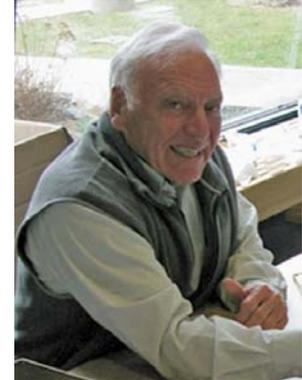


All are invited to attend the monthly meeting of the  
**Nittany Mineralogical Society**  
**Wednesday, May 16, 2018**  
*Parents/guardians must provide  
supervision of minors.*

**Honoring  
Dr. Duff Gold as a  
Life Member of  
Nittany Mineralogical  
Society**

**Space Debris, Part 2:  
Asteroids and Comets:  
Dark Threats**

by  
Dr. D.P. "Duff" Gold  
Professor Emeritus of Geology  
Penn State



*Our May meeting will be held Wednesday the 16th in room 114 (larger auditorium) of **Earth & Engineering Sciences Building** on the west side of the Penn State campus in State College, PA. Maps are available on our web site.*

***6:45 to 7:40 p.m.:** Social hour, refreshments and reception in the lobby - **We'll cut the cake at 7:20***

***7:40 to 8:00 p.m.:** **Honoring Dr. Duff Gold as a Life Member of NMS***

***about 8:00 p.m.:** **featured program***

*The event has free admission, free parking, and free refreshments, and is **open to all; parents/guardians must provide supervision of minors.** Bring your friends and share an interesting evening!*

Before the main program at the May 16<sup>th</sup> meeting, please join us for a short reception and presentation to honor Duff Gold, a founding member and Board member through the Society's 24-year history. See page 3 of the May Bulletin on the web site for more.

The emphasis of this talk is on recognition of astroblemes (impact scars), and **development of a scale involving size and associated magnitude of energy transfer.** The objective is to gain some idea of frequency through deep time, and speculate on "risk." The reality of "large events" was demonstrated in real-time on July 16, 1994, with the impact of Shoemaker-Levy 9 cometary fragments on Jupiter.

Very few of us would consider "space debris" as a hazardous agent when discussing large natural disasters such as hurricanes, tropical storms, earthquakes, tsunamis and volcanic eruptions. The closest we come is the Volcanic Energy Index (VEI), adapted to units of "energy transfer" expressed in megatons of TNT in a highly brissant explosion... [See the web site for the complete abstract]

This scale is open-ended; with known asteroid packing sufficient kinetic energy to match the rotational energy of the earth, and initiate "ocean boiling" events. We will touch on the co-lateral damage such as nuclear winter, climate change and mass extinctions and briefly compare hazardous event risks.

We plan to have samples of unique shock metamorphism (shatter-cones, suivite, pseudo-tachylite breccias, and melts, tektite, desert glass and KT boundary ash) on display.

See our web site **[www.nittanymineral.org](http://www.nittanymineral.org)**