Extended discussion of the between-model variability in the North Atlantic

S. E. Mikaloff Fletcher,1 N. Gruber,1 A. R. Jacobson,2 S. C. Doney,3 S. Dutkiewicz,4 M. Gerber,5 M. Follows,4 F. Joos,5 K. Lindsay,6 D. Menemenlis,7 A. Mouchet8 S. A. Müller5 and J. L. Sarmiento2

Most of the models are in excellent agreement in the Atlantic; however, the UL model exhibits a different latitudinal distribution of anthropogenic carbon uptake compared with the other OGCMs used (Figure 6 of the manuscript and Figure 9 of the online supplement). This area is composed of the North Atlantic High-, Mid-, and Low-Latitude Regions (Regions 2-4). Flux into the Arctic Ocean (Region 1) and into North Atlantic High-Latitudes (Region 2) is the primary mechanism for anthropogenic carbon storage in the high latitude North Atlantic, while the North Atlantic Mid- and Low-Latitude regions have the strongest signals at mid-latitudes (Figure 2 of the online supplement). The UL model keeps a larger portion of the dye injected into the Arctic Ocean and North-Atlantic High-Latitudes close to the surface than any of the other contributing models. As a result, greater anthropogenic uptake in these regions is required to match the observed storage of anthropogenic carbon in the high-latitude North Atlantic. In order to balance this high anthropogenic carbon estimate in the North Atlantic High-Latitude region, the inversion estimates a small amount of out-gassing from the North Atlantic Mid-Latitude region. Finally, a higher uptake is needed in the North Atlantic Low-Latitude Region to match the observed storage at mid-latitudes.