We thank Dr. L. Barbara (Referee #1) for his constructive review of our manuscript. To facilitate the discussion, we copied his comments below in black and inserted our responses in blue.

The manuscript by Chiessi and colleagues seeks to reconstruct oceanic and atmospheric thermal conditions in the southeastern South America region, as evidence for changing climate during Termination 1. In general the manuscript is well presented, well-written, and with comprehensive literature support. The finding that the marine temperature appear to be associated with AMOC strength, and that changes in the continental temperature in this region are synchronous with atmospheric CO2, are interesting. In general, I am very much in favor of this paper which is within the scope of Climate of the Past. Before publication, however, I would like the authors to consider these 2 major points listed below.

1. My overall concern is that the results and discussion sections are brief and could be more informative. Chiessi et al. present a really interesting high-resolution data set of the Termination 1. However the authors discuss only the (multi-)millennial scale variability when the data show interesting multicentennial scale variability. I would like the authors to complete the results and discussion sections in term of centennial scale variability, particularly the opposite centennial trend between SST and MAT during the HS1: For example, high SST occur when minima in MAT occur at 16.5 and 15 cal ka BP. SST drop Vs MAP sharp increase at 15.5 cal ka BP. How the authors can explain this opposite thermal evolution during HS1 between the continent and the BC? In this way, I would like the author to give more details about regional ocean-atmosphere interactions at millennial and centennial time scale.

Uncertainties intrinsic to (i) radiocarbon based age models, and (ii) our sea surface temperature and mean air temperature proxies call for caution while interpreting and correlating multi-centennial-scale variability to other records. Thus, we prefer to limit our interpretation to the main features present in our records that are robustly supported. This is the case, for instance, of the marked negative anomaly in our sea surface temperature record around 15.5 cal ka BP. It has been described in the results but not appropriately addressed in the discussion. We agree that giving more attention to it in the discussion will improve our manuscript, particularly considering new high temporal resolution records like Martrat et al. (2014. Quaternary Science Reviews). We will implement this suggestion in the revised version of our manuscript.

We examined a putative anti-phased behavior between our sea surface temperature and mean air temperature records. Since a scatter plot between both records shows no inverse correlation (Fig. 1) we do not have support to discuss this topic in more detail.

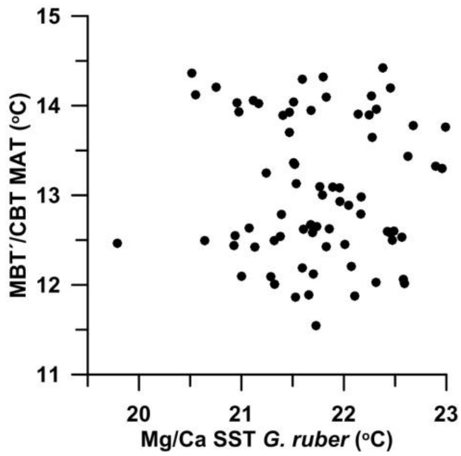

Fig. 1. GeoB6211-2 Methylation Branched Tetraether (MBT') and Cyclisation Branched Tetraether (CBT) based mean air temperature (MAT) vs. GeoB6211-2 *Globigerinoides ruber* (white) Mg/Ca based sea surface temperatures (SST) from 18.8 until 14.1 cal ka BP (the time window for which both datasets show similar temporal resolution). Before plotting, both datasets were linearly interpolated with a step of 65 yr starting at 14.1 cal ka BP.

2. Following the previous studies, the slowdown of the AMOC during HS1 has been presented as responsible of the heat retention in the Southern Hemisphere. This is not strictly the case as explained by Mayewski el al., 2009. Those authors describe that changes in the Antarctic ice sheet, sea ice extent, and Antarctic Circumpolar Current (ACC) position can also affect Southern Hemisphere heat retention and ocean circulation. The Brazil-Malvinas Confluence is connected with the ACC. Several studies in Antarctic Peninsula have shown that the winter sea ice edge, cold fresh water discharged, Iceberg runoff would have driven the latitudinal position of the ACC in the South Atlantic Ocean during the Termination 1. In this way, a change in ACC position would have affected the latitudinal position of the Brazil-Malvinas Confluence and affected the SST of the BC. I suggest that the teleconnection between the high latitude and the mid-latitude should have to be taken on board during this period. I would like to ask the authors to consider their interpretations of the SST changes in light of the studies about the ACC evolution during the Termination 1. Maybe the authors could compare their results with the SST reconstruction of Bianchi et al., 2004 (EPSL) or the Icebergs discharge reconstruction of Weber et al., 2014 (Nature).

The paleoclimatic section from Mayewski et al. (2009. Reviews of Geophysics) rather deals with the Holocene. However, in the introductory section "1. Prelude to recent climate", the authors briefly discuss millennial-scale changes of the last glacial/deglaciation. More specifically, the authors suggest, "The cause(s) of these millennial-scale climate events are not fully understood, but slowing of the MOC has been attributed to North Atlantic meltwater flood events and/or to massive iceberg discharges (Heinrich events) that slow the formation of North Atlantic Deep Water. Changes in the Antarctic ice sheet and sea ice extent can also affect Southern Ocean heat retention and ocean circulation [Stocker and Wright, 1991; Knorr and Lohman, 2003]." Although we see no fundamental contradiction to our view of HS1, we agree that encompassing the potential influence that changes in the Southern Ocean may have over our records (see below) will strengthens the manuscript.

The Brazil-Malvinas Confluence is a major barrier for planktonic foraminifera (Boltovskoy et al., 1996. Marine Micropaleontology; 2000. Journal of the Marine Biological Association of the United Kingdom). To the north of the Brazil-Malvinas Confluence, subtropical species like *Globigerinoides ruber* and *Globigerinoides sacculifer* dominate the mixed layer of the warm and salty Brazil Current, while to the south of the Brazil-Malvinas Confluence, the uppermost water column is dominated by transitional species like *Globigerina bulloides* and *Turborotalita quinqueloba*. The presence of *G. ruber* throughout Termination 1 is an indicator that the Brazil Current always bathed our core site. Moreover, *Globorotalia inflata* $\delta^{18}O$ shows a ca. 2 ‰ change across the Brazil-Malvinas Confluence (Chiessi et al., 2007. Marine Micropaleontology; Voigt et al., 2015. Paleoceanography). In our core, *G inflata* $\delta^{18}O$ never reach the heavy values typical of the Malvinas Current during Termination 1 (Chiessi et al., 2008. Geology), if changes in global sea level are taken into account. Thus, we exclude a direct influence of the Brazil-Malvinas Confluence over our core site during Termination 1. Still, the Southern Ocean could indirectly affect our core site through the Benguela and South Equatorial Currents, with the signal eventually reaching the Brazil Current. Also, as discussed below, mean air temperatures over the La Plata River drainage basin may have been influenced by the Southern Ocean through an atmospheric teleconnection.

Because of the higher temporal resolution, we prefer to compare our results to Weber et al. (2014. Nature) instead of to Bianchi and Gersonde (2004. Earth and Planetary Science Letters).

Regarding mean air temperatures, the multi-model experiment from Weber et al. (2014. Nature) suggests a cooling over southern South America (i.e., to the south of 30°S) as a response to an Antarctic meltwater pulse. The cooling amounts to ca. 1.0°C over the southernmost portion of the La Plata River drainage basin, whereas the temperature anomaly over the rest of the basin is not shown. As mentioned in section 3.5 of our manuscript, we expect our mean annual temperature record to represent an integrated signal over the La Plata River drainage basin with a predominant contribution from its northwestern domain. The absence of most of the La Plata River drainage basin, including its northwestern domain, on the modelling results from Weber et al. (2014. Nature) hampers a direct evaluation of the impact that an Antarctic meltwater pulse may have had over our mean air temperature record. However, the two most prominent events of increased flux of iceberg-rafted debris at the Scotia Sea (a proxy for Antarctica meltwater pulse) recorded during Termination 1 (Weber et al., 2014. Nature) (i.e., Antarctic Ice Sheet discharge (AID) event 7 between 16.91 and 15.75 cal ka BP, and AID6 between 14.86 and 13.94 cal ka BP) partially correlate with negative anomalies in our mean air temperature record, given age model uncertainties (Fig. 2). Accordingly, we will add this remark to the revised version of our manuscript.

Regarding sea surface temperatures, the multi-model experiment from Weber et al. (2014. Nature) also suggests a cooling for the uppermost ca. 1000 m of the water column of the subtropical South Atlantic as a response to an Antarctic meltwater pulse. The cooling amounts to ca. 0.5°C at the uppermost water column, where we expect our sea surface temperature signal to come from. Indeed, our sea surface temperature record shows minor (i.e., ca. 0.5°C) decreases around peak iceberg-rafted debris fluxes within AID7 and AID6. Thus, Antarctic meltwater pulses may have contributed to the variability of sea surface temperatures of the subtropical domain of the Brazil Current on top of the mechanisms described in our manuscript. We will incorporate this notion to the revised version of the manuscript. However, the ocean temperature modelling results shown by Weber et al. (2014) relate to a zonally averaged meridional transect, and has to be compared with caution with our sea surface temperature record that comes from the westernmost portion of the subtropical South Atlantic.

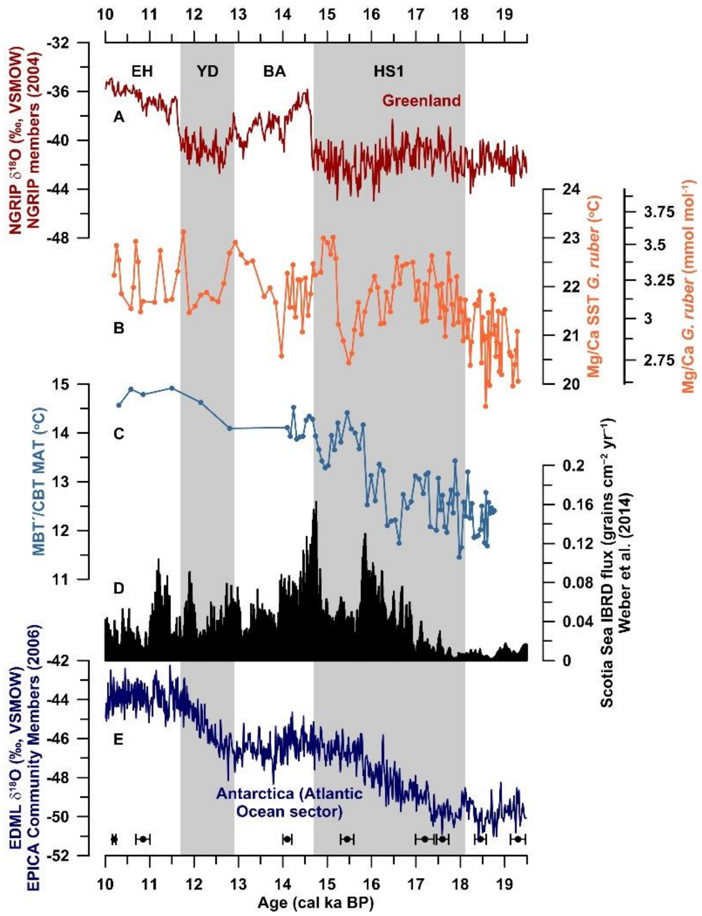

Fig. 2. Millennial-scale variability of the sea surface temperatures of the Brazil Current and mean air temperatures of southeastern South America spanning Termination 1 compared to selected circum-Atlantic records. (a) North Greenland Ice Core Project (NGRIP members, 2004. Nature) δ^{18}O plotted vs. the Greenland Ice Core Chronology 2005 (GICC05) (Rasmussen et al., 2006. Journal of Geophysical Research). (b) GeoB6211-2 *Globigerinoides ruber* (white) Mg/Ca and Mg/Ca based sea surface temperatures (SST). (c) GeoB6211-2 Methylation Branched Tetraether (MBT') and Cyclisation Branched Tetraether (CBT) based mean air temperature (MAT). (d) Stacked iceberg-rafted debris (IBRD) flux record from the Scotia Sea (Weber et al., 2014. Nature). (e) EPICA Dronning Maud Land (EPICA Community Members, 2006. Nature) δ^{18}O plotted vs. its original chronology. Black symbols at the bottom of the panel depict calibrated radiocarbon ages used to produce the age model for GeoB6211-2.Grey vertical bars depict Heinrich Stadial 1 (HS1) (Sarnthein et al., 2001) and the Younger Dryas (YD) (Rasmussen et al., 2006). BA: Bølling–Allerød; EH: early Holocene.