1. Here we present a three year dataset of simultaneous measurements made at ~50 stations along the western Antarctic Peninsula (WAP) continental shelf in midsummer (January) 2012-14.
2. This is especially true in remote regions such as polar marginal ice zones.
3. New P and NCP(O2) did not differ significantly.
4. Net seasonal scale changes in water column inventories (0-150 m) of nitrate and iodide were also estimated at the same stations.
5. New production (New P, the rate of net primary production (NPP) supported by exogenously supplied limiting nutrients) and net community production (NCP, gross primary production not consumed by community respiration) are closely related but mechanistically distinct processes.
6. A major uncertainty in the relative magnitude of the inventory estimates is specifying the start of the growing season following sea ice retreat.
7. New P and NCP(O2) were significantly greater than sinking particle export from Thorium-234.
8. The relationships, relative magnitudes and variability of New P (from 15 NO3- uptake), O2:Argon-based NCP and sinking particle export (based on the 238U:234Th disequilibrium) are increasingly well documented but still not clearly understood.
9. We suggest this is a persistent and systematic imbalance and that other processes such as vertical mixing and advection of suspended particles are important export pathways.
10. They set the carbon balance in the upper ocean, and define an upper limit for export from the system.
11. The average daily rates based on inventory changes exceeded the shorter-term rate measurements.
12. New P and NCP(O2) were significantly greater than sinking particle export from Thorium-234.