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Global air sampling network reveals decreasing NH terrestrial carbon uptake

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Rapid increases in the north-south gradient of atmospheric carbon dioxide recorded at continental, mid-latitude Northern Hemisphere measurement sites of the NOAA/ESRL Global Air Sampling Network reveal a shrinking terrestrial carbon sink. Seven of nine sites strongly influenced by terrestrial carbon fluxes show differences with the South Pole increasing faster than can be explained by fossil fuel emissions, resulting in an average north-south difference at these sites 1.7 ppm larger in 2004 than in 1996. In contrast, annual means recorded at marine boundary layer (MBL) sites show differences with the South pole increasing more slowly than can be explained by fossil fuel emissions. Although MBL sites are only partially sensitive to terrestrial fluxes, this contrasting picture does imply at least a slightly increasing ocean carbon sink. In addition to pointing to a terrestrial flux trend, the large differences we observe between continental and MBL sites also reinforce the importance of making high accuracy carbon dioxide measurements over land in order to accurately characterize large scale carbon dioxide spatial patterns.