

-22 Atmospheric Tracer and Radiochronometer

The aerosol monitoring component of the International Monitoring System (IMS) was principally designed to detect atmospheric nuclear testing for the Comprehensive Nuclear-Test-Ban Treaty (CTBT). Beyond the CTBT applications, IMS radionuclide data also has important Earth science research applications such as climate change, meteorology, solar cycle impacts on terrestrial processes, etc. Na-22 and Be-7 are two natural radionuclides produced in the stratosphere through cosmic ray spallation with atmospheric gases. While Be-7 is extremely easy to measure, Na-22 is produced in such minute quantities that it is rarely observed when there is strong vertical atmospheric transport. Using a spectral summation technique, it is possible to detect the Na-22 signal. By comparing the Na-22 signal with Be-7 concentrations it is possible to investigate solar cycle impacts on these natural radionuclides and possibly provide information on the airborne transport pathway of air masses. The relative concentrations of Be-7 and Na-22 function as a radiochronometer providing information on transit time from the site of production (stratosphere) to the observing site. This type of information is important for understanding the 3D motion of the atmosphere which is also important to CTBT.

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