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**Award Abstract #1661511**
**Consortium for Materials Properties Research in Earth Sciences (COMPRES): National Facilities and Infrastructure Development for High-Pressure Geosciences Research**

**NSF Org:** [EAR](#)  
[Division Of Earth Sciences](#)

**Initial Amendment Date:** May 16, 2017

**Latest Amendment Date:** May 16, 2017

**Award Number:** 1661511

**Award Instrument:** Cooperative Agreement

**Program Manager:** David Lambert  
EAR Division Of Earth Sciences  
GEO Directorate For Geosciences

**Start Date:** June 1, 2017

**End Date:** May 31, 2022 (Estimated)

**Awarded Amount to Date:** \$2,400,000.00

**Investigator(s):** Carl Agee agee@unm.edu (Principal Investigator)

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**NSF Program(s):** INSTRUMENTATION & FACILITIES

**Program Reference Code(s):** 9150

**Program Element Code(s):** 1580

**ABSTRACT**

COMPRES is a national, community-based consortium, with a mission to support research in the properties of materials that comprise the interiors of Earth and other planetary bodies, with particular emphasis on high-pressure science and technology and related fields. It is charged with the oversight and guidance of specialized laboratories at several national synchrotron facilities. COMPRES laboratory scientists determine the basic material properties of the inaccessible Earth and these measurements, in turn, shed light on questions of direct societal impact, such as the causes of earthquakes and volcanic eruptions. They can also help explain the formation of natural resources within the Earth, and they can improve our quality of life through the discovery of new advanced materials. As part of its mission, COMPRES continually develops new infrastructure and technologies to advance U.S. geoscience research.

Data from mineral physics measurements carried out at COMPRES-supported facilities are critical for interpreting

seismological and volcanological phenomena as well as other geophysical processes operating in the Earth's interior. Synchrotron-based techniques have played an ever-increasing role in experimental efforts to measure properties of geological materials at high pressures and temperatures. COMPRES is perfectly positioned to take advantage of the new generation of synchrotrons that offer great promise for the coming decade and beyond. For example, our beam line facilities XPD and FIS will be stationed at Brookhaven National Laboratory's National Synchrotron Light Source-II (NSLS-II), which is a recently completed, \$900 million facility, that produces X-rays over 10,000 times brighter than its predecessor NSLS, while providing improved spatial and energy resolution as well as a world-leading synchrotron-infrared (IR) radiation source. COMPRES also supports diamond anvil cell (DAC) beam lines at the Advanced Photon Source (APS) Argonne National Laboratory, at the Advanced Light Source (ALS) Lawrence Berkeley National Laboratory, and a multi-anvil press project at Arizona State University. The new or upgraded synchrotrons augmented by improvements in x-ray optics and detectors will lead to dramatic advances in measurements at high pressure. Thus, the upcoming period, spanned by the new 5-year cooperative agreement, offers exciting opportunities as these synchrotron facilities will dramatically improve experimental capabilities and allow for novel experiments needed to test hypotheses and address yet-unanswered questions on the nature of deep planetary interiors. Infrastructure and facility developments supported by COMPRES are at the same time creating a new generation of tools and techniques for attaining and measuring the deep interior environment in the laboratory.

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