**(Radioactive) Equilibrium is boring**

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The naturally occurring primordial radionuclides 238U, 235U and 232Th are the starting points of radioactive decay series passing through isotopes of elements of significantly different chemical and physical properties. Radioactive equilibrium, i.e. the state of equal decay rates for all members of a decay series, can only be achieved in environmental systems that are closed over geological time scales. Radioactive disequilibria in open systems contain time information, since the recovery of the equilibrium takes place according to the half-lives of the nuclides involved. Gamma ray spectrometry is the method of choice to determine such disequilibria non-destructively and relatively uncomplicated.

The significance and the benefits of radioactive disequilibria in environmental and technical materials are illustrated by three examples:

* Age determination of forest soil layers by 210Pb dating
* Fluids and precipitates from geothermal plants exploiting highly saline deep water
* Influence of time-dependent dose rates on age determination using dosimetric dating methods (OSL, TL ...)