Knowledge of the properties of Antarctic sea ice and of its evolution within the physical system is crucial to gauge its fate under changing climate conditions. Due to the great expanse of Antarctic sea ice, remotely-sensed data are required to fully assess the sea-ice properties. The data records for sea-ice concentration extend back to the 1970s, however, there are few large-scale data on ice thicknesses or velocities. Information of their spatio-temporal distribution is crucial for deriving the sea-ice mass balance, its long-term variability, and any trend. Access to robust observations is of great value as sea-ice motion and deformation quickly respond to environmental changes. To address this need, synthetic aperture radar (SAR) images have been matched into overlapping pairs separated by few hours or days, and analysed by tracking features for each pair via cross-correlation. Initial research showed that Envisat ASAR imagery obtained in the early part of the European Space Agency’s polar background mission was too sparse for use in deriving Antarctic sea-ice motion. Consequently ESA increased the image acquisition rate from September 2009. Here we present the first compilation of high-resolution (sub-kilometre) Antarctic sea-ice motion, and compare these data to historic drifting buoy-derived ice motion. We find that ice-motion vectors derived from the two methods exhibit a mean difference of -11%, with buoy-derived motion exceeding that derived from ASAR imagery. However, interannual variability in ASAR-derived ice motion for September in each of 2008, 2009 and 2010 in the Mertz Glacier region is substantial, with a standard deviation of 0.55 m/s across the region.