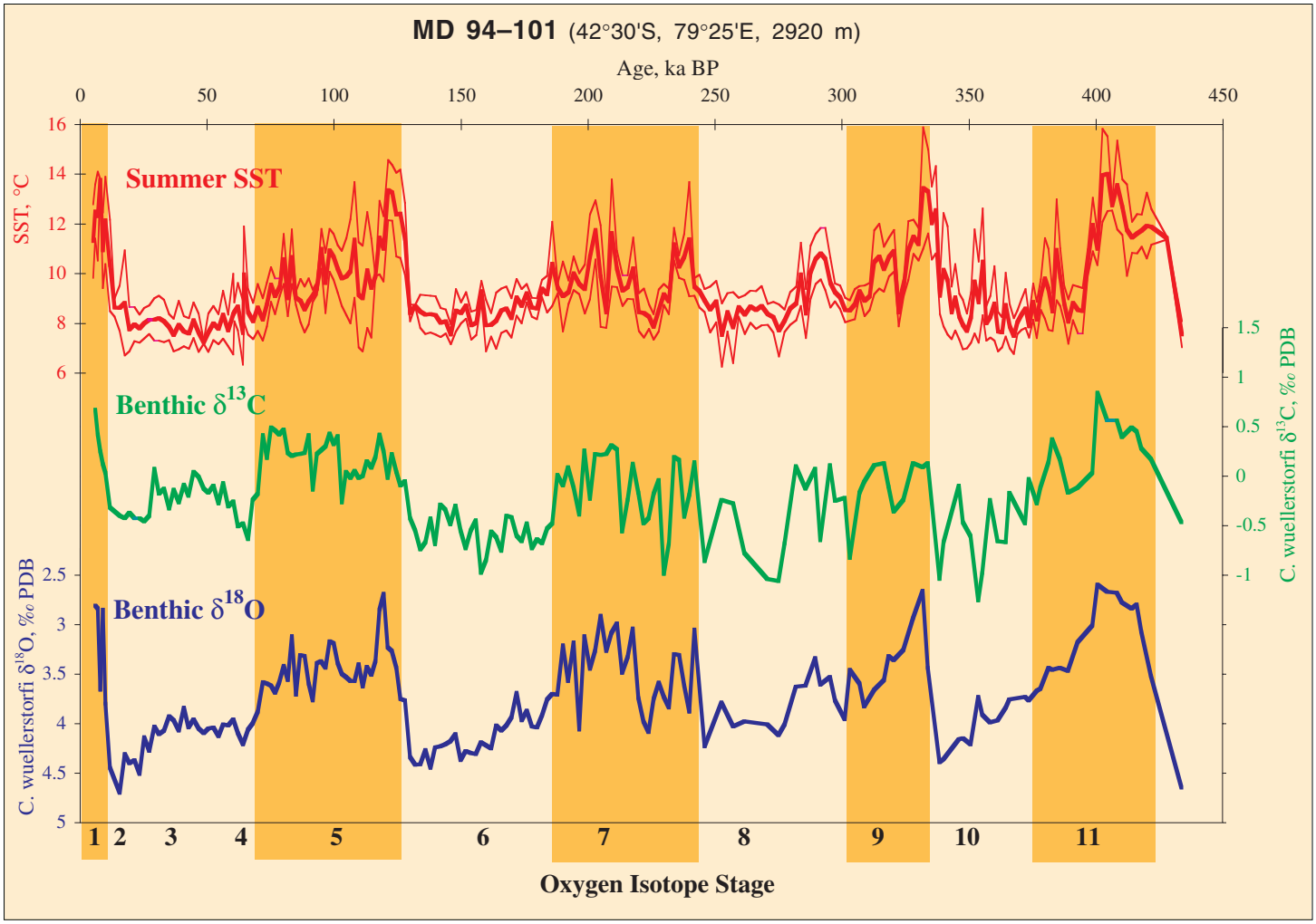

Figure 6: Time series of summer SST and isotopic measurements from marine core MD 94–101.

Southern Ocean Core MD 94–101

This core is located just north of the subtropical convergence, in the Indian sector of the Southern Ocean. SST is reconstructed from planktonic foraminiferal assemblages (Salvignac, 1998) by the revised analog method (Waelbroeck et al., 1998). Benthic foraminifera $\delta^{18}O$ and $\delta^{13}C$ are expressed in per mil versus the Pee Dee Belemnite (PDB) standard. Isotope measurements were made at the LSCE (Gif, France) on a Finnigan MAT 251 mass spectrometer (Lemoine, 1998). The mean external reproducibility (1 s) of carbonate standards is 0.05‰ and 0.02‰ for $\delta^{18}O$ and $\delta^{13}C$, respectively. These records have been dated by correlating the *Cibicides wuellerstorfi* $\delta^{18}O$ with the SPECMAP $\delta^{18}O$ stack of Bassinot et al. (1994). Marine isotope stages are indicated for reference.

C. wuellerstorfi $\delta^{18}O$ reflects variations in global ice volume, whereas its $\delta^{13}C$ is an index of deep water nutrient content (or ventilation): heavy $\delta^{13}C$ values representing well ventilated waters (or nutrient-rich waters), and vice versa. Visual inspection of these three records indicates that, in this region, increases in summer SST lead decreases in global ice volume and increases in deep water ventilation. This is confirmed by spectral analysis: SST leads deep water $\delta^{18}O$ and $\delta^{13}C$ by approximately 3 ky in the precession and obliquity bands, and by 3–7 ky in the 100 ky band. Our records thus show that deep water ventilation in this region is directly related to variations in the global ocean circulation, itself directly linked to variations in the global ice volume on glacial-interglacial time scales. On the other hand, the lead of SST with respect to benthic $\delta^{18}O$ in core MD 94–101 is of the same order as that found in core MD 88–770 (46°01'S, 96°28'E, 3290 m), located further south, in the Subantarctic front area (Labeyrie et al., 1996). Waelbroeck et al. (1995) demonstrated that MD 88–770 SST record is in phase with the Vostok air temperature signal over the two first climatic cycles. Consequently, SSTs from the entire region between the present-day Subantarctic and Subtropical fronts appear to be in phase with Vostok air temperature, suggesting that this latitudinal band could be a source of water vapor for the precipitation falling on Vostok.

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