



# STUDY OF RADIOACTIVITY IN ARCTIC MARINE SEAWEED FROM KONGSFJORDEN (SVALBARD)

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## INTRODUCTION

Levels of natural and anthropogenic radionuclides have been determined in six brown and red seaweed species from Arctic coasts (Kongsfjorden, Spitsbergen, Svalbard Islands) in order to characterize the radioactivity in this ecosystem.

### Natural radionuclides

The activity of the cosmogenic radionuclide is higher in *F. distichus*, the only specie inhabiting the intertidal zone, therefore, it is more exposed to <sup>7</sup>Be than the rest of the species

High activities of <sup>40</sup>K were observed in all species, as this is one of the essential elements in biota

The ratio <sup>228</sup>Ra/<sup>226</sup>Ra in seaweeds is an important indicator for studies of coastal water circulation

High content of <sup>210</sup>Pb in the red seaweeds, suggesting that they might possess a higher capacity for heavy metals bioaccumulation than the analyzed brown seaweeds



## MATERIALS AND METHODS

- ☞ Samples were collected in September 2014, August 2017 and July 2019.
- ☞ Levels of <sup>7</sup>Be, <sup>40</sup>K, <sup>208</sup>Tl, <sup>210</sup>Pb, <sup>226</sup>Ra and <sup>228</sup>Ra were measured by high-resolution gamma spectrometry. While anthropogenic radionuclides (<sup>14</sup>C and <sup>129</sup>I) were determined by low-energy accelerator mass spectrometry (LEAMS).



	<sup>7</sup> Be	<sup>40</sup> K	<sup>228</sup> Ra	<sup>226</sup> Ra	<sup>210</sup> Pb	<sup>14</sup> C	<sup>129</sup> I
	Bq Kg <sup>-1</sup>	Bq Kg <sup>-1</sup>	Bq Kg <sup>-1</sup>	Bq Kg <sup>-1</sup>	Bq Kg <sup>-1</sup>	mBq gC <sup>-1</sup>	mBq Kg <sup>-1</sup>
<i>Chorda filum</i>	<37	2410 ± 38	<5	<3	<19	-	-
<i>Saccharina latissima</i>	<7	1280 ± 21	<4	<2	<12	237 ± 2	(170 ± 0.1)·10 <sup>-1</sup>
<i>Fucus distichus</i>	26 ± 8	759 ± 15	6 ± 1	4 ± 1	<17	-	-
<i>Desmarestia aculeata</i>	<3	1260 ± 25	2 ± 1	4.4 ± 0.6	<8	-	-
<i>Phycodrys rubens</i>	<22	635 ± 15	9 ± 2	<5	130 ± 10	231 ± 2	(8.9 ± 0.3)·10 <sup>-2</sup>
<i>Ptilota gunneri</i>	20 ± 4	1530 ± 127	3.4 ± 0.9	2.3 ± 0.5	110 ± 22	237 ± 2	(3.7 ± 0.1)·10 <sup>-1</sup>
<i>Alaria esculenta</i>	10 ± 4	1080 ± 92	<3	0.28 ± 0.06	<12	242 ± 2	(3.3 ± 0.1)·10 <sup>-2</sup>

### Antropogenic radionuclides

- ☞ The activities of <sup>129</sup>I are two orders of magnitude higher than those found in algae collected on the Spanish Atlantic Coast and presents more variability than the <sup>14</sup>C results, indicating their different affinity to this element depending on the species.
- ☞ Radionuclide tracers discharged from Sellafield and La Hague are transported into the Arctic Ocean where they circulate at different depth levels, marking water of Atlantic origin (Karcher et al., 2012).



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## REFERENCE

- Karcher M.J., Smith J., Kauker, R., Gerdes, R. and Smethie, W.M. Recent changes in Arctic Ocean circulation revealed by iodine-129 observations and modeling. 2012. *J. Geo. Res. Atmos.* 117 (C8):8007.

