Japanese PEat records of ATmospheric deposition of artificial radionuclides (J-PEAT): Impacts of Fukushima accident and implications for radiochronology

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Abstract

On March 11th, 2011, the most powerful earthquake in Japan history and the subsequent tsunami caused significant damages in the Fukushima-Daiichi Nuclear Power Plant. Artificial radionuclides were released into the environment and to the atmosphere, transported by air masses and deposited on continental surfaces. Despite their harmful effects in terrestrial ecosystems and potential risks to human health, few studies evaluated the total deposition of artificial radionuclides from this accident in low-impact (i.e. natural) areas.

Their exclusive atmospheric nutrients/pollutants supply and high binding capacity render peat bogs suitable to study radionuclide deposition. A reliable chronology of their records allows the temporal reconstruction of fluxes of atmospherically deposited elements. These fluxes can be used to obtain information on emission rates as well as global/local impacts on pristine environments. Japan has numerous relatively pristine peatlands that constitute ideal environments to investigate the immediate regional impact of the Fukushima-Daiichi accident.

The J-PEAT project will couple environmental geochemistry, pollution impacts and radioecology, to investigate the spatial and temporal variability of the atmospheric deposition of artificial radionuclides in Japanese low-impact areas using a multiproxy approach based on

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the analyses of peat cores. This innovative project will provide, for the first time, estimations of emission rates and total inventories of artificial radionuclide before and after the Fukushima-Daiichi accident. In this poster, we will present the first results of pre-Fukushima radionuclide and chemical element deposition in two peat sections from Hokkaido Island. We will also detail the future objectives of J-PEAT. For instance, the influence of long-range atmospheric transport on the distribution of the radionuclides will be evaluated and new environmental chronometers using artificial radionuclides will be discussed to develop a single approach as far back as the last 500 years, which will benefit the entire research community working on local and global environmental changes.