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Linking Atmospheric Pollution to Cryospheric Change over the Third Pole Region: Current Research Status and Future Prospects

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Tibetan Plateau and its surroundings, known as the Third Pole (TP), is noted for its accelerated cryospheric degeneration and related shifts in hydrological cycles which affect Asian water supplies. Atmospheric pollutants contribute to climatic and cryospheric changes via mediating solar radiation and albedo of snow/ice surface, at the same time, their fates, cycles within cryosphere and environmental impact are rising concerns. Here we introduce a coordinated monitoring and research framework and network including over 30 monitoring sites to link atmospheric pollutants and cryospheric changes (APCC) over the TP (Figure 1), outlining its main research objectives, contents and protocols, aiming to quantify the composition, distribution, and transport pathways of atmospheric pollutants and to assess their effects on cryospheric changes over the TP. We review the up-to-date progresses and achievements in relation to the APCC research framework and propose future research priorities. We include several pioneer sites in polar regions and propose an extending program to a global scale. The ongoing monitoring network and research facilitates the most comprehensive studies on atmosphere-cryosphere interactions, represents one of the important China's efforts in the research expedition over the TP and polar regions, and also contributes to a global perspective of earth system science.