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Interactive comment on "Linking climatic-driven iron toxicity and water stress to a massive mangrove dieback" *by* James Z. Sippo et al.

Anonymous Referee #2

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Although the scientific aspect of the paper by Sippo et al is quite novel, the reasoning of mangrove dieback due to Fe toxicity, drought period and strong ENSO is quite speculative that requires more careful handling before being conclusive.

Since 1985, drought condition during the occurrence of 7 El Nino events affected dead mangroves (34 $\pm$ 1 years old), in contrast to the living mangroves which are younger (21 $\pm$ 4 years old) are survived to 4 El Nino events in Gulf of Carpentaria. Ir was seen that Fe peak in the dead mangrove area at the time of tree mortality were 30 to 90 fold higher than baseline in contrast to the living mangrove which showed an Fe peak 25 fold higher than baseline. Authors argued that low sea level and low rainfall/groundwater reduced soil water content, leading to oxidation of Fe sulphide minerals and release of Fe2+. Fe was observed in the upper intertidal zone. Even in absence

of El Nino event, these Fe bearing-phases dissolution can occur in suboxic conditions in mangrove ecosystems. On the one hand, crab burrow and root system may induce these conditions allowing the renewal of electron acceptors with tides; and on the other hand, physiological activities of mangrove root system can lead to increased O2 concentrations in the sediment (Aquat. Bot. 89 (2), 210–219, 2008). Generally, roots absorb Fe+2 and is highly affected by several plant and environmental factors and their toxicity is often associated with salinity and a low phosphorus or base status of soils. Furthermore, injured leaves or necrotic spots on leaves indicate an accumulation of Fe above 1000 ppm (3 to 6 times as high as the Fe content of healthy leaves). However, the most pronounced symptom is the ratio of Fe to other elements and to heavy metals in particular. The proper Fe:Mn ratio seems to be the most obligatory factor in the tolerance of plants to Fe toxicity.The world average Fe (μg g-1) conc in Avicennia marina is estimated to be 54000 (Lewis et al. 2011, Bayen 2012), and 120000 in New Caledonia, the South-West Pacific Ocean (Marchand et al. 2016). The increased uptake of Fe+2 in toxic level by the mangrove root system may reduce growth, DNA damage as evident by morphological or structural damage. Authors could highlight above aspects in their paper by comparing a possible impact of iron and substrate factors on mangrove that would be very relevant in this specific context.

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