

The nature and extent of bomb tritium remaining in deep soils

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Abstract

Understanding the movement of water in soils is important for estimating subsurface water reserves. Despite the advances made in understanding water movement, very few tools can directly "follow the water". Tritium, a tracer that decays with time and resides within individual water molecules, is one such tool. Some tritium is produced naturally, others result from the nuclear bomb test era of the 1960s. Since the atmospheric nuclear tests ended following the Partial Nuclear Test Ban Treaty in 1963, however, the amount of tritium in soil water has declined, putting into question the usefulness of the environmental tritium method for tracking water movement in future studies. Our study explores the usefulness of the tritium method. Our results highlight the narrow window of time, over the next 20 years depending on the model used, within which the tritium method may still be applicable. We call on scientists to now take full advantage of the environmental tritium method in places where the tool may still be applicable. A richer understanding of water movement in soils is ultimately critical for ecosystem services and water resources management, particularly in semi-arid environments with deep soils.