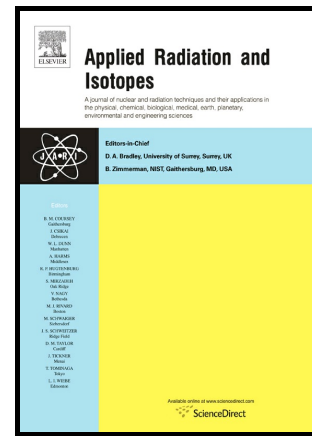


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Observation of Natural Background Radiation during the Great American Eclipse

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Abstract

Observations of photon and neutron background radiation were made in Rigby, Idaho, during the Great American Eclipse on August 21, 2017. Photon measurements were made using a mechanically-cooled, high-purity germanium gamma-ray spectrometer, segmenting the data into four energy bands of < 1 MeV, 1 to 2 MeV, 2 to 3 MeV, and 3 to 7 MeV. Neutron measurements were made using ³He proportional counter arrays embedded in polyethylene, either bare or wrapped with Cd or B filters. All data was analyzed in 900-s intervals starting one day before the eclipse and extending to one day after the eclipse. More detailed analyses were made in 90-s intervals for the photon data and 110-s intervals for the neutron data. Meteorological data was simultaneously recorded in 60-s intervals, recording solar radiance, temperature, air pressure, relative humidity, and dew point. For the observations described here, no statistically-significant ($>3\sigma$) variations in signal count rates were observed in either the photon or neutron data. This level corresponds to the lack of observed photon variations exceeding 2.1%, 12.2%, 21.6%, or 43.2% of mean values in the four photon energy groups, respectively; it corresponds to a lack of observed neutron variations exceeding 25.3%, 25.6%, or 16.1% of mean values in the three neutron detector arrays, respectively.

1. Introduction

Over the past thirty years several research teams around the world have performed observations to monitor natural background radiation during solar eclipses. This work includes observations of total solar eclipses (TSEs), annular eclipses, and partial eclipses. A list of important examples

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