



Salt inclusions in polar ice core: Location and chemical form of water-soluble impurities

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Recently, we reported the first finding of water-soluble salt inclusions in the Dome Fuji Antarctic ice (Ohno *et al.*, 2005). We observed micro-inclusions in ice sections under an optical microscope. These inclusions were typically a few micrometers in diameter and generally away from ice grain boundaries. We investigated chemical compositions in the inclusions by micro-Raman analysis. The micro-inclusions are mainly composed of the sulfate salts $\text{Na}_2\text{SO}_4 \cdot 10\text{H}_2\text{O}$, $\text{MgSO}_4 \cdot 12\text{H}_2\text{O}$, and $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$. Methane-sulfonate-salts and other complex salts were also found only in the glacial-period ice. We estimated the total amount of ions that comprised the sulfate salts and found that substantial portions of soluble impurities were trapped in the inclusions. These findings have considerable implications for considering the post-depositional modification and redistribution of soluble impurities that we have used as proxies for past climate. Also, the new facts will be the bases for understanding several physical aspects of polar ice.

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