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Radon bursts

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Radon timeseries typically contain a mixture of periodic and transient signals. Radon cycles can cover a broad frequency spectrum ranging from half-diurnal (S2, M2), daily (S1, O1), multiday, fortnightly, monthly, semi-annually, seasonal, to decadal variations. Physically, these variations are caused by a complex mix of meteorological parameters like air pressure, air temperature, wind, humidity, rain, snow, soil moisture, as well as pressure and temperature gradients in the ground or water level changes. In rare cases also Earth tides may modulate the radon signal. From time to time transient signals appear on top of these quasi-periodic signals – sometimes even in the form of radon bursts. These bursts are characterised by a sharp increase in radon concentration, often followed by a decay-like decrease. They last for hours, days, or months; they occur in soil, sediments, and rocks (granite, phyllite, lava), and appear in various geological environments (mofettes, mud volcanoes, volcanoes, rift systems). Spike-like bursts were also reported for other gases like methane or carbon dioxide. Deformation and related pore-pressure changes are discussed as physical origin of these transients. Spike-like anomalies are frequently claimed to be earthquake precursors. But they can also be caused by external events, like strong rainfall events, lake-level changes and even be artificially induced, e.g. by drilling activities. Thus my working hypothesis is that it is not possible to deduce the origin of a spike-like anomaly from its form and duration.