

The mineralogical evidence of the existence of two mass sources along a traverse route from Zhongshan Station to Dome A, Antarctica

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In the Antarctic summer of 1998/1999, the third Chinese Trans-Antarctic inland glaciological scientific expedition successfully entered Dome A area and extended its research to the site of 79°16'S, 77°00'E, 3,931 m.a.s.l., 1,128km away from Zhongshan station. In our former studies, we have presented the results of chemical analysis of surface snow samples collected from the traverse route. These results provide an evident transitional site (DT263, 76°32.5'S, 77°1.5'E, 2800 m.a.s.l.) approximately located at 820km away from Zhongshan Station (coast) with the elevation of 2800m. Meanwhile, our former climatic record study of an 80 meter DT263 ice core drilled at this site also suggests the site is influenced by interaction of maritime and continental climates.

The present study, by using scanning electron microscopy equipped with energy dispersive X-ray detector (SEM-EDX), analyses the individual particle characteristics and mineral composition of insoluble particles in surface snow along the same traverse route. It is revealed that the insoluble particles are mainly composed of "Si-rich" particles with the irregular shape. The content of "Si-rich" particles in surface snow collected from high altitude region is high, but that in surface snow collected from low altitude region is relatively low. This difference is due to atmospheric circulation. The high altitude region is affected by large-scale circulation with longitude-direction, and that insoluble particles in surface snow come from faraway sources. The low altitude region is mainly affected by strong cyclones at peripheral region of the ice sheet, and insoluble particles mainly come from coastal area. The demarcation area is approximately equivalent to the transitional site discovered by our former studies. This further confirms the existence of the transitional site.