Figure 1. Locations of the automatic weather stations (AWS) used in this study and corresponding gridpoint locations for ERA-Interim (red) and NCEP-2 (blue) reanalyses. Wind vectors show the climatological surface wind regime (850 hPa) over the RIS and Ross Sea (from ERA-Interim monthly data averaged over 2008–2012).
Figure 2. Total accumulation and precipitation over time for each station (note different time periods). ADG accumulation is in m snow (left axes) and ERA and NCEP reanalyses is in m w.e. (right axes), with axes offset by 35% (approximate density of surface snow on RIS). A close up of the time period outlined by the grey box in the Margaret plot is shown in Figure 4.
Figure 3. Differences between ERA and NCEP reanalyses (ERA minus NCEP) from 2008–2012 over the Ross Sea and RIS region (60°S to 85°S, 160°E to 240°E) for a) total precipitable water (total column water) (kg m⁻²) and b) 850 hPa meridional winds (m s⁻¹). Red contours are positive (ERA larger than NCEP), blue contours are negative (NCEP larger than ERA), grey line is zero. Total precipitable water contours are 0.1 kg m⁻², wind contours are 0.5 m s⁻¹.
Figure 4. Zoomed-in section of the Margaret accumulation plot (corresponding to the grey box in Margaret in Figure 2) showing the characteristics typical of a coincident event. ADG snow accumulation is on the left y-axis and ERA/NCEP precipitation is on the right y-axis as in Figure 2 (note axes are different scales for clarity). The dashed boxes indicate the different durations of the coincident event (defined as > 5 mm snow day$^{-1}$ and > 0.5 mm w.e. day$^{-1}$) for each dataset.
Figure 5. Comparison of event sizes for all coincident events. ADG event sizes are m snow; reanalyses event sizes are m w.e. Regression lines and $r$-values are shown for correlations at 90% significance level. Black lines indicate the slope of the regression that would be expected for snow densities at various ranges (freshly fallen snow, $\rho = 70 - 120$ kg m$^{-3}$; wind-redistributed snow, $\rho = 250$ kg m$^{-3}$).
Figure 6. Relationship between near-surface wind speed and event size correlation values (from Figure 5), including those not significant at > 90% level (indicated with asterisk). Wind speed values are derived from ERA-Interim 850 hPa monthly averages (750 hPa for Byrd), averaged over the period of this study (2008–2012). Stations with the highest wind speed (Sabrina) and lowest (Margaret) are labeled.