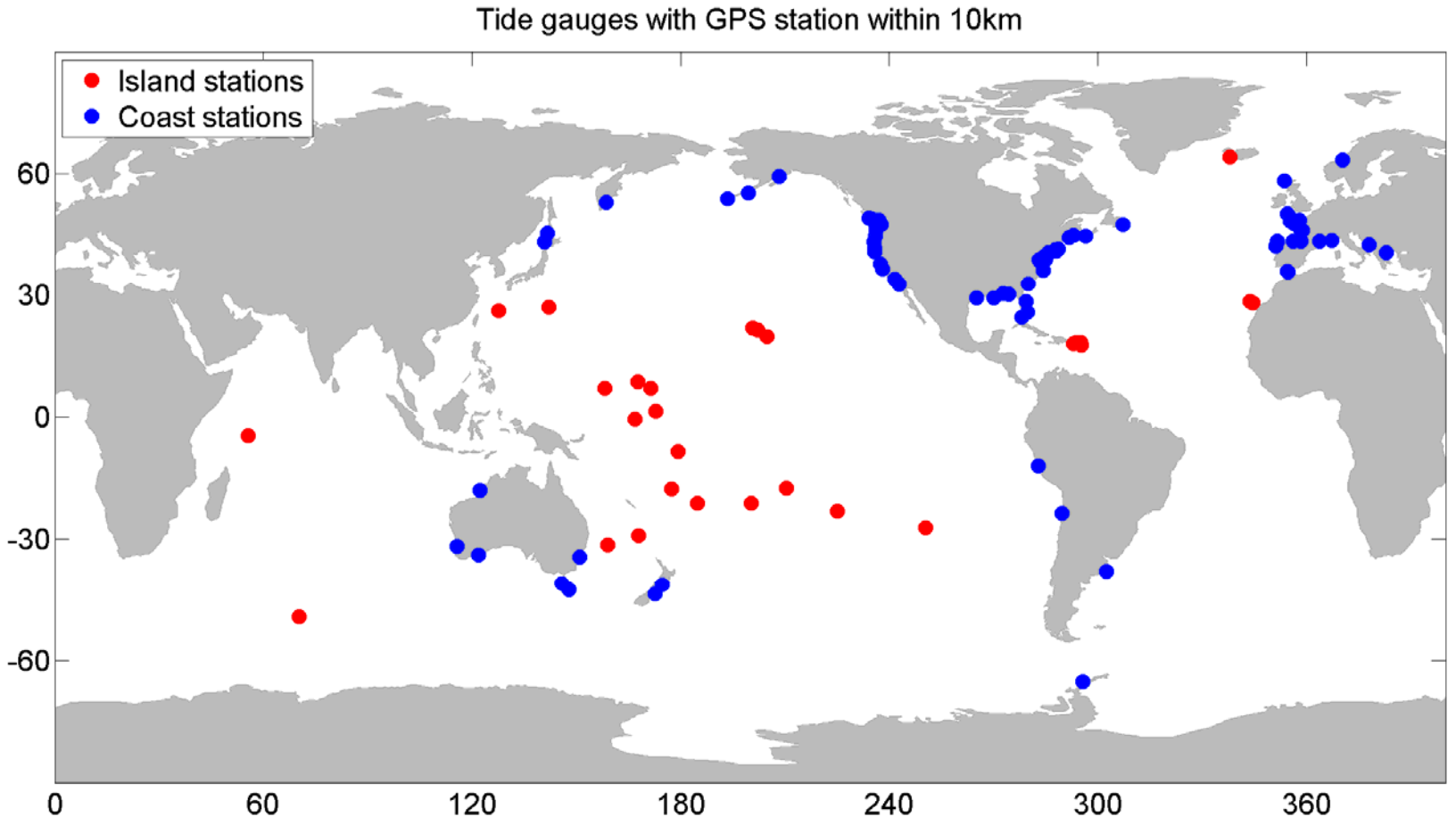
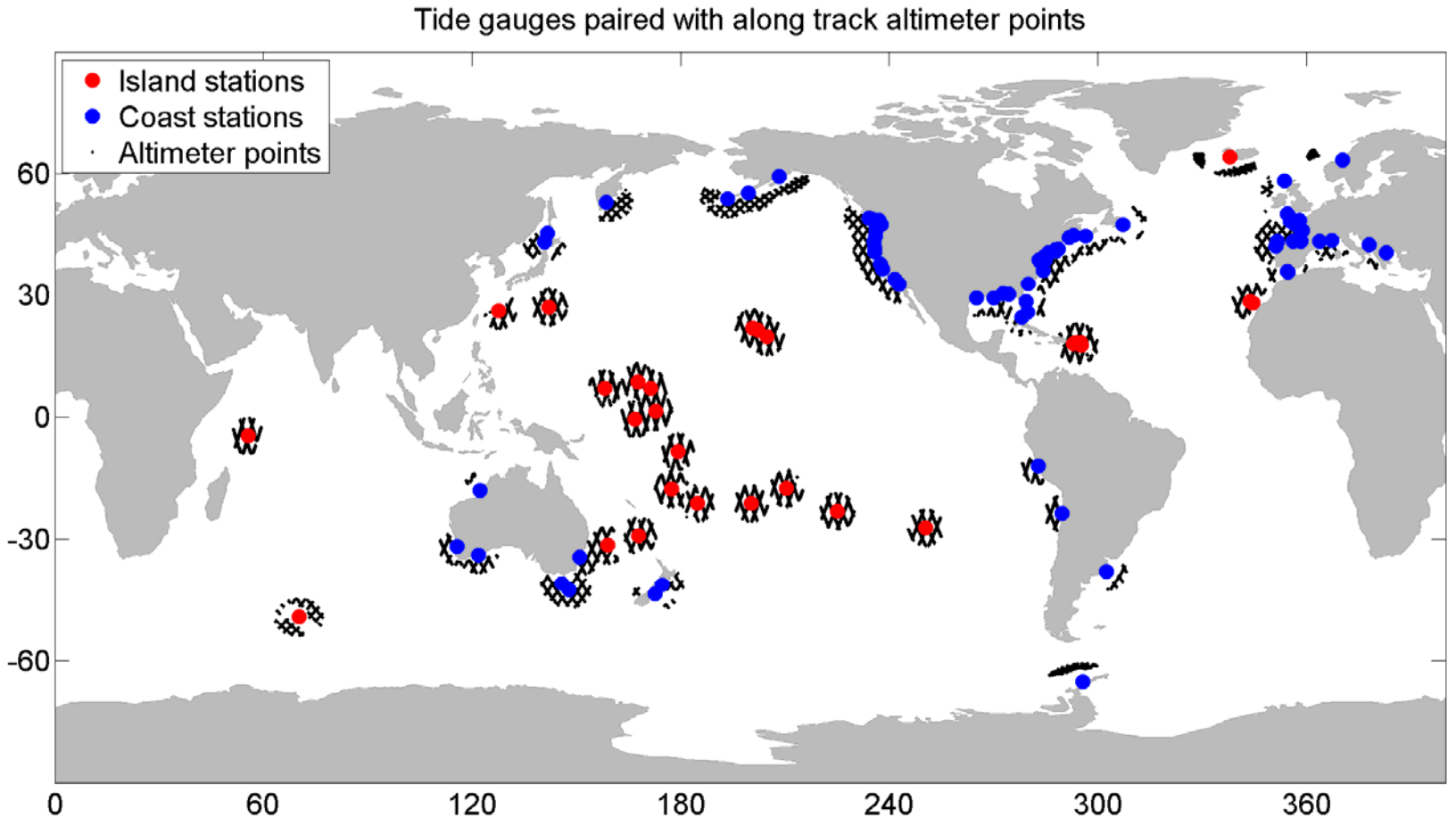
- There have been studies suggesting that sea level trends from tide gauges might differ from those measured in the nearby open ocean by altimeters.

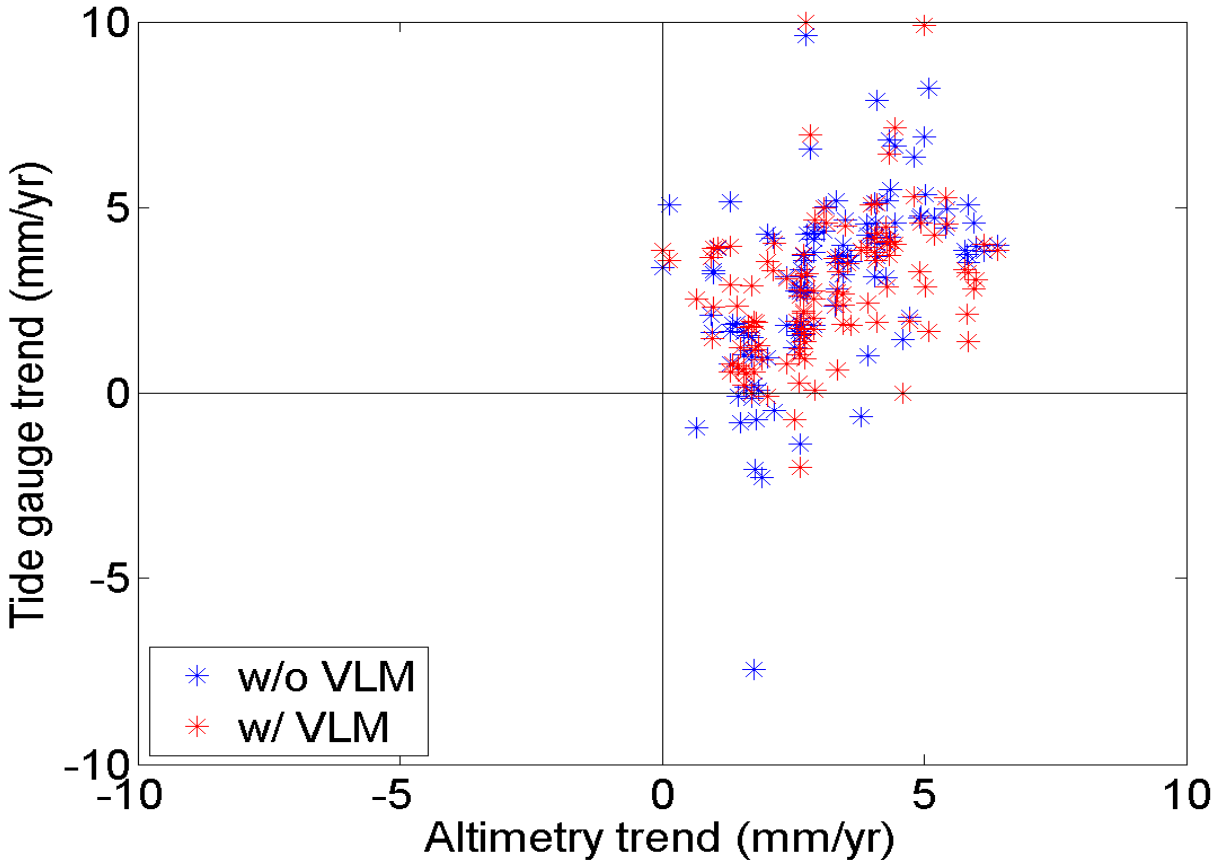
- Tide gauge trends reflect not only water volume changes but also vertical land movement (VLM). GPS data provide an estimate of VLM.

- We compare linear trends of sea level at tide gauges with and without GPS VLM correction to trends at nearby altimeter points in open ocean and ask:

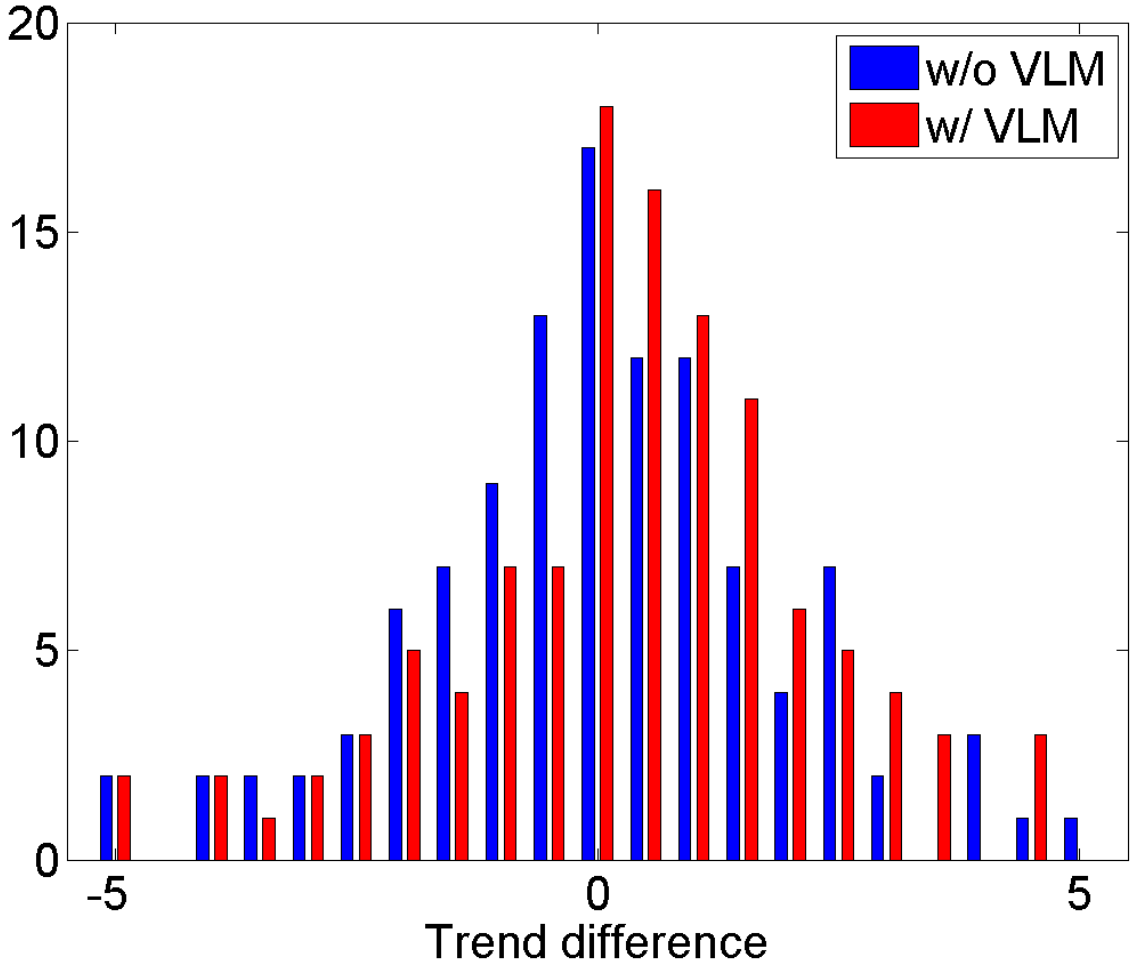
Are there significant differences?


Tide gauges with GPS station within 10km
Island stations
Coast stations
60
30
0
-30
-60
0
60
120
180
240
300
360

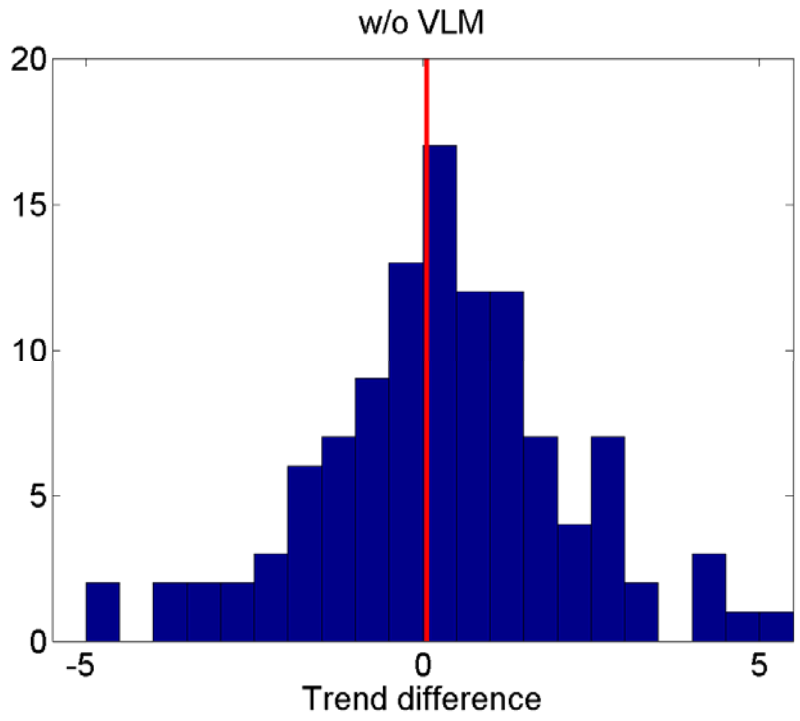

Tide gauges paired with along track altimeter points
Island stations
Coast stations
Altimeter points
60
30
0
-30
-60
0
60
120
180
240
300
360

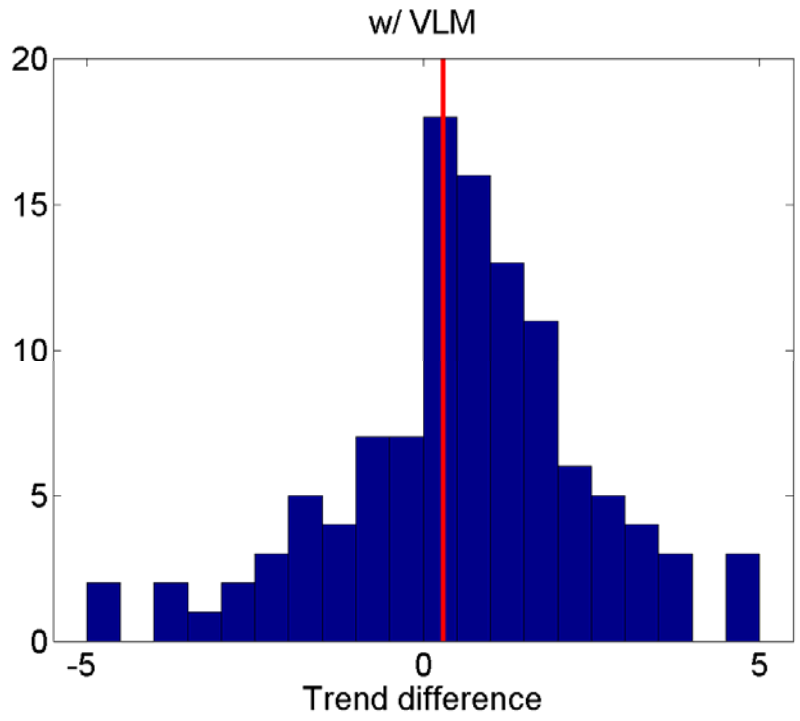


	Mean trend (mm/yr)	Correlation
Tide gauge(w/o VLM)	3.0	0.50
Altimetry	3.1	
Tide gauge(w/ VLM)	2.8	0.34


20
15
10
5
0
-5
0
5
Trend difference
w/o VLM
w/ VLM

Are there significant differences in the global mean trends?





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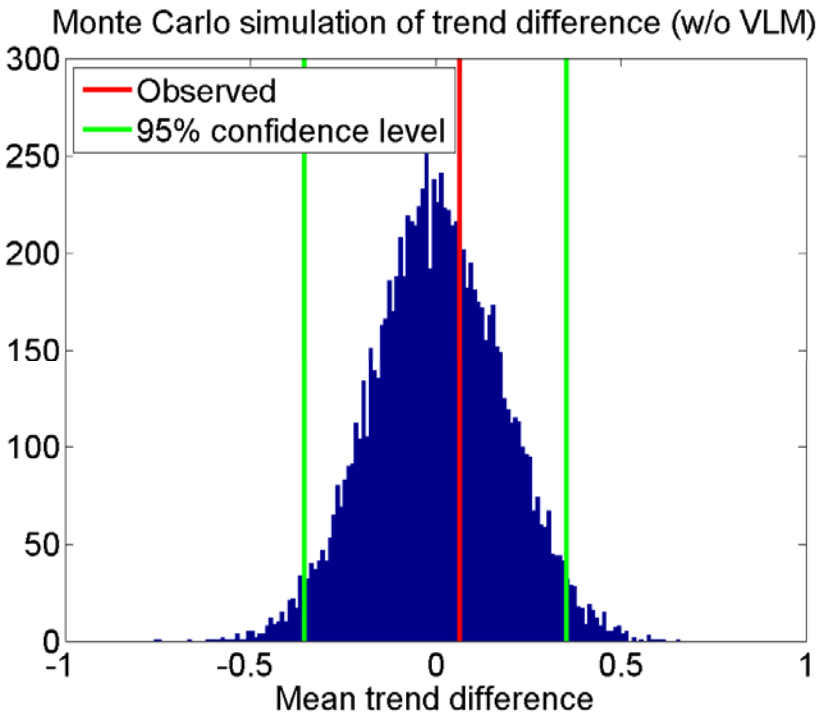
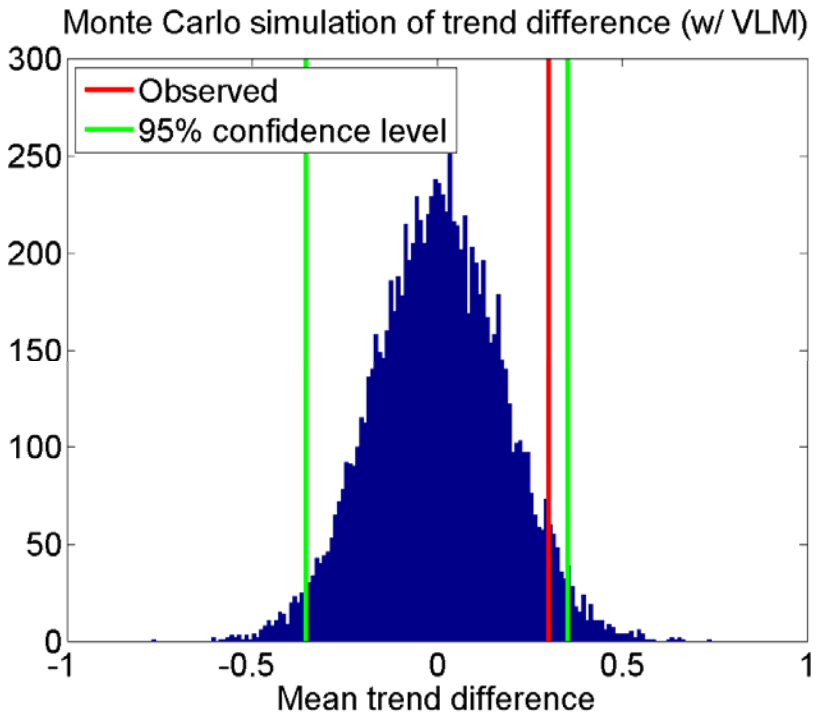
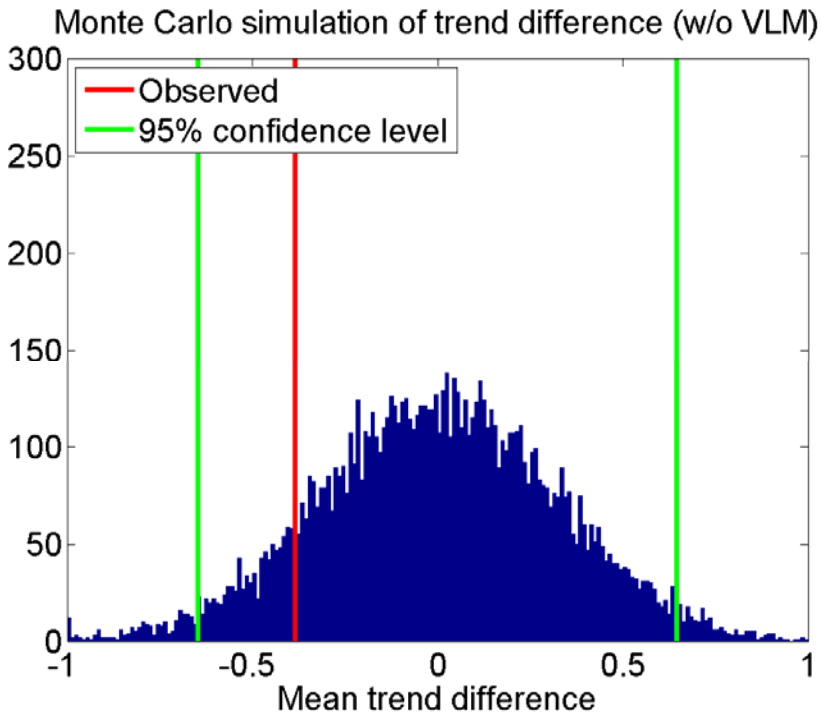
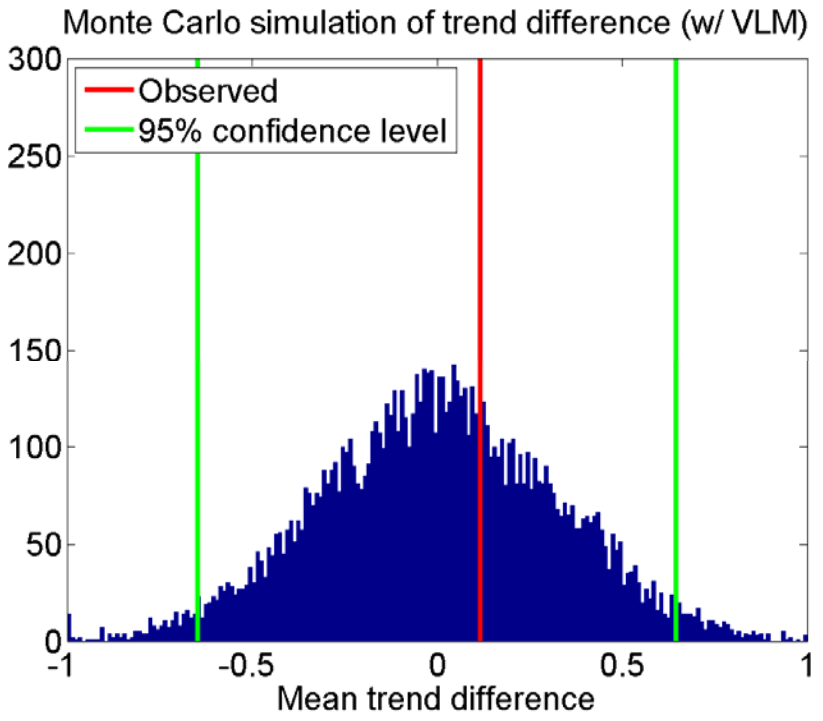


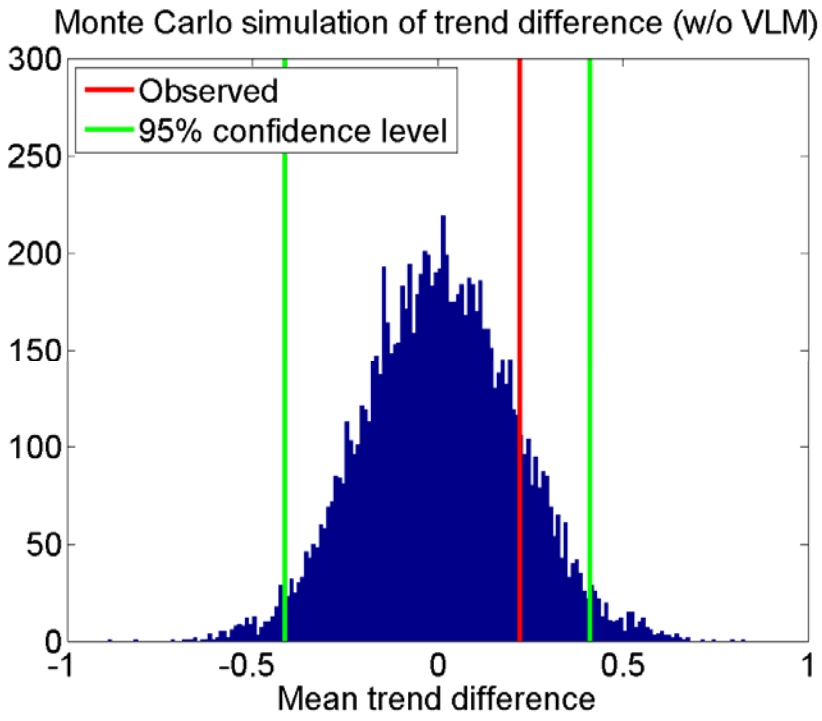


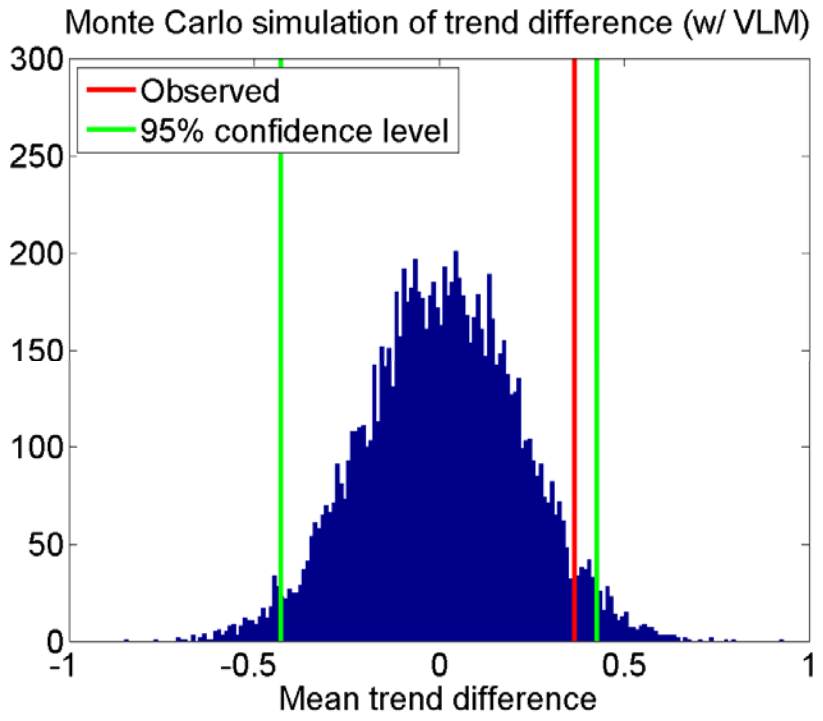
Are there significant differences in the mean trends at islands?

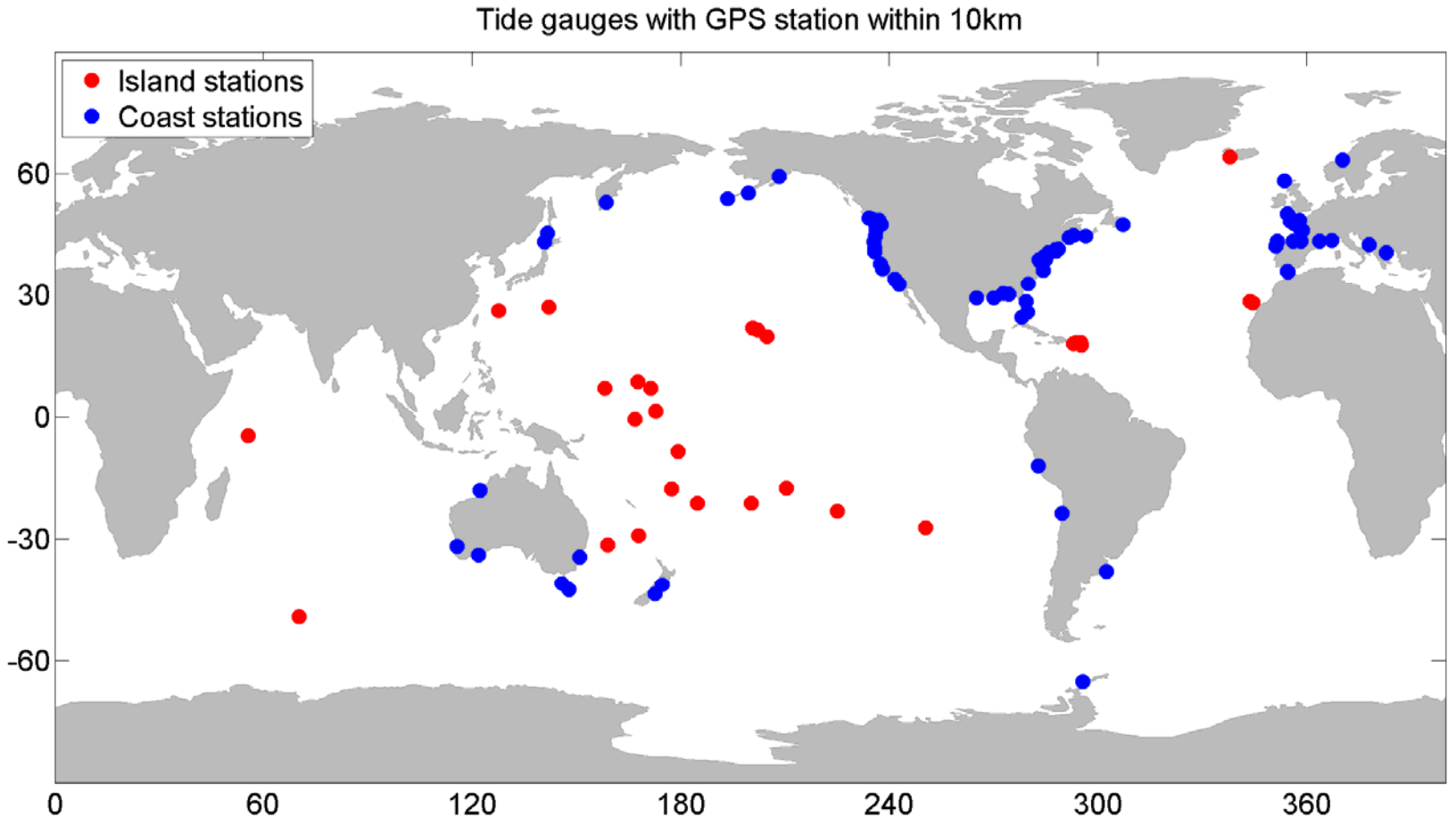




Are there significant differences in the mean trends at coastal stations?



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Conclusions and future work

- **Trends at tide gauges and at nearby altimeter points in the open ocean are correlated, and the mean difference is not statistically different from zero. This is also true when island and coastal stations are examined.**

- **Applying VLM corrections results in interesting, but not statistically significant, changes in the trend difference distribution.**

- **Future work will examine whether there are significant spatial patterns in the differences even though the global mean is unchanged.**