Biomass burning and fossil fuel combustion emit vast amounts of refractory black carbon aerosol (rBC) into the global atmosphere. These particles impact climate directly by absorbing solar radiation and indirectly by decreasing snow pack albedo and influencing cloud cover. Transported and deposited to Antarctica, rBC preserves a history of Southern Hemisphere (SH) emissions and atmospheric circulation. Here, we present subannual resolution rBC ice records spanning the 20th century from the West Antarctic Ice Sheet and Law Dome, East Antarctica. The records were developed using a unique ice-core melter rBC analysis system. This system determines the individual masses of rBC particles from the incandescent light emitted as rBC reaches its boiling point (~3700 to 4300K) inside an intracavity laser. Concentrations of rBC found in the two records were correlated and consistent with incursions of rBC into East and West Antarctica during the SH dry season (June to November). On a decadal scale, the records are similar to recent rBC emission inventories, which show 20th century changes in SH emissions due to changes in hydro-climate, land-use activity and fossil fuel combustion. Changes in the rBC aerosol mass spectrum were also evident and may reflect the mixing of rBC from fossil fuel combustion with rBC from biomass burning.