Advances in Radon Based Earthquake Forecasting using Sensor Networking[1]

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For decades, scientists have searched for reliable early warning signs of earthquakes[1]. One promising clue lies in radon (Rn), a gas released when uranium decays in the Earth's crust. Studies have shown that radon levels can show variations before an earthquake [2], likely due to stress deep underground causing cracks that allow radon to escape. Carrier gases like CO_2 and CH_4 help transport radon to the surface, affecting its concentration in groundwater [3]. Unlike air and soil measurements, which are influenced by weather and other external factors, groundwater monitoring offers a more stable and sensitive way to track these changes [2, 4].

The *ArtEmis* Euratom project is advancing earthquake research by deploying a dense network of 50–100 radon sensors across earthquake-prone regions in Greece, Italy, and Switzerland. These sensors use scintillators integrated with Silicon Photomultipliers [5], making radon detection both simple and efficient. In addition to radon levels, they continuously monitor environmental factors such as pressure, conductivity, and temperature [6]. Our latest prototypes are not only more sensitive but also smarter and easier to deploy, with enhanced communication capabilities. To process the vast amounts of data collected, *ArtEmis* is integrating AI tools to identify patterns and correlate radon fluctuations with seismic activity [7]. The first round of prototype installations has already delivered promising results. Currently, we are improving and expanding our sensor network with the aim of providing new insights that could one day contribute to a trustable and effective earthquake forecasting.

References

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