

Fukushima Dai-ichi and the Ocean: 10 years of study and insight Abstract Submission Form : Entry # 19

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Session

Consequences for the ocean

Abstract Title (English, limited to 300 characters)

Quantifying the transfers of radiocesium from Japanese land to the Pacific Ocean through the monitoring of coastal rivers draining the main plume and the deployment of sediment fingerprinting techniques

Abstract (English, limited to 2000 characters)

Significant quantities of radionuclides including a majority of radiocesium deposited on Japanese land following the FDNPP accident in March 2011. The main inland radioactive plume is drained by several coastal rivers to the Pacific Ocean. Since 2011, contaminated sediment has been progressively transferred from upland soils to coastal plains, with the majority of these transfers taking place during floods occurring in spring or following typhoons between July and October. Overall, radiocesium concentrations in sediment transiting these coastal rivers decreased by ~90% between 2011 and 2019. This very strong decrease is partly explained by the effectiveness of the remediation works undertaken by Japanese authorities on agricultural and residential land, with the removal of the 5-cm topsoil layer concentrating radiocesium and its replacement with locally extracted crushed granite material.

During the last decade, several original sediment fingerprinting techniques based on different diagnostic properties (e.g. organic matter properties, geochemical composition, environmental DNA) analysed in potential sources and in sediment were developed in these coastal catchments. They showed that cropland, forests and subsurface material originating from landslides and channel bank collapse delivered significant quantities of sediment to the river systems in this region, with their respective contributions showing significant spatial and temporal variations. These changes in the sources supplying sediment to the river network and, ultimately, to the Pacific Ocean impact the delivery of radiocesium to marine waters and its behaviour in this environment.

Future research should investigate the impact of restarting cultivation in this region and investigate the perennial supply of sediment and radiocesium originating from forests that have not been decontaminated to riverine and marine environments of

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the Fukushima Prefecture.