Aerosol residence times and iodine
gas/particle conversion over the North Pacific
as determined from Chernobyl radioactivity

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Radioactivity from the Chernobyl accident present on aerosols was measured at several island sites
and on a ship in the North Pacific. The radioactivity arrived at the various sites located from 11°–64°N
between 6–14 May 1986. Isentropic trajectory analyses and measurement of the natural radioactive
species 7Be and 222Rn indicate that the continental air containing Chernobyl fission products (e.g., 131I,
137Cs) was transported to the central North Pacific through the middle troposphere. We estimate
the residence time and gas-to-particle conversion times by combining the radionuclide data with surface
concentration estimates in Japan. The atmospheric residence time over the North Pacific for the aerosols
containing the fission products was 3–5 days. The calculated mean gas-to-particle conversion time for
radioactive 131I was 2–3 weeks, with a minimum of ~12 days. The results indicate that the radioactive
submicrometer aerosol and the iodine gas from the Chernobyl explosion have residence and conversion
times similar to those of naturally occurring aerosols and gases in the atmosphere.