Radioisotopes of significance to environmental radioactivity

**Tritium**

Why is it of interest?
- Extremely mobile isotope
- Easily transferred to any biological tissues, as tritiated water
- Potential for incorporation in DNA
- Major component of gaseous and liquid releases from nuclear power plants (with $^{14}$C)

**Behavior in the Environment**
- Three chemical forms: tritiated water (HTO), gaseous tritium (HT), organically bound tritium (OBT)
- HTO follows the water fluxes and biogeochemically cycle
- Easy atmosphere-water exchanges (evaporation, fog, etc.)
- HTO very easily absorbed by plants and animals
- Equilibrium quickly achieved in aquatic environment (HTO)
- HTO does not bioconcentration
- Much less known about OBT

**Key sources**
- **Nuclear cycle**: Nuclear power plants, reprocessing, waste
- **Fallout**: Nuclear weapons testing
- **Nuclear accidents**: e.g. Windscale, Chernobyl, Fukushima Daiichi
- **Others**: military, medical and research applications
- **Natural sources**: reactions of high-energy cosmic rays with atmospheric nitrogen and oxygen

**Hydrogen**
- **Element classification**: not classified
- **No. of isotopes**: 7 ($^1$H and $^2$H stable)
- **Typical elemental concentrations**:
  - Soil (dry): not relevant
  - Seawater: about 100 g/L

For more information ...
- IRSN $^3$H factsheet
- ANL tritium factsheet
- Remediation

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