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On Site Carbon Dioxide and Stable Isotopologues Measurement to Support OSI Subsurface Gas Sampling

Sampling of subsurface soil gases represents one of the main On Site Inspection (OSI) activities for the verification of the Treaty. According to the scenario in which the OSI has been launched, the search logic framework could give to this activity an high priority. Generally, gas compositions are entirely different in air and deep-crust derived components and the usually higher concentration of helium, radon, methane and carbon dioxide in the subsurface gases drives the diffusion of these gases upward to the surface and the mixture with the air components; thus soil gas composition results from the mixing of these two components. In the OSI scenario the presence of buried structures and the production of high quantity of gases could influence the gas mixture migration and change its the final composition. Deep faults or fractures below the surface may provide pathways for the gases and carbon dioxide could act as carrier gas facilitating the migration upward from the deep crust or mantle. Portable isotopic analysers allow the measurement of CO2 and its stable isotopologues concentration can be used to understand infiltration from atmospheric gases or the degree of permeation of atmospheric gases in the soil gases.

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