

Noble gas isotope studies of Ningwu Ore District, Middle-Lower Yangtze River polymetallic ore belt, East China

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Different causes, such as the atmosphere, the Earth's crust, mantle and sources of abundance and of the noble gas isotopic composition is significantly different. Typical ratio of helium in the Earth's crust $^3\text{He}/^4\text{He}$ is 10^{-8} , $^3\text{He}/^4\text{He}$ value of 10^{-5} of mantle helium, difference of nearly 1000 times.

So helium argon and other noble gas isotope has become a research of crust-mantle interaction, the tracer mantle fluid mineralization and different ore-forming fluid mixed effective means and the most sensitive tracer.

In this study, the concentration and isotopic compositions of noble gases were measured in pyrite and magnetite phenocrysts of 11 iron ore from Ningwu ore district Gaocun and Dongshan, $^3\text{He}/^4\text{He}$ ratio is $1 \text{ Ra} \sim 0.04 \text{ Ra}$, $^3\text{He}/^4\text{He}$ ratio of air 1.4×10^{-6} . The He isotopic study shows, the environment of different $^3\text{He}/^4\text{He}$ ratio, showed there was no With the same degree of deep fluid. Typical characteristics can be seen as the mantle fluid.

Model-predicted and satellite-retrieved tropospheric NO₂ columns over East Asia

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In this study, we attempted to evaluate NO_x emission fluxes over East Asia for the year of 2006, using CMAQ-predicted and OMI-retrieved tropospheric NO₂ columns. The two retrieved OMI products were taken from the Level-2 DOMINO product version 2 (using KNMI algorithm) and from the Level-2 OMNO2 product version 2.1 (using NASA algorithm). The two OMI products were well correlated ($R=0.98$ over Central East China). Also, averaging kernels (AKs) taken from each OMI product were applied to the CMAQ-predicted NO₂ columns (Ω_{CMAQ}) for the comparison analysis. The applied AK_{KNMI} (i.e. AK retrieved from the KNMI algorithm) to the Ω_{CMAQ} showed seasonally good correlations with the $\Omega_{\text{OMI,KNMI}}$ ($R=0.75$, slope=0.92). However, the Ω_{CMAQ} with the AK_{NASA} showed larger values than the $\Omega_{\text{OMI,NASA}}$ from the OMI observations despite of good correlation coefficient ($R=0.75$) because the AK_{NASA} are vertically even larger by factors of approximate 2 – 10 than AK_{KNMI} over Central East China (CEC). The differences between the Ω_{CMAQ} and Ω_{OMI} using the NASA algorithm were much larger than those using the KNMI algorithm during the winter episodes, whereas the differences were smaller using the NASA algorithm than those using the KNMI algorithm. In addition, this study investigated the large discrepancies between CMAQ-predicted and OMI-retrieved NO₂ columns during the winter episodes in terms of the seasonal variations of NO_x source and heterogeneous NO_x sink. First, the seasonal variation of the NO_x emissions influenced greatly in the tropospheric NO₂ columns. For example, when non-seasonal factors were applied to the CMAQ model simulation, the $\Omega_{\text{NO}_2,\text{CMAQ}}$ decreased by 38% over CEC regions during winter, compared to those from the our baseline simulation. For the latter, four parameterizations of gamma N₂O₅ were applied to the separate CMAQ model simulations during the cold seasons.