Interactive comment on "Mangrove habitats provide refuge from climate change for reef-building corals" by K. K. Yates et al.

Anonymous Reviewer

General Comments:

This clearly written paper describes an unusual (or possibly under-reported) habitat occupied by zooxanthellate corals – among the prop roots of mid- and outer-bay mangroves of small tropical islands. The research team recorded observations of specimens or colonies representing more than 30 taxa of stony corals growing on or under mangrove prop roots in Hurricane Hole, St. John, US Virgin Islands. The authors measured a suite of physical and chemical parameters in inner-bay mangroves that lack associated corals, in mid- and outer bay mangroves with associated corals, and rock outcrops with unshaded corals.

The title of the paper might be more appropriately phrased as a question rather than as a statement. Moreover, while the authors measured a variety of chemical parameters, their observations support previous reports that shading is an extremely important factor in protecting corals from higher temperatures. Mangroves are consistent sources of colored dissolved organic matter (CDOM), which attenuates shorter, more damaging blue to ultraviolet wavelengths of light (see Zepp et al. 2008 or Ayoub et al. 2012 and references therein), and thereby can substantially reduce photo-oxidative stress that induces bleaching (e.g., Fitt and Warner, 1995). In this respect, corals living in proximity to mangroves are protected from the highest energy solar radiation by CDOM, just as mesophotic corals are protected by water depth. The major difference, which is critically important for the survival of shallow-dwelling coral species, is that many shallow-water species don't live in mesophotic habitats. So even if the authors' data may not be particularly strong with respect to ocean acidification, their observations should be very useful to reef-resource management because they reinforce previous work concluding the critical importance of mangroves and CDOM. Although local management practices may not be able to protect coral reefs from ocean acidification, they can protect coral species from extinction by keeping mangrove shorelines intact.

Specific Issues:

a. What is the mineralogy of the "rock outcrops"? Are they limestone or igneous/ metamorphic? That is important to understanding how the substrata can influence local seawater chemistry, as well as the texture and mineralogy of the sediments.
b. Are there similar chemical and physical data available for reef sites in the general area? If so, this could contribute to understanding what environmental parameters associated with the mangrove habitat are particularly favorable to the corals.

Technical correction and suggestion:

Section 2.1 Seawater chemistry, line 10, fourth word should be “were” (not “was”).

Tables would be more readable if data were centered below headings (other than in the left column).

References:

Ayoub, L.M., Hallock, P., Coble, P.G., Bell, S.S. 2012. MAA-like absorbing substances in Florida Keys phytoplankton vary with distance from shore and CDOM: Implications for coral reefs. JEMBE 420:91-98. DOI: 10.1016/j.jembe.2012.03.026

Fitt, W.K., Warner, M.E., 1995. Bleaching patterns of four species of Caribbean reef corals. Biol Bull 189:298–307

Zepp, R.G., Shank, G.C., Stabenau, E., Patterson, K.W., Cyterski, M., Fisher, W., Bartels, E., Anderson, S.L., 2008. Spatial and temporal variability of solar ultraviolet exposure of coral assemblages in the Florida Keys: importance of colored dissolved organic matter. Limnol Oceanogr 53:1909–1922