The goal of this investigation was to examine how sediment accretion and organic carbon (OC) burial rates in mangrove forests respond to climate change. Specifically, will the accretion rates keep pace with sea-level rise, and what is the source and fate of OC in the system? Mass accumulation, accretion and OC burial rates were determined via Pb-210 dating (i.e. 100 year time scale) on sediment cores collected from two mangrove forest sites within Everglades National Park, Florida (USA). Enhanced mass accumulation, accretion and OC burial rates were found in an upper layer that corresponded to a well-documented storm surge deposit. Accretion rates were 5.9 and 6.5 mm yr\(^{-1}\) within the storm deposit compared to overall rates of 2.5 and 3.6 mm yr\(^{-1}\). These rates were found to be matching or exceeding average sea-level rise reported for Key West, Florida. Organic carbon burial rates were 260 and 393 g m\(^{-2}\) yr\(^{-1}\) within the storm deposit compared to 151 and 168 g m\(^{-2}\) yr\(^{-1}\) overall burial rates. The overall rates are similar to global estimates for OC burial in marine wetlands. With tropical storms being a frequent occurrence in this region the resulting storm surge deposits are an important mechanism for maintaining both overall accretion and OC burial rates. Enhanced OC burial rates within the storm deposit could be due to an increase in productivity created from higher concentrations of phosphorus within storm-delivered sediments and/or from the deposition of allochthonous OC. Climate change-amplified storms and sea-level rise could damage mangrove forests, exposing previously buried OC to oxidation and contribute to increasing atmospheric CO2 concentrations. However, the processes described here provide a mechanism whereby oxidation of OC would be limited and the overall OC reservoir maintained within the mangrove forest sediments.

Keywords: Mangrove forest; Sediments; Organic carbon; Sea level; Storms; Climate change