

Seminar Title: Radiation Dosimetry Measurements Onboard Air and Space Craft for Human Safety Programs and Cancer Epidemiology Studies

Date: 05/22/2019, 12:00-1:00 pm

Location: NENR Building, Room 231

Abstract

A complex and changing spectrum of galactic cosmic and solar particle radiation is present in space and also continually bombards the Earth's upper atmosphere. Components of this cosmic radiation spectrum interact in different ways with the atmosphere producing secondary radiation. The measurable amount of radiation exposure caused by this primary and secondary radiation in the atmosphere increases with increasing altitude. In Low Earth Orbit (LEO) as well as at common commercial aircraft altitudes, the radiation dose received by astronauts, flight crew members or frequent flyer passengers can be significant from a radiation protection and safety standpoint. Awareness of this radiological safety issue by the aerospace scientific community, individuals associated with the air travel industry, as well as the general public has led to a host of studies over a period of decades which have been designed to measure, model and predict the radiological environment and risks posed during air and space travel. Presented in this seminar are results from flight dosimetry studies performed by researchers at the National Aeronautics and Space Administration (NASA) Center for Radiation Engineering and Science for Space Exploration (CRESSE) at Prairie View A&M University, Prairie View, Texas, and at Space Environment Technologies, Los Angeles, California. Also presented are examples of how flight dosimetry results are integrated into both human radiation safety programs and cancer epidemiology studies.



Speaker: Dr. Brad Gersey is considered an expert in micro-dosimetry and interacts with all major academic and governmental groups in the field of radiation research. He has taken micro-dosimetry measurements in radiation facilities all over the world, including the NASA Space Radiation Laboratory at Brookhaven National Laboratory, the Los Alamos Neutron Science Center at Los Alamos National Laboratory and the HiMAC facility at NIRS in Chiba, Japan. He has also conducted collaborative radiation dosimetry research aboard a multitude of flight platforms including the ER2, DC9, high altitude balloons, Virgin Galactic SpaceshipTwo, and the NASA Zero

Gravity Plane (The Vomit Comet). He has included underrepresented STEM students in his research, including work at all these facilities and platforms. He also advised students performing micro-dosimetry experiments on the NASA "Vomit Comet" micro-gravity vehicle. The results obtained by the students were presented at an international conference on space dosimetry on the International Space Station.

Selected Publications

1. B. Gersey and R. Wilkins, "Comparison of a Tissue Equivalent and a Silicon Equivalent Proportional Counter Microdosimeter to High-Energy Protons During a Simulated Solar Particle Event", presented at the 2010 Radiation Effects on Components and Systems (RADECS) Conference, Langenfeld, Austria, September 20-24, 2010..
2. "M-Band analysis of chromosome aberrations in human epithelial cells induced by gamma rays and secondary neutrons of low dose rate", H. Wu, M. Hada, F. Cucinotta, B. Gersey, P. Saganti and R. Wilkins, Mutation Research – Genetic Toxicology and Environmental Mutagenesis, Vol. 701, 67-74 (2010).
3. A. Boutte, B. Gersey, K. Kirby, R. Wilkins, Radiation Detector Arrays in Lunar and Martian Habitat Simulation Testbeds, 7th Annual PATHWAYS Symposium, Texas A&M International University Campus, Laredo, TX, November 13-14, 2009.
4. W. Kuhne, B. Gersey, R. Wilkins, H. Wu, S. Wender, W. Dynan, Biological effects of high-energy neutrons measured in vivo using a vertebrate (*Oryzias latipes*) model, Radiat Res. Vol. 172, No. 4, pp. 473-480. October 2009.
5. B. Gersey, S. Aghara, R. Wilkins, J. Wedeking and R. Dwivedi, Comparison of a tissue equivalent proportional counter microdosimeter to high-energy proton and neutron fields. Trans on Nucl Science 54, 2276-2281, (2007).
6. B. Gersey, J. Sodalak, M. Hada, P. Saganti, R. Wilkins, F. Cucinotta, H. Wu, Micronuclei induction in human fibroblasts exposed in vitro to Los Alamos high-energy neutrons, Adv in Space Res. 40, 1754-1757, (2007).
7. B. Gersey, T.B. Borak, S. Guetersloh, C. Zeitlin, J. Miller, L. Heilbronn, T. Murakami, Y. Iwata, The Response of a Spherical Tissue-Equivalent Proportional Counter to ⁵⁶Fe Particles from 200-1000 MeV/nucleon. Radiat Res. Vol. 157, No. 3. pp. 350-360. 2002.