Temporal trends of radio-cesium concentration in the marine environment after the Chernobyl and Fukushima Dai-ichi Nuclear Power Plant accidents

EGU22 26 May 2022

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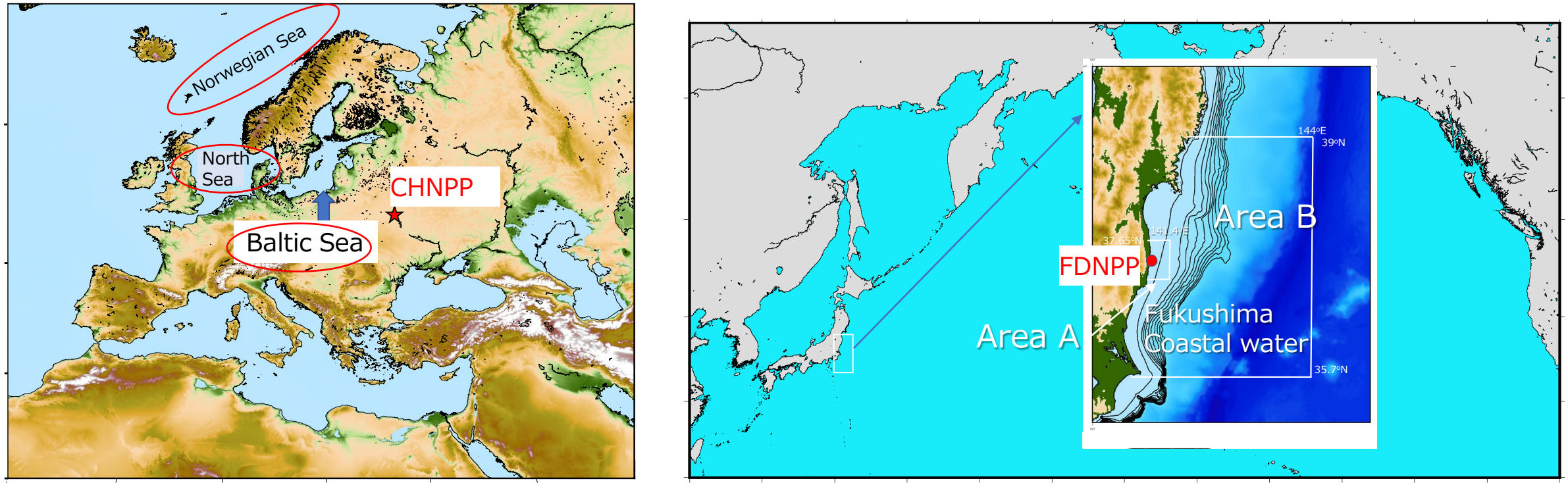

Figure 1 Study areas in (a) Europe seas (Lambert Azimuthal projection) and in (b) North Pacific and Japan Sea (Mercator projection) in which (c) coastal and offshore areas off Miyagi, Fukushima and Ibaraki prefectures, Japan. Red star in left hand and red circle in right hand indicate Chernobyl Nuclear Power Plant and Fukushima Nuclear Power Plant, respectively. All maps were made by the generic mapping tool software.

European seas such as, Baltic, North, and Norwegian Seas are mostly affected areas by the accident at the Chernobyl nuclear power plant (CHNPP) in 1986.

Since Fukushima Daiichi nuclear power plant (FDNPP) is located on the coast of the North Pacific Ocean in east Japan, its accident resulted in the release of large amounts of radiocesium to the surrounding coastal marine environment (i.e. the waters off Fukushima and neighboring prefectures).

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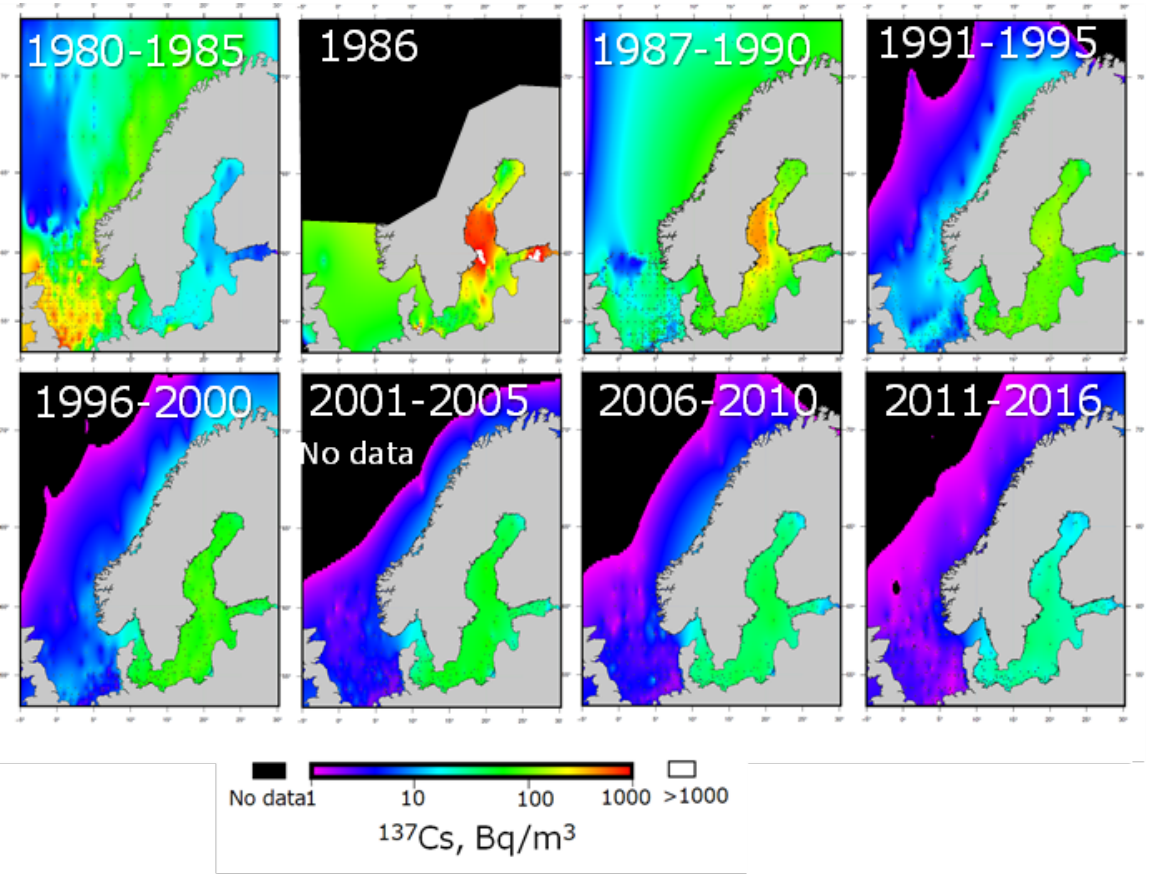

Figure 2 Averaged activity concentrations of ^{137}Cs in North, Norwegian, and Baltic seas for each five-year period (except data in 1986).

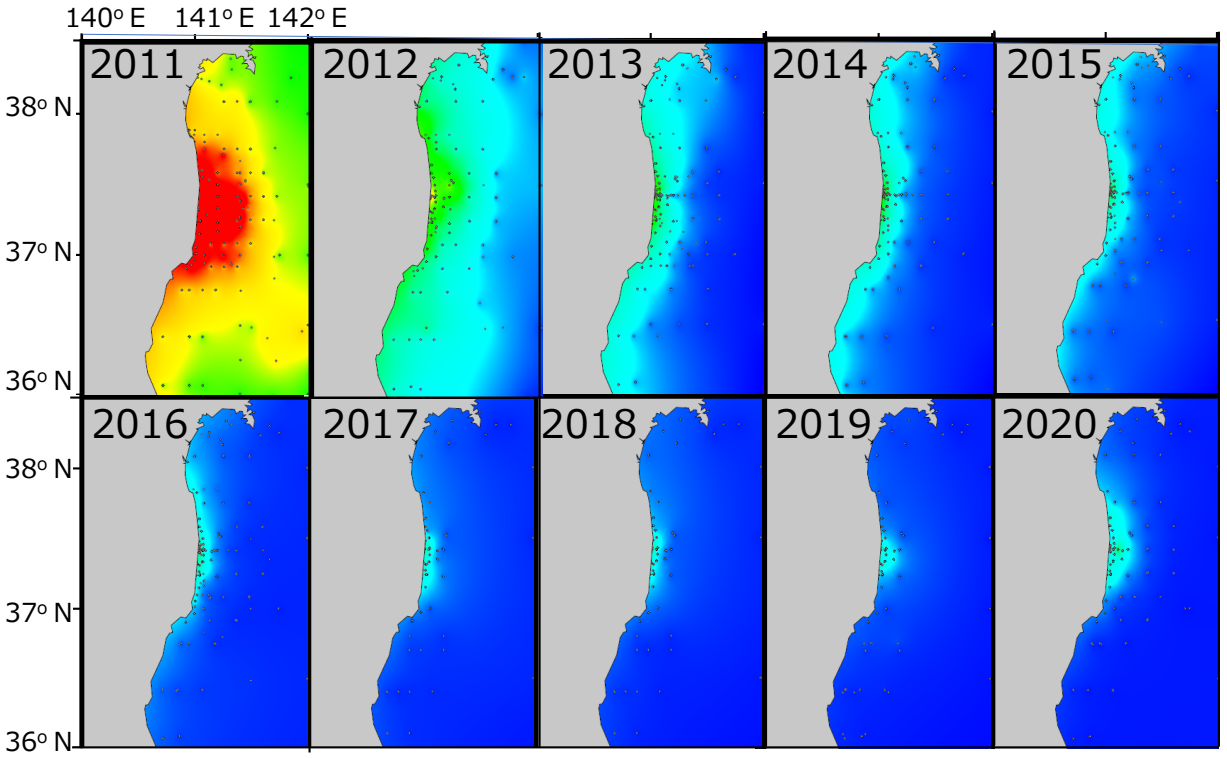

Figure 3 Annual mean of ^{137}Cs activity concentration in surface seawater off Miyagi, Fukushima, and Ibaraki prefectures.

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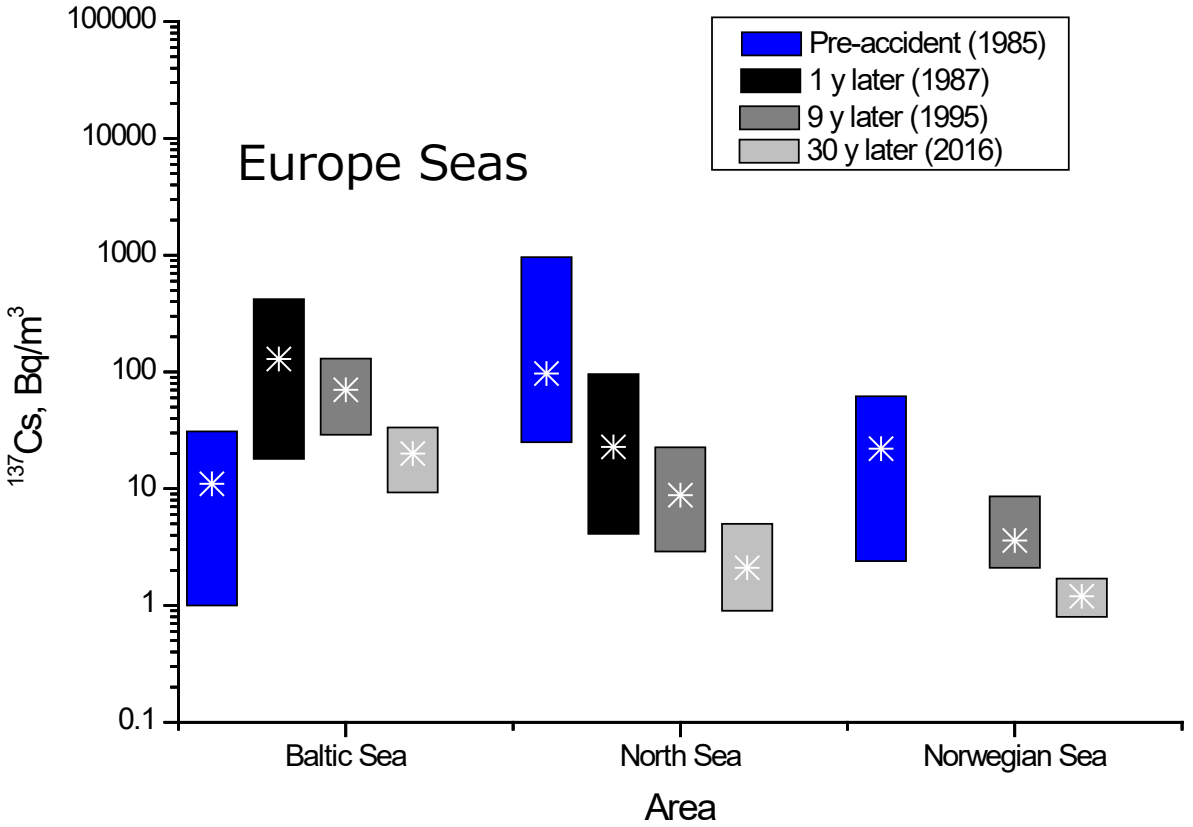

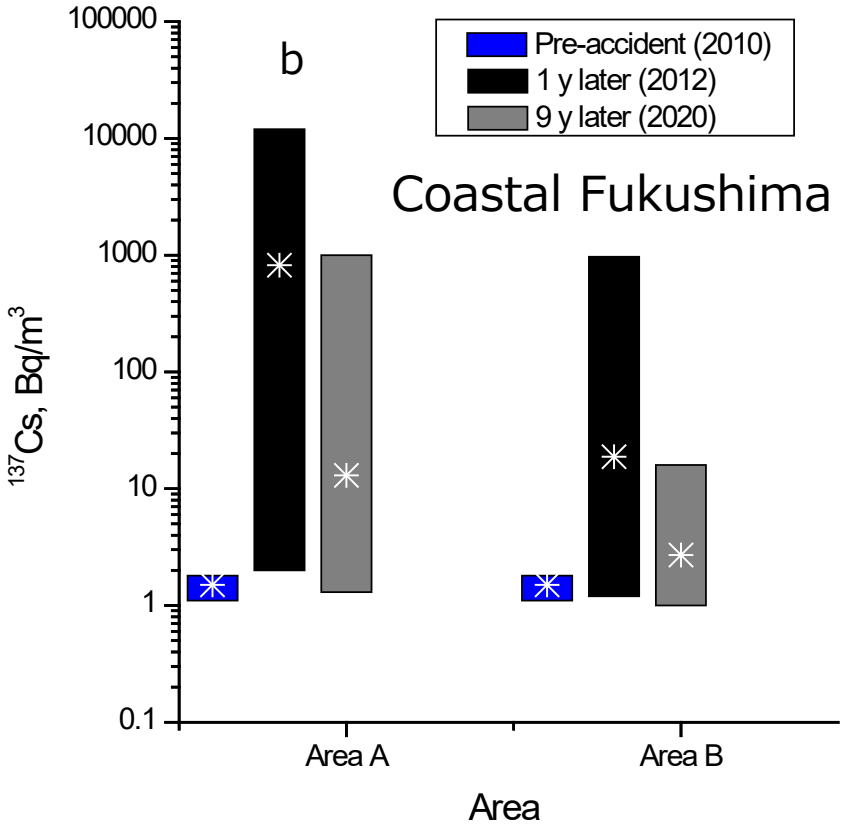

Figure 4 Minimum-maximam (bars) and annual means (asterisks) of ^{137}Cs activity concentrations in (a) European seas and (b) two areas off Miyagi, Fukushima and Ibaraki prefectures of Japan categorized in Figure 1. Pre-accident data for Norwegian Sea in 1985 were not able to be cited from MARIS, then data on 1984 were used. There were no data on 1987 in Norwegian Sea.

Although concentration of radioacesium (^{137}Cs) in the surface water of the Baltic Sea (central part) continuously decreased, the values in 1995, 9 years after the accident, were even higher than pre-accident level in 1985.

On the other hand, in the waters off Fukushima and neighboring prefectures ^{137}Cs concentrations in 2020, nine years after the accident, are approaching the pre-accident levels of 2010. The quick decrease is attributable to the intrusion or mixing of water masses with low ^{137}Cs.

Acknowledgment This research was funded by the Japan Society for the Promotion of Science, Grant-in-aid for Scientific Research (B) (21H03574).