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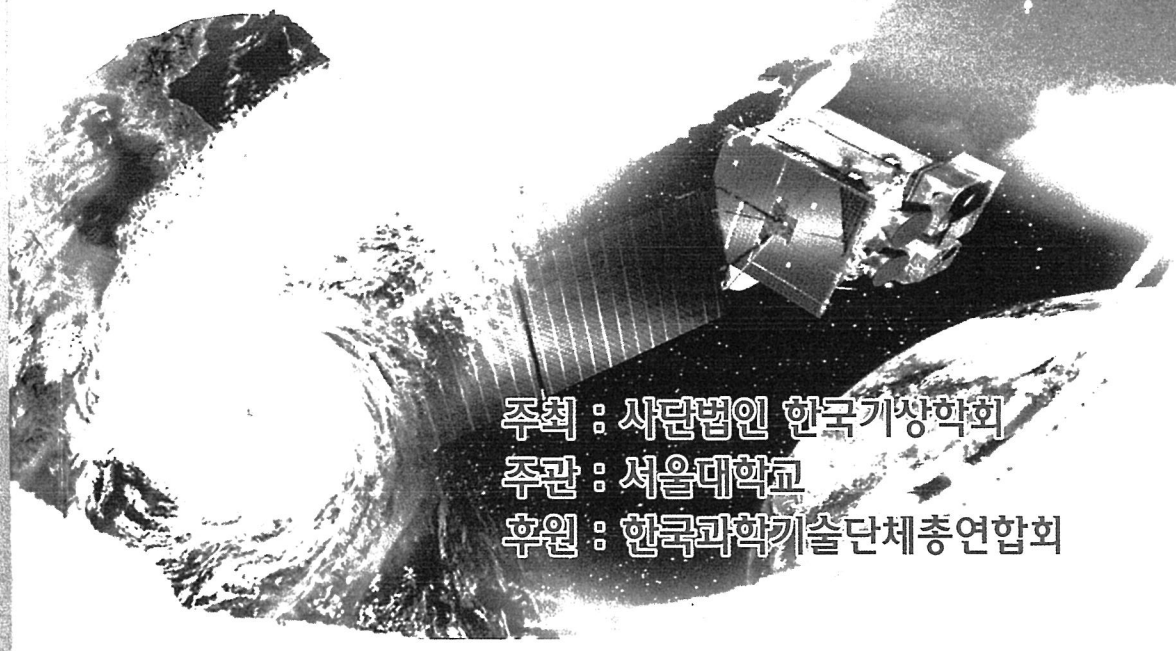

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CGCM2 and about 20% in CCM3 at the modern position of the maximum wind. Another notable feature is the movement of the mean position of the maximum westerly winds towards the equator by roughly 3-4 degrees. This is consistent with proxy estimates (Sigman and Boyle, 2000).

The weakening of westerlies in the LGM is due to a reduction in meridional pressure gradient. In the LGM, MSLP substantially increases in high southern latitudes by more than 10 hPa, while in the subtropical high pressure system, MSLP is reduced in both experiments. The MSLP reduction in the low pressure system is larger in the CGCM2 case by more than 10 hPa than in CCM3. The change in MSLP in the LGM is associated with the change in surface air temperature (SAT). Upon implementation of glacial boundary conditions, SAT decreases remarkably towards the high southern latitudes. In CCM3, SAT decreases sharply at 50°S by up to about 18°C, while in CGCM2 SAT decreases rather gradually towards Antarctica. The larger SAT reduction in CCM3 in subpolar latitudes is in part due to a larger sea ice extent which was specified based on reconstruction (CLIMAP, 1981). In both experiments, the surface cooling is larger in tropics than in subtropics, associated with cold tongues in the equatorial Pacific and Atlantic where enhanced trade winds lead to a stronger equatorial upwelling (Kim et al., 2003). A similar feature is found in the LGM SST reconstructions (CLIMAP, 1981). This result suggests that the increase of sea ice in the SO is associated with the increase in surface pressure and at the same time pushes the low pressure center slightly toward the equator, eventually weakening the SH westerlies.

4. Conclusion

In conclusion, with the implementation of glacial boundary conditions the southern hemisphere westerly winds are weakened and displaced to the north due to the increase in surface pressure around Antarctica associated with the marked surface cooling.

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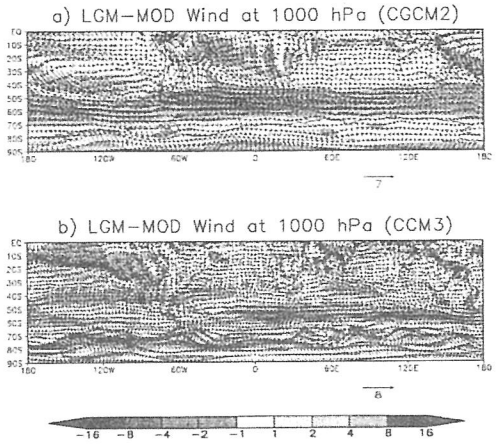

Figure 1. Geographic distribution of the change in annual mean wind vectors at 1000 hPa with wind magnitude between MOD and LGM for a) CGCM2 and b) CCM3. Units are in m s^{-1}.

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