(13.5) Cosmic-ray irradiation of the atmosphere yields 0.036 ^{10}Be atoms cm^{-2} s^{-1}. If this ^{10}Be is rapidly carried down into sea water, which is assumed to have a volume of 1.4*10^{18} m^3, what will the equilibrium radioactivity of ^{10}Be in 1 m^3 sea water be? The earths surface is 510*10^6 km^2.

First define one Bq:

$Bq := sec^{-1}$

Then we need the volume of the sea and the area of the earth:

$V_{sea} := 1.4 \cdot 10^{18} \cdot m^3 \qquad A_{earth} := 510 \cdot 10^6 \cdot 1000^2 \cdot m^2$

The specific production rate given in the text is:

$Rate := 0.036 \cdot cm^{-2} \cdot sec^{-1}$

Decay rate = production rate must hold after a long time.

$Activity := \frac{Rate \cdot A_{earth}}{V_{sea}} \qquad Activity = 0.131 \cdot \frac{Bq}{m^3}$