

AN OPTICALLY STIMULATED LUMINESCENCE STUDY OF COSTAL SAND AS A POTENTIAL FORTUITOUS DOSIMETER



Monica Vidotto¹, Emanuela Bortolin², Nadica Maltar-Strmečki¹

¹Ruđer Bošković Institute, Bijenička c. 54, 10000 Zagreb, Croatia

²Istituto Superiore di Sanità, Viale Regina Elena 299, I-00161 Rome, Italy



In the case of a mass-casualty radiological or nuclear (R/N) event, the grouping of individuals into those requiring medical care (> 1 Gy) and those who were not affected during the accident is urgent. Often, the people involved do not own a professional dosimeter and therefore the dose assessment relies on fortuitous dosimeters.



This study focuses on the possibility of using costal sand (lakes and/or sea) as a fortuitous dosimeter in a R/N emergency. A significant number of papers regarding the optically stimulated luminescence (OSL) response of dating of sediments has been published, but none on the application proposed in this work.

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„NOVEL
BIOLOGICAL
AND PHYSICAL
METHODS FOR
TRIAGE IN
RADIOLOGICAL
AND NUCLEAR
(R/N)
EMERGENCIES”

MATERIALS AND METHODS



Adriatic sea, Kostrena, Croatia



Irradiation: Co-60 source (Alcyon) -> 1 Gy

Detection SUERC portable OSL reader v.2.4

portable mini
photo-luminescence
(PSL/OSL) reader



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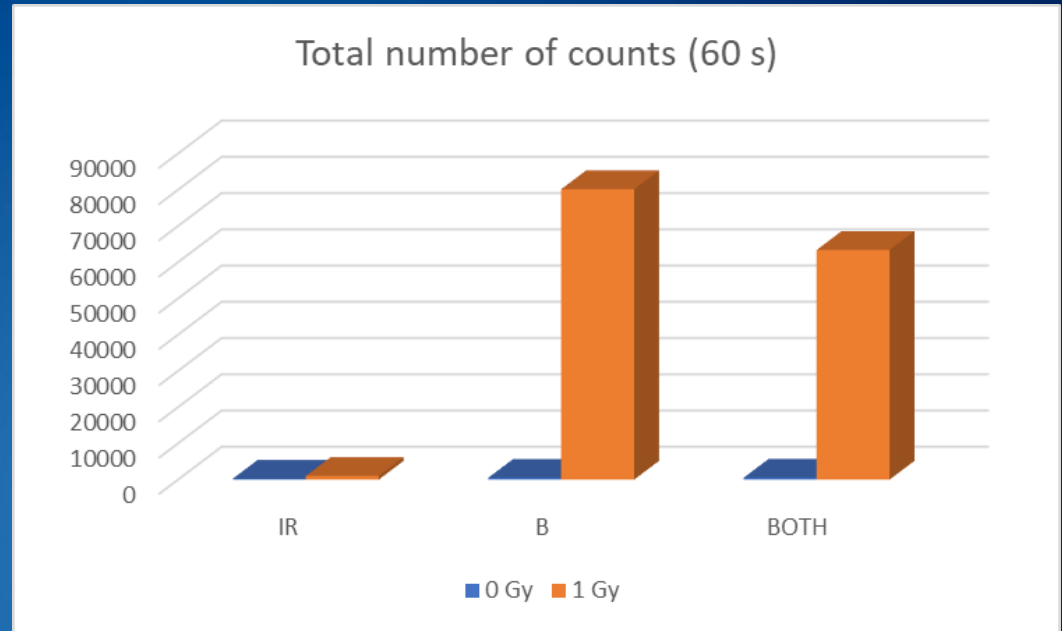
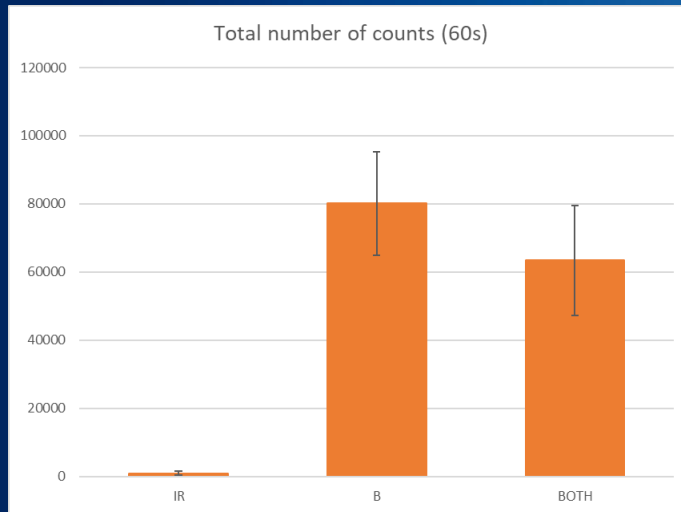
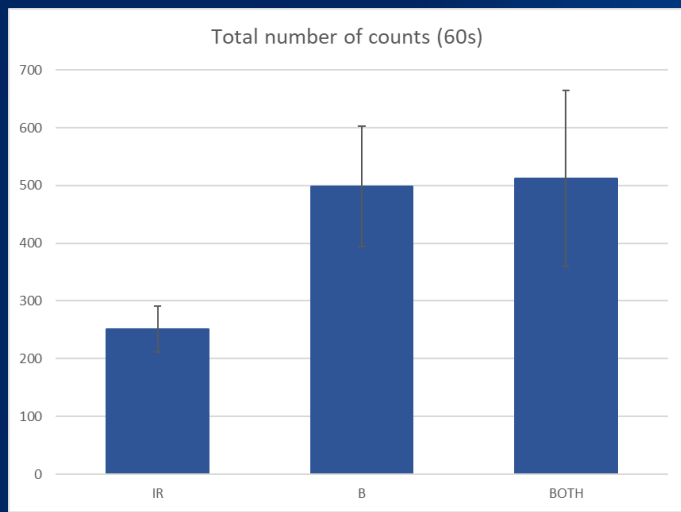
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RESULTS

OSL Response 0 Gy

(Average values of 20 aliquots. Error=3 SD)



Comparison of OSL Response 0 and 1 Gy
(Average values of 20 aliquots. Error=3 SD)

OSL Response 1 Gy

(Average values of 20 aliquots. Error=3 SD)

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To summarize:

- reader portable and usable on site
- instrument already available in many laboratories in the world, designed and commercialized for irradiated food
- simplicity for operations
- objects (near or on the person) of no considerable value (cigarettes, snacks, sand,...) usable as dosimeters
- simple sample preparation required
- fast measurement (about 60 s)

To conclude:

- sand samples seem to be very promising as fortuitous dosimeter
- the encouraging results suggest that this method might be suitable for a rapid radiation triage of a large number of civilians in a mass casualty event
- however, further analysis of increased statistics of dose response linearity, dose assessment and signal stability are needed before this method can be recommended

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