

EGU22-2684, updated on 10 Aug 2022

<https://doi.org/10.5194/egusphere-egu22-2684>

EGU General Assembly 2022

© Author(s) 2022. This work is distributed under the Creative Commons Attribution 4.0 License.



The role of Pusteria fault zone (North-Eastern Alps, Italy) on enhancing the Geogenic Radon component

Eleonora Benà¹, Giancarlo Ciotoli^{2,5}, Chiara Coletti¹, Antonio Galgaro¹, Volkmar Mair³, Matteo Massironi¹, Claudio Mazzoli¹, Corrado Morelli³, Pietro Morozzi⁴, Livio Ruggiero⁵, Laura Tositti⁴, and Raffaele Sassi¹

¹Department of Geosciences, University of Padova, Via Gradenigo 6, I-25131 Padova, Italy

²Institute of Environmental Geology and Geoengineering, National Research Council, 00015 Rome, Italy

³Office for Geology and Building Materials Testing, Autonomous Province of Bolzano-South Tyrol, 39053 Cardano-Kardaun, Italy

⁴Department of Chemistry "G. Ciamician", University of Bologna, Via Selmi 2, I-40126 Bologna, Italy

⁵National Institute of Geophysics and Volcanology, Via di Vigna Murata 605, 00143 Rome, Italy

Radon (²²²Rn) is a radioactive gas widely considered an indoor air pollutant due to its harmful effects on human health (WHO, 2009). The Geogenic Radon Potential (*GRP*) quantifies what "Earth delivers" in terms of radon and represents the most important contributor to Indoor Radon Concentrations (*IRC*) indicating the potential risk over an area (Bossew 2015). This is the special case of some municipalities in Pustertal/Pusteria Valley (Bozen/Bolzano, North-Eastern Italy) which display a high *IRC*, based on Indoor measurements carried out by Minach et al. (1999), exceeding the threshold value recommended by EURATOM 59/2013. These municipalities are located along a wide brittle-fracture zone between the Pusteria Line (*PL*, the eastern part of Periadriatic Lineament) and the Defferegggen-Anterselva-Valles (*DAV*) faults. This fractured zone may act as preferential pathway for radon transport and migration by carrier gases (mainly CO₂ and CH₄), strongly contributing to its geogenic component. A *GRP* map of the study area has been developed based on field measurements of radon, thoron (²²⁰Rn) and other soil gases (CO₂, CH₄, H₂, O₂, H₂S) according to a sampling grid in an area of 6x10 km, and along three profiles crossing above mentioned fault lines in Terenten/Terento, Mühlen/Molini and Pfalzen/Falzes specific areas. The *GRP* map was constructed by using soil gas radon data and other proxy variables in a spatial regression model. Soil gas measurements have been supported by high-resolution gamma-ray spectrometry on 16 rock samples belonging to the main outcropping lithologies in the study area *i.e.* granite, orthogneiss, micaschist-paragneiss, phyllite. The preliminary radon map highlights a wide area of radon anomaly located to the North of the Periadriatic Lineament. The global trend of these radon anomalies follows the structural trend of the brittle fracture zone between *PL* and *DAV* faults and tends to close from the eastern part (Pfalzen/Falzes) toward the western part (Terenten/Terento) of the study area. In particular the easternmost sector of the map displays a wide north-south area of radon anomaly related to a wide brittle-fracture zone probably composed by a system of sub-parallel faults. The spatial distribution of radon anomalies confirms the key role played by the Pustertal/Pusteria fault system in the fluid degassing processes

enhancing geogenic radon potential of the Pustertal/Pusteria Valley.

Keywords: Natural Radioactivity, Geogenic Radon Potential, Indoor Radon, Periadriatic Lineament

References:

Bossew Peter. Mapping the Geogenic Radon Potential and Estimation of Radon Prone Areas in Germany. Radiation Emergency Medicine 2015 Vol. 4, No.2 13-20.

Council Directive 2013/59/EURATOM. Basic safety standards for protection against the dangers arising from exposure to ionising radiation.

Minach L., Verdi L., Marchesoni C., Amadori C. Radon in Südtirol. Environmental Protection Agency. 1999.

WHO 2009. Zeeb H. and Shannoun F. (eds.) WHO handbook in Indoor Radon - a public health perspective. ISBN 978 92 4 1547672.