



Conversion and Interpolation of the Ice Thickness Distribution in ACCESS-OM2

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OceanMAPSv4 is based on ACCESS-OM2-01 with the addition of:

- Optimized performance for stability and frequent restarts,
- Atmospheric forcing by ACCESS-G3,
- Hybrid ENKF-C data assimilation,
- Assimilation of the Bureau's observational datasets.

Demonstration operations on NCI's *gadi* since October 2021.

We intended to develop a parallel configuration with an Ice Thickness Distribution (ITD) with higher resolution and a focus of thinner ice, as more typical of Antarctic sea ice.

Can we take an existing CICE restart with a 5-category ITD, and convert it to more categories?

Technique

For each grid point:

- Determine mean ice thickness in each category,
- For a given set of new thickness categories, determine which category ice of each mean thickness is located,
- Integrate with a new restart, allowing model to adjust.

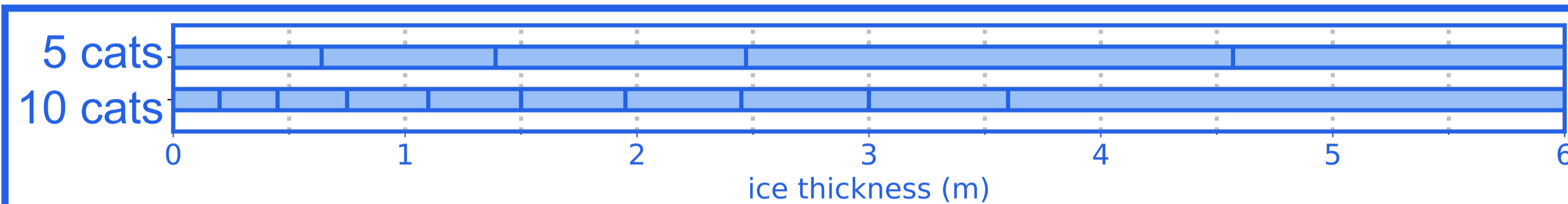


Figure 1: position of category boundaries for the two ITDs.

Testing with ACCESS-OM2-025-IAF+mushy thermodynamics

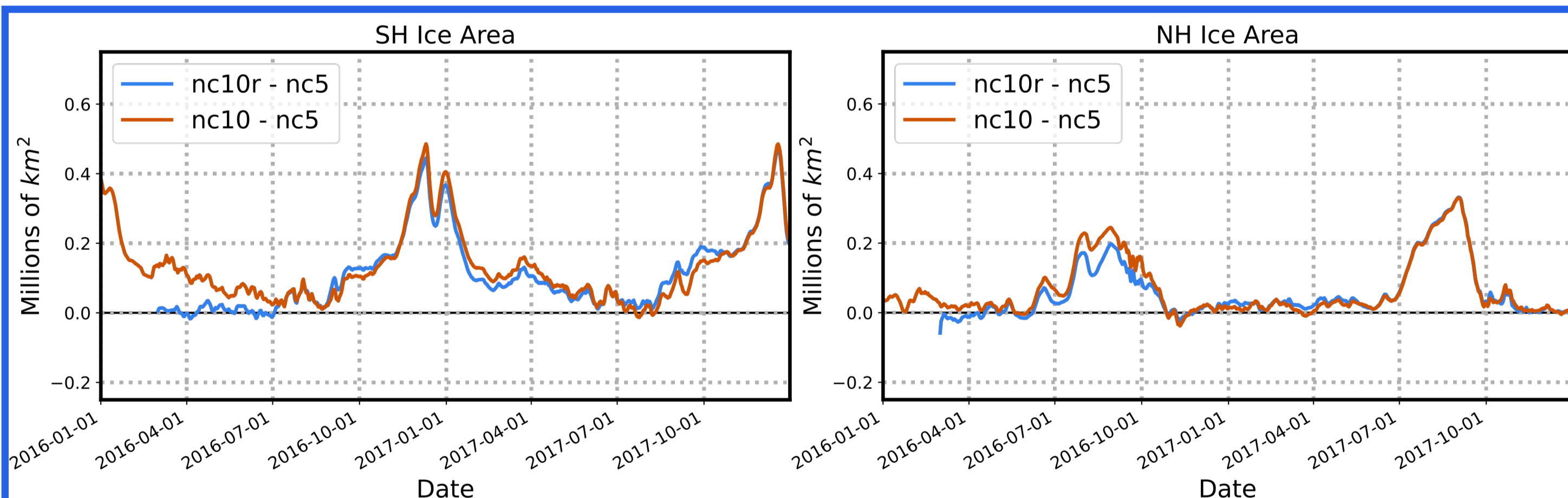
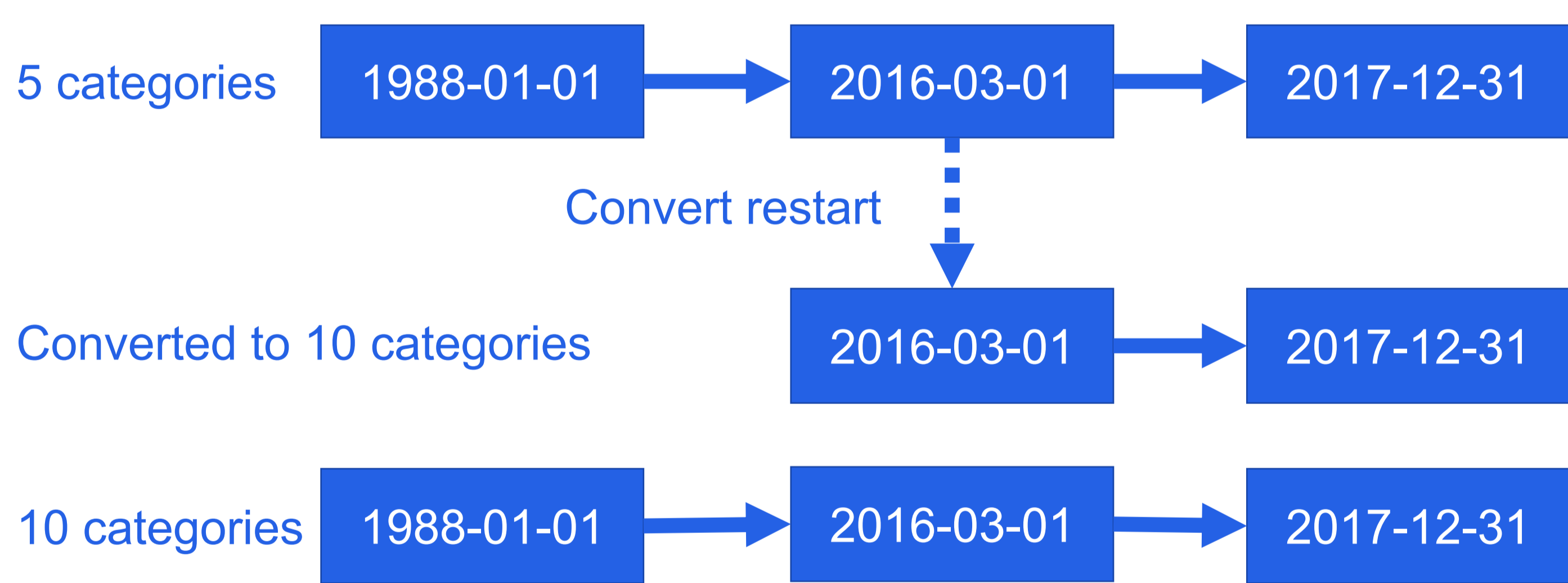


Figure 2: Difference in sea-ice area between the 5-category run (nc5) and the two 10-category runs. nc10r is the run converted to 10 categories, nc10 is the native 10-category run.

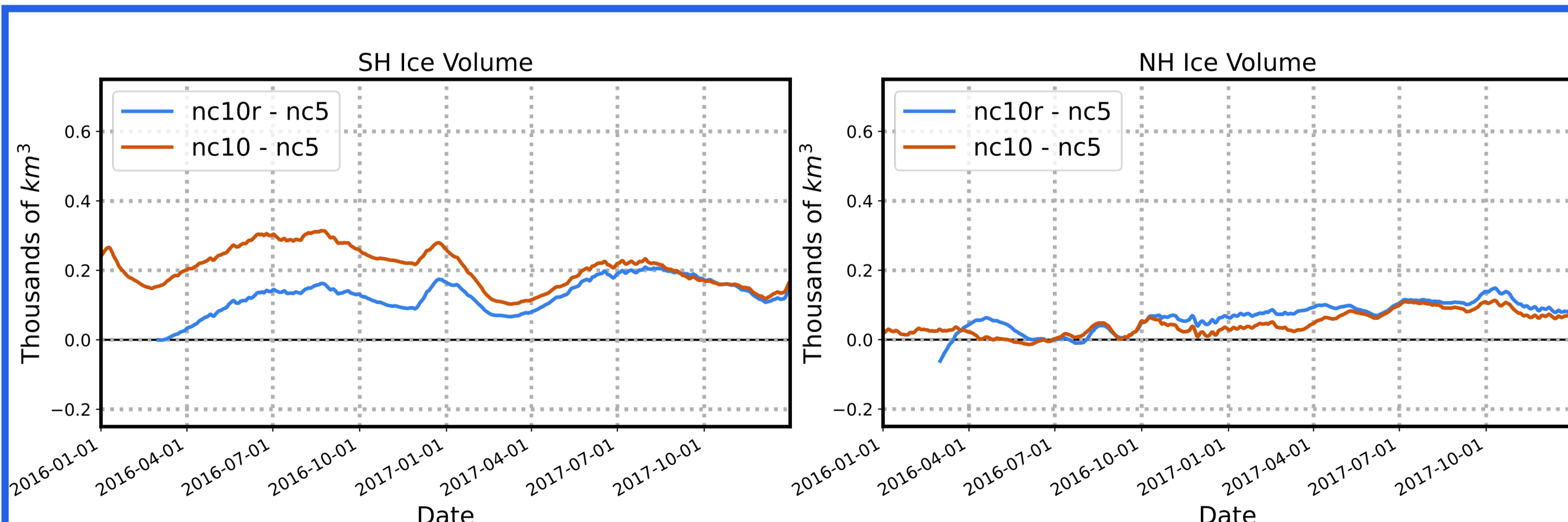


Figure 3: As for figure 2 but for sea-ice volume.

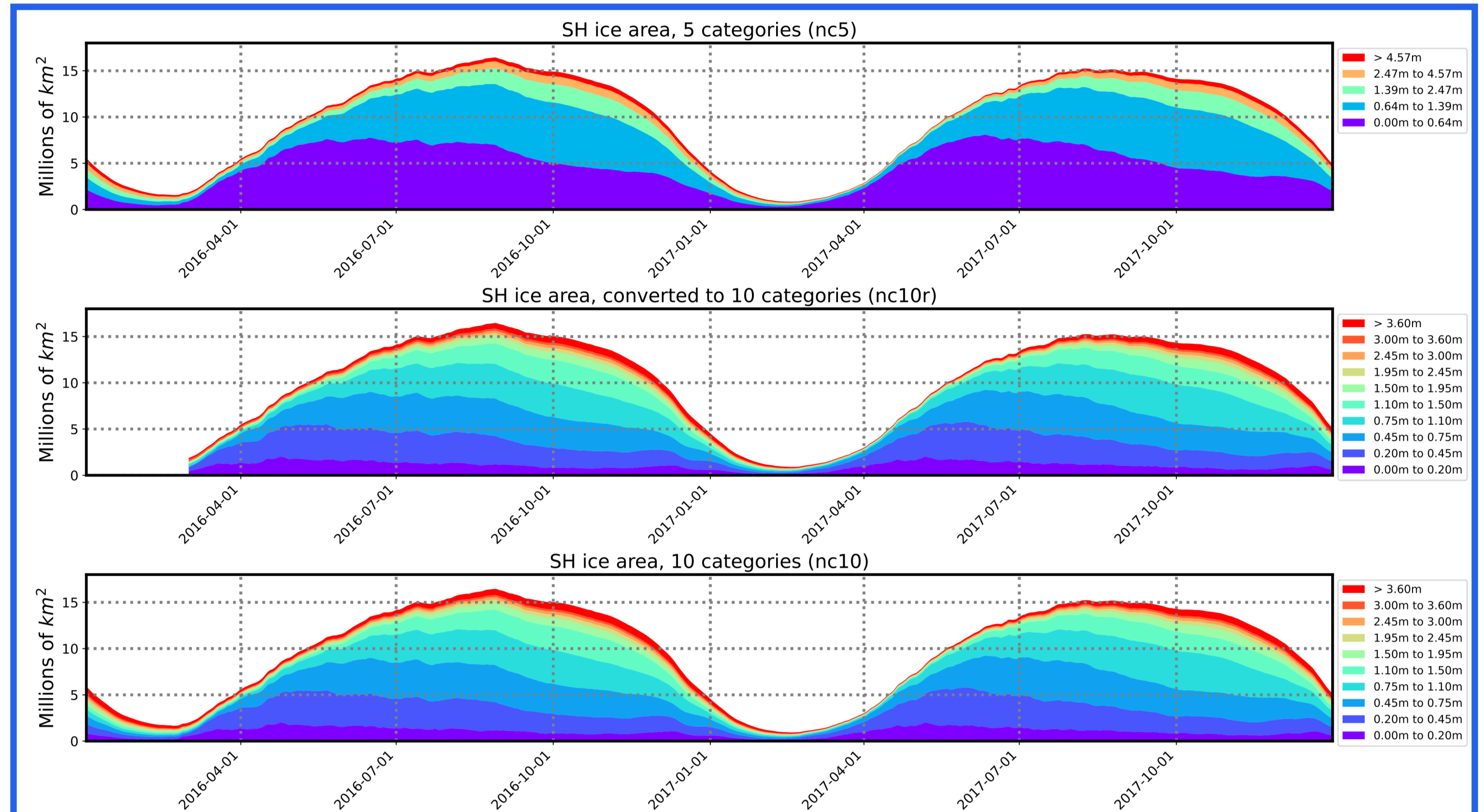


Figure 4: Southern Hemisphere sea-ice area by thickness category for the three runs.

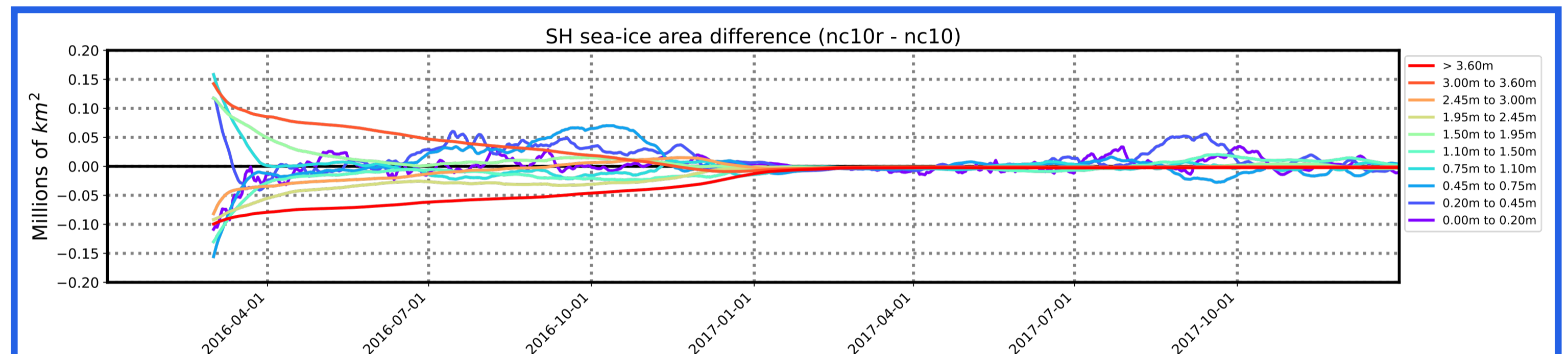


Figure 5: Differences in Southern Hemisphere sea-ice area between the two 10-category runs for corresponding thickness categories.

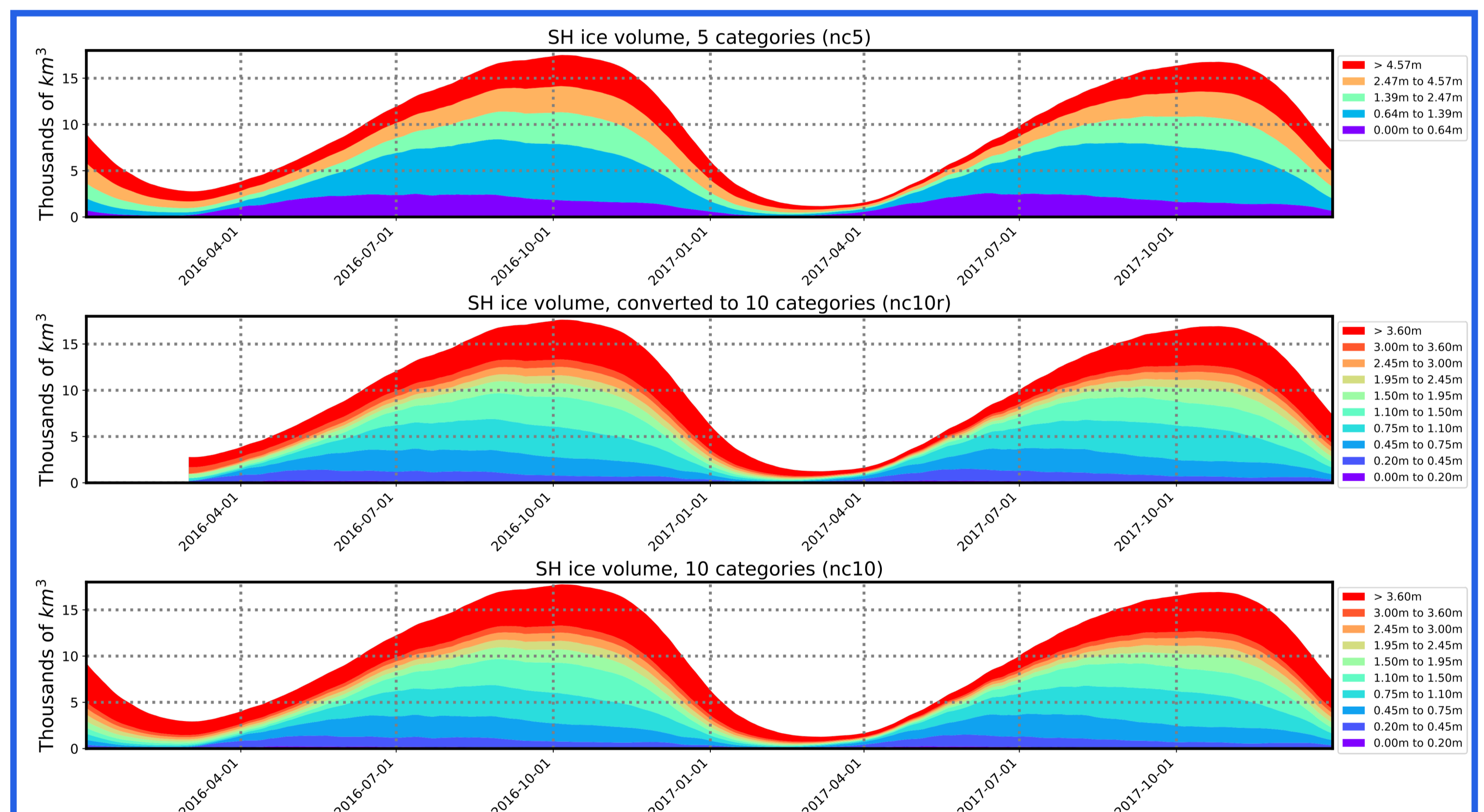


Figure 6: As for figure 4, but for sea-ice volume.

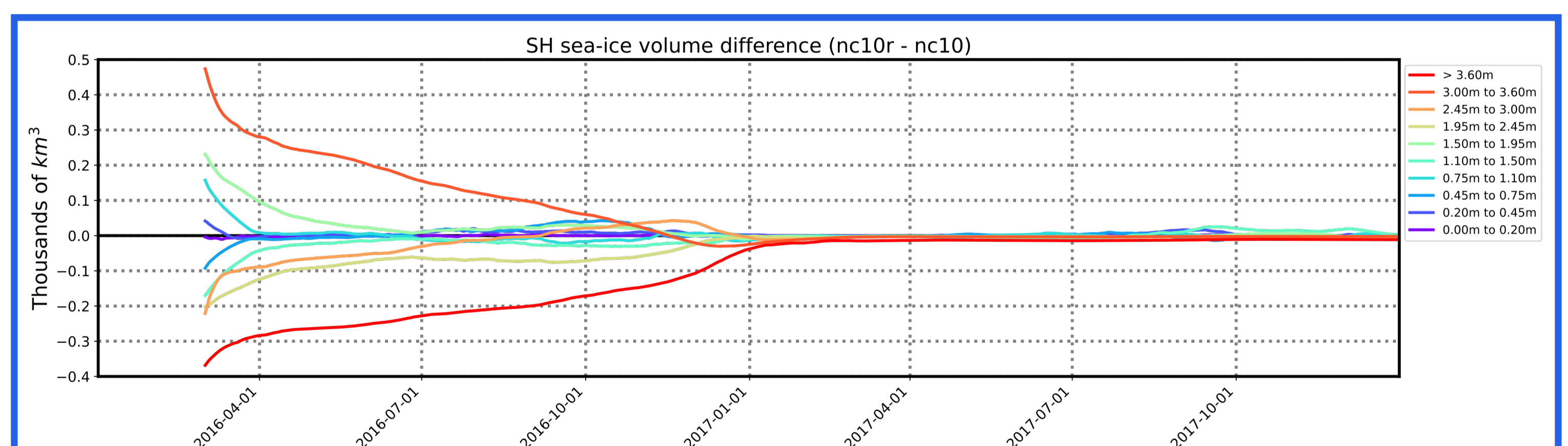


Figure 7: As for figure 6, but for sea-ice volume.

Further Work

- Explore seasonality: restart model with converted ITD at different times of year. Does adjustment time vary?
- Linear interpolation: developing method to linearly interpolate the ITD, based on how CICE 'remaps' thickness categories following melting/freezing. Will hopefully reduce adjustment time.
- Implement with DA: this will reduce adjustment time further.