**PRIORITY SCIENCE TARGETS FOR FUTURE SAMPLE RETURN MISSIONS WITHIN THE INNER SOLAR SYSTEM OUT TO THE YEAR 2061.** F. M. McCubbin[1] [1]NASA Johnson Space Center, 2101 NASA Parkway, Houston, TX 77058. francis.m.mccubbin@nasa.gov.

**Introduction:** The Astromaterials Acquisition and Curation Office at NASA Johnson Space Center (JSC) is responsible for curating all of NASA's extraterrestrial samples. The NASA Curation Office plans for the requirements of future collections in an "Advanced Curation" program. Advanced Curation is tasked with developing procedures, technology, and data sets necessary for curating new types of collections as envisioned by NASA exploration goals. Here we review the science value of some potential targets for sample return missions from the inner solar system over the next 43 years.

**Mercury:** Mercury represents an endmember planet among the terrestrial planets, and sample return from Mercury would provide constraints on models of the formation of the terrestrial planets in terms of proximity to the Sun, size, composition, and oxygen fugacity.

**Venus:** Our knowledge of the surface of Venus is limited to the observations from the Venera landers. As a companion planet to Earth and Mars (and the most Earth-like of the terrestrial planets) in the habitable zone of the solar system, sample return from Venus would enable understanding of how planets in the habitable zone can evolve geologically in such a way that is incompatible for the development of life.

**Moon:** The top targets for lunar sample return are sieved regolith samples from the ancient South Pole Aitken Basin (SPA), samples of young lunar basalt flows near Aristarchus Crater (AC), samples of lunar surface volatiles from permanently shadowed regions, and samples of farside basalts and plutonic rocks.

**Mars:** Mars sample return (MSR) is the highest priority of the 2013-2022 planetary science decadal survey. The return and subsequent curation of Mars samples will provide new challenges related to planetary protection requirements given its designation as a Class V restricted Earth return body.

**Phobos & Deimos:** Laboratory investigation of material from Phobos and Deimos are necessary to address questions of their origin. Additionally, Phobos and Deimos sample return would serve as a precursor to martian sample return.

**Ceres:** Ceres exhibits evidence of past cryogenic processes. Samples from Ceres would give unique insight into the distribution and transport of volatiles within the interiors and regolith of moderately-sized airless planetary bodies. Furthermore, the isotopic composition of the silicate and volatile components of Ceres would shed light on the chemical processes of differentiation and the isotopic composition of volatiles at the interface of the inner and outer solar system.

**Conclusions:** Future sample return missions will present new sample handling and storage challenges and will require technological advances in the areas of cold curation, extended curation of ices and volatiles, and curation of organically- and biologically-sensitive samples. Advanced curation will continue meet the needs of the planetary science community as NASA's exploration goals evolve.