

of IMS Data and Its Potential for Research Through Global Noble Gas Concentration Maps

CTBTO is establishing a global monitoring system for atmospheric xenon radioactivity as part of the International Monitoring System (IMS). Daily activity concentrations have been collected worldwide for over 15 years, of which the past 5 years with reviewed results in IDC Operations, providing unique data sets with long term time series that can be used for the identification of regional sinks and sources and to analyse atmospheric circulation dynamics on the time-scale of the radioxenon isotope half-life (between 9 hours and 11 days). In this study, we use the worldwide noble gas observations at IMS stations for reconstructing global Xe-133 concentration maps. This reconstruction is compared with ATM simulations based on known sources. By creating a residual plot, we can optimize the rendering process of the reconstruction map and improve the understanding of the source estimation on a regional basis. The motivation of this work results from the need to get a better understanding of the global distribution of the activity releases from radioxenon background sources to enhance the Treaty monitoring capabilities. Moreover, this study highlights the unique value for civil and scientific applications that is accrued in more than 15 years of worldwide IMS data on atmospheric radioactivity concentrations.

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