Indian nuclear facilities found to have radioactive influence on Southern Tibetan Plateau

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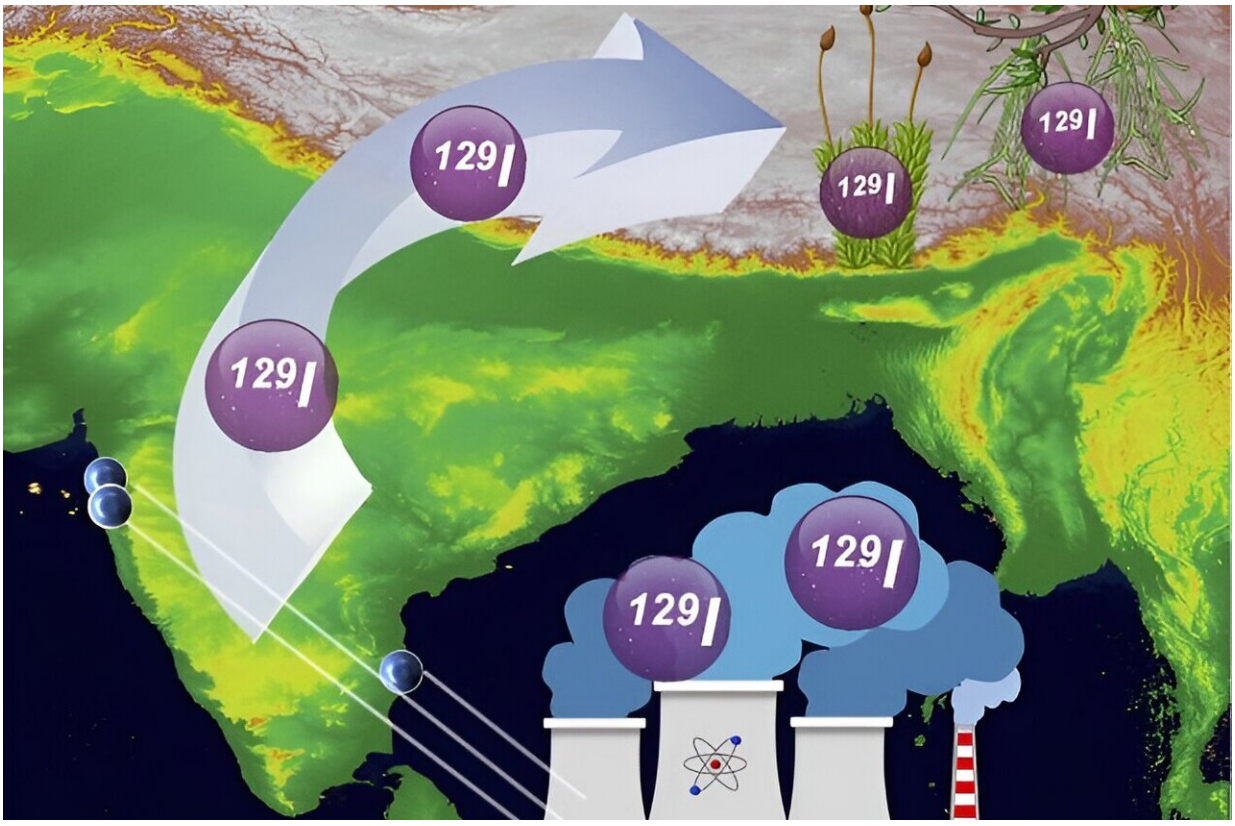

Radoiactive iodine-129 released from India's nuclear fuel reprocessing plants is transported to the southern Qinghai-Tibet Plateau by long-range transboundary transport. Credit: Zhang Luyuan

A study published in *Environmental Science & Technology Letters* has shed light on the long-range transboundary transport of radioactive iodine-129 (^{129}I) from the Indian nuclear fuel reprocessing plants (NFRPs) to the Southern Tibetan Plateau (STP).

This study, conducted by researchers from the Institute of Earth Environment of the Chinese Academy of Sciences (CAS), provides a new understanding of the transport of airborne radioactive pollutants from low to high altitudes, and may have implications for environmental protection on the Tibetan Plateau.

The Tibetan Plateau, known as the "Third Pole of the Earth" and the "Roof of the World," is a remote, isolated, and presumably pristine region. Previous studies of radioactive contamination have focused primarily on the northern TP, leaving little knowledge of the STP. Primarily originating from human nuclear activities, iodine-129, with its properties of high volatility and radiation risk of short-lived radioiodine, serves as a key radionuclide for nuclear environmental safety monitoring.

In this study, the researchers have meticulously investigated the spatial variation of ^{129}I in the bioindicators, moss and lichen, from the STP.

They found that ^{129}I in the STP was significantly higher than the pre-nuclear levels and those in Chinese inland cities, but two to four orders of magnitude lower than those in the vicinity of the Indian and European NFRPs.

Analysis of the ^{129}I discharge history in conjunction with the wind field

indicates that the Indian NFRPs are the primary sources of ^{129}I in the STP. The prevailing ISM plays a crucial role in the transport of ^{129}I from the lowland to the high-altitude STP. The transport process is further enhanced by the summertime overlying heat pump, but is weakened by topographic blocking, forest adsorption, and cold trapping.

The spatial distribution of ^{129}I and ^{127}I in lichens distributed on Mt. Galongla shows that the Yarlung Zangbo Grand Canyon serves as a key transport channel.

"It is much beyond our expectation that Indian NFRPs have such a significant impact on the Tibetan Plateau. Since there are many nuclear facilities in operation and under construction in India, the radiation risk is just there. So we still need more data to find out the extent and scope of such impacts," said Dr. Zhang Luyuan, corresponding author of this study.

More information: Luyuan Zhang et al, Long-Range Transboundary Transport of Iodine-129 from South Asia to the Southern Tibetan Plateau Revealed by Moss and Lichen, *Environmental Science & Technology Letters* (2024). DOI: 10.1021/acs.estlett.4c00058

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