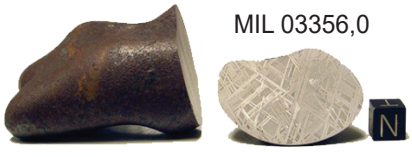
# ANTARCTIC METEORITES

Collected during Antarctic Search for Meteorites (ANSMET) Expeditions and curated at the Johnson Space Center in Houston, Texas

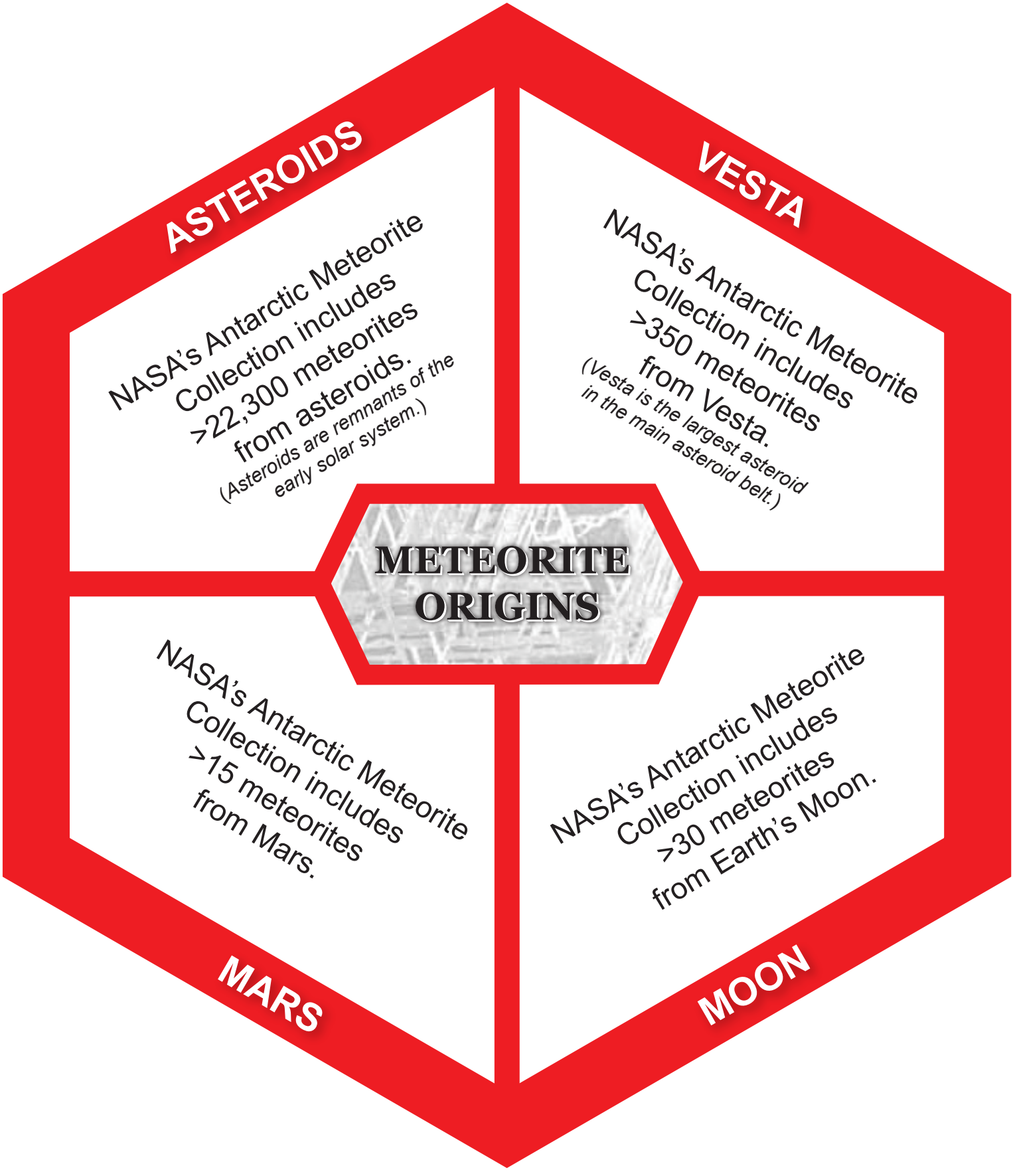

Meteorites are rocks from space that hold clues about our solar system's origins and evolution.



MIL 03356,0




Developed by Astromaterials Research and Exploration Science (ARES), Jacobs/JETS at the NASA Johnson Space Center


ASTEROIDS
NASA's Antarctic Meteorite Collection includes >22,300 meteorites from asteroids.
(Asteroids are remnants of the early solar system.)
VESTA
NASA's Antarctic Meteorite Collection includes >350 meteorites from Vesta.
(Vesta is the largest asteroid in the main asteroid belt.)
METEORITE ORIGINS
MARS
NASA's Antarctic Meteorite Collection includes >15 meteorites from Mars.
MOON
NASA's Antarctic Meteorite Collection includes >30 meteorites from Earth's Moon.

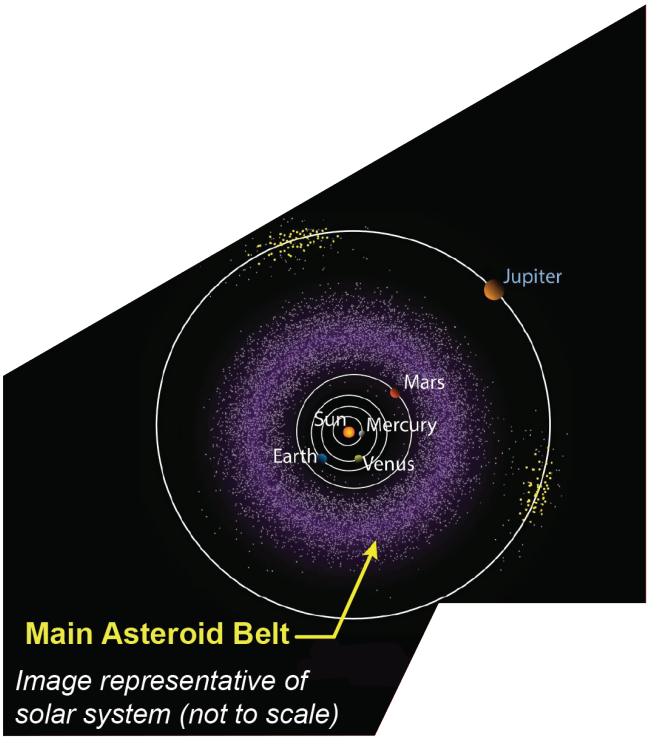
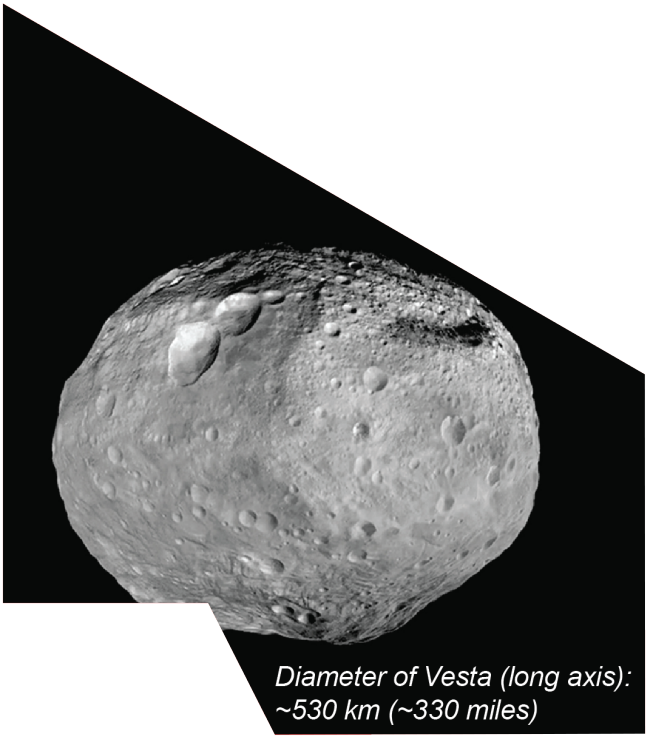
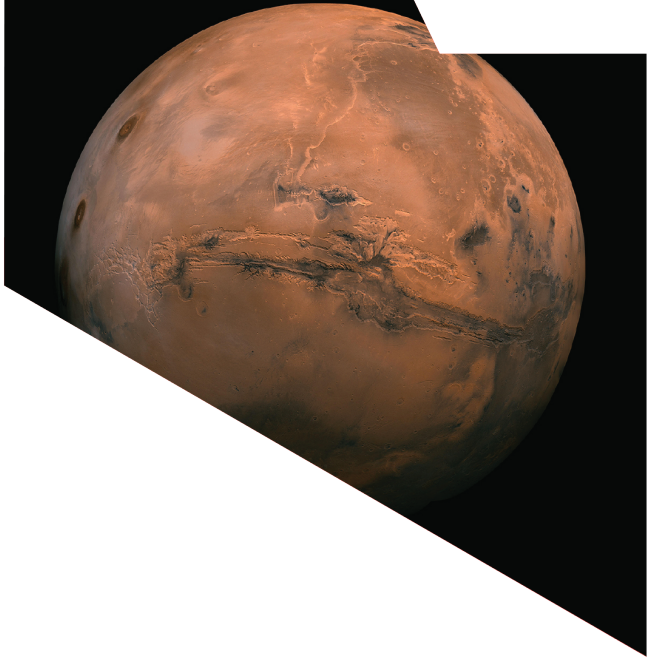



*Image representative of solar system (not to scale)*

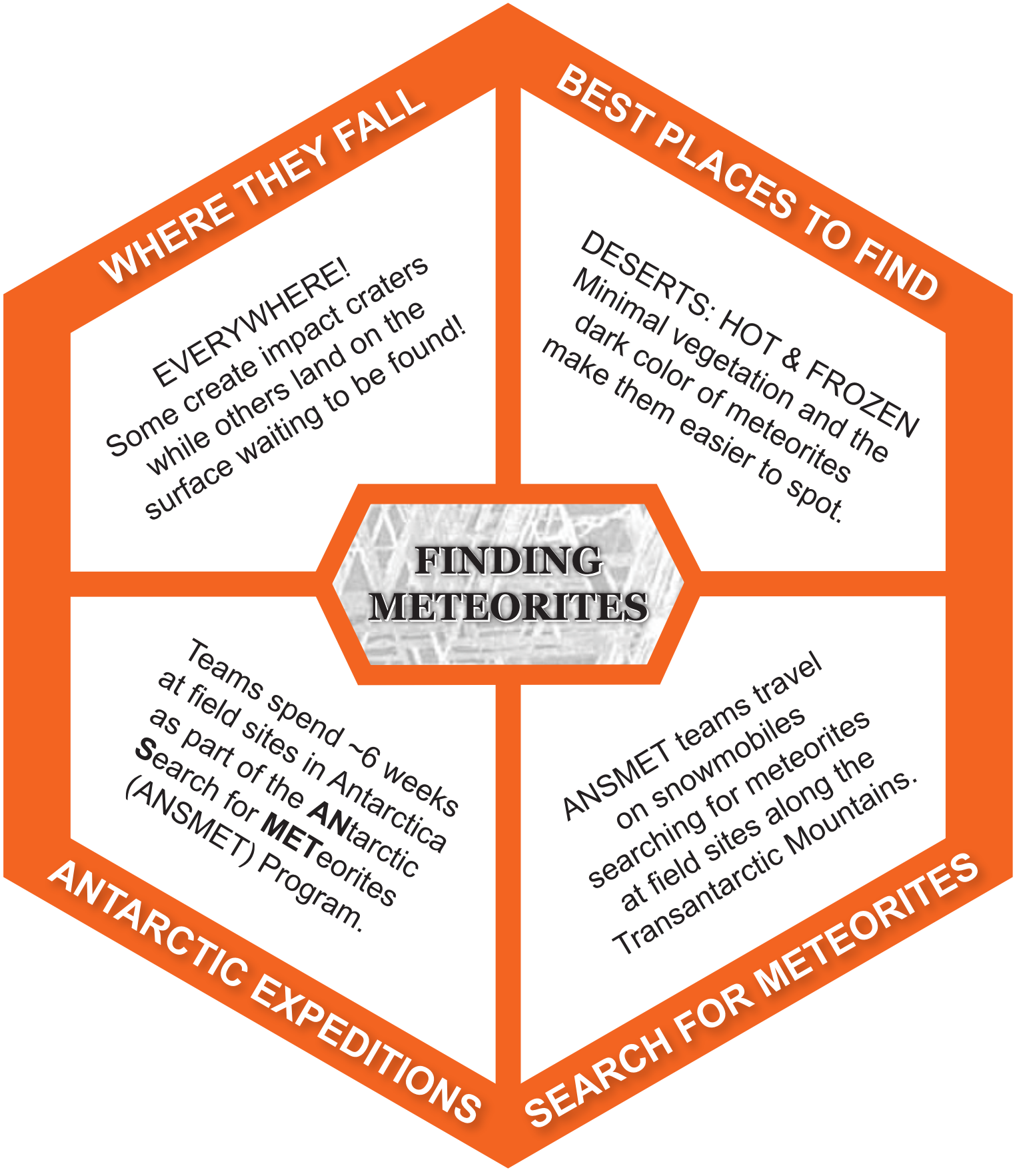


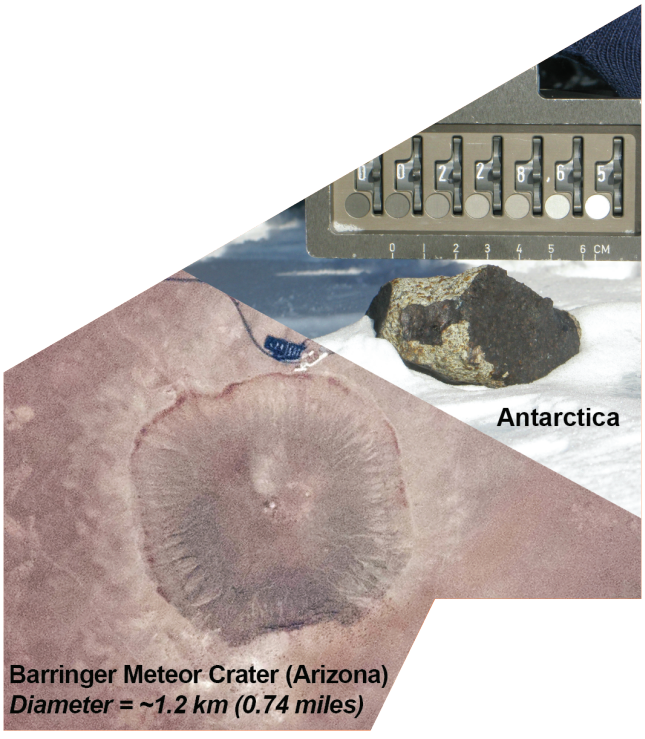
*Diameter of Vesta (long axis): ~530 km (~330 miles)*

*Diameter of Mars: ~6791 km (~4220 miles)*

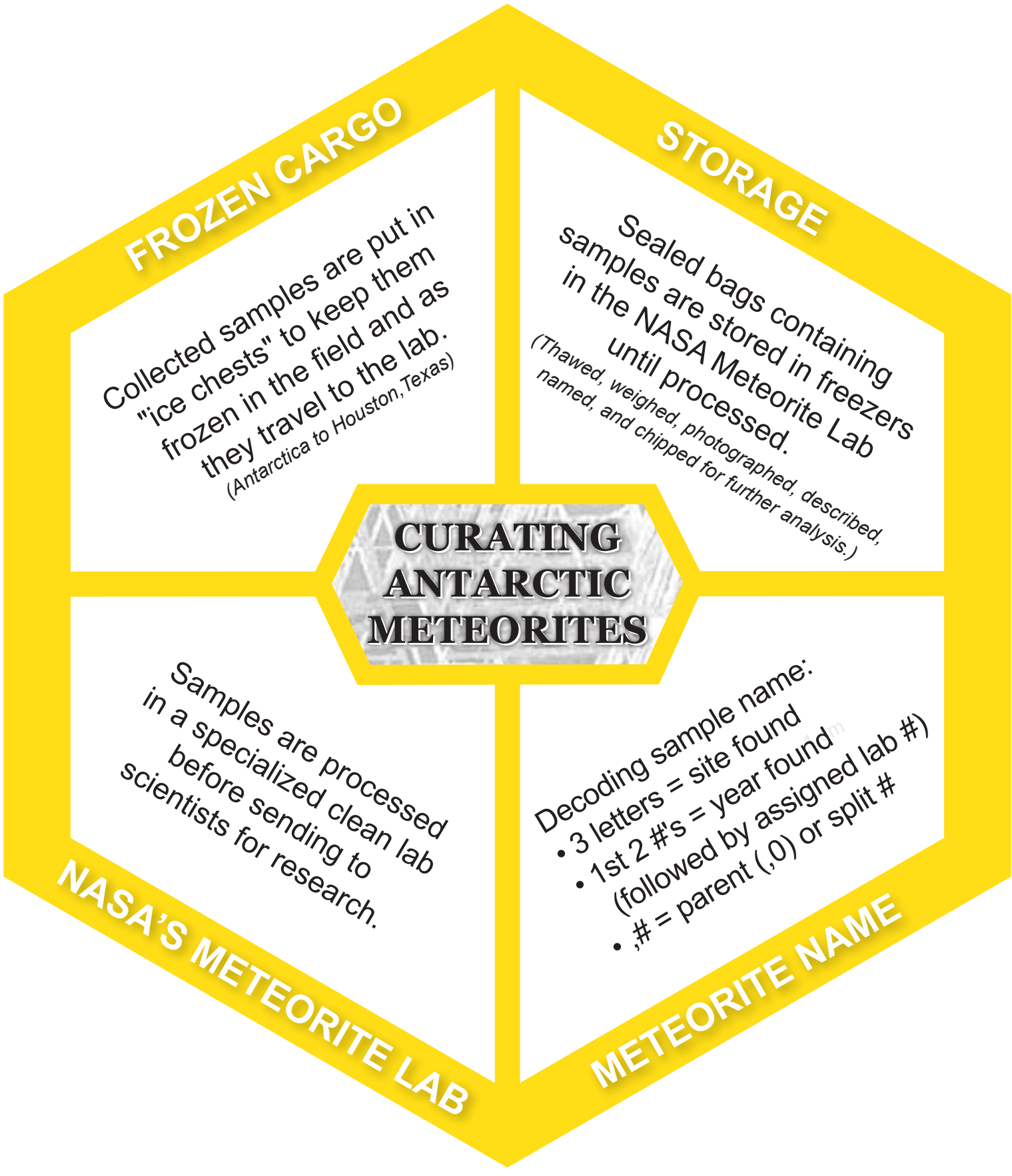


*Diameter of the Moon: ~3475 km (~2159 miles)*


FINDING METEORITES
WHERE THEY FALL
EVERYWHERE!
Some create impact craters while others land on the surface waiting to be found!
BEST PLACES TO FIND
DESERTS: HOT & FROZEN
Minimal vegetation and the dark color of meteorites make them easier to spot.
ANTARCTIC EXPEDITIONS
Teams spend ~6 weeks at field sites in Antarctica as part of the ANtarctic Search for METeorites (ANSMET) Program.
SEARCH FOR METEORITES
ANSMET teams travel on snowmobiles searching for meteorites at field sites along the Transantarctic Mountains.

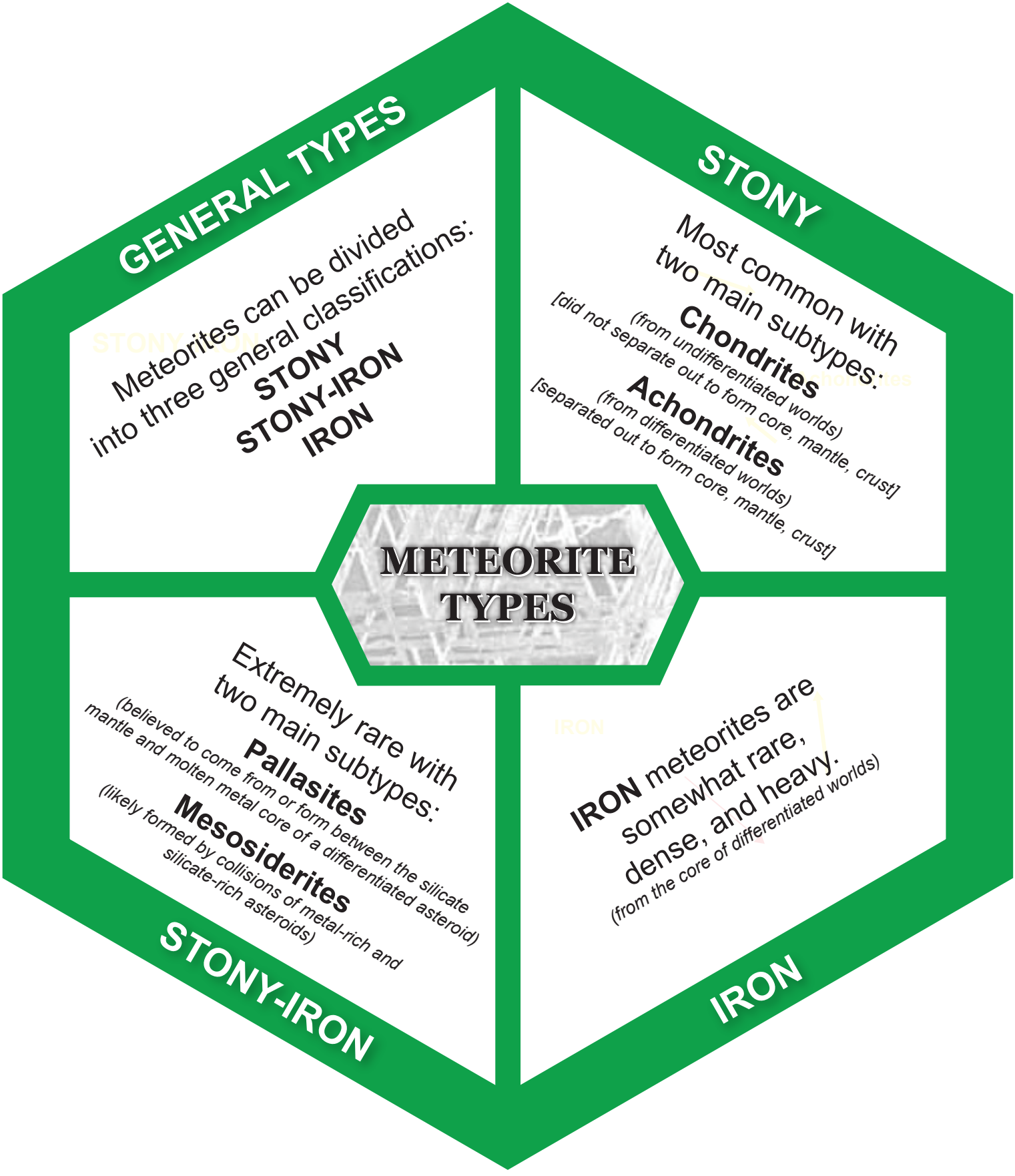

Antarctica
Barringer Meteor Crater (Arizona)
*Diameter = ~1.2 km (0.74 miles)*

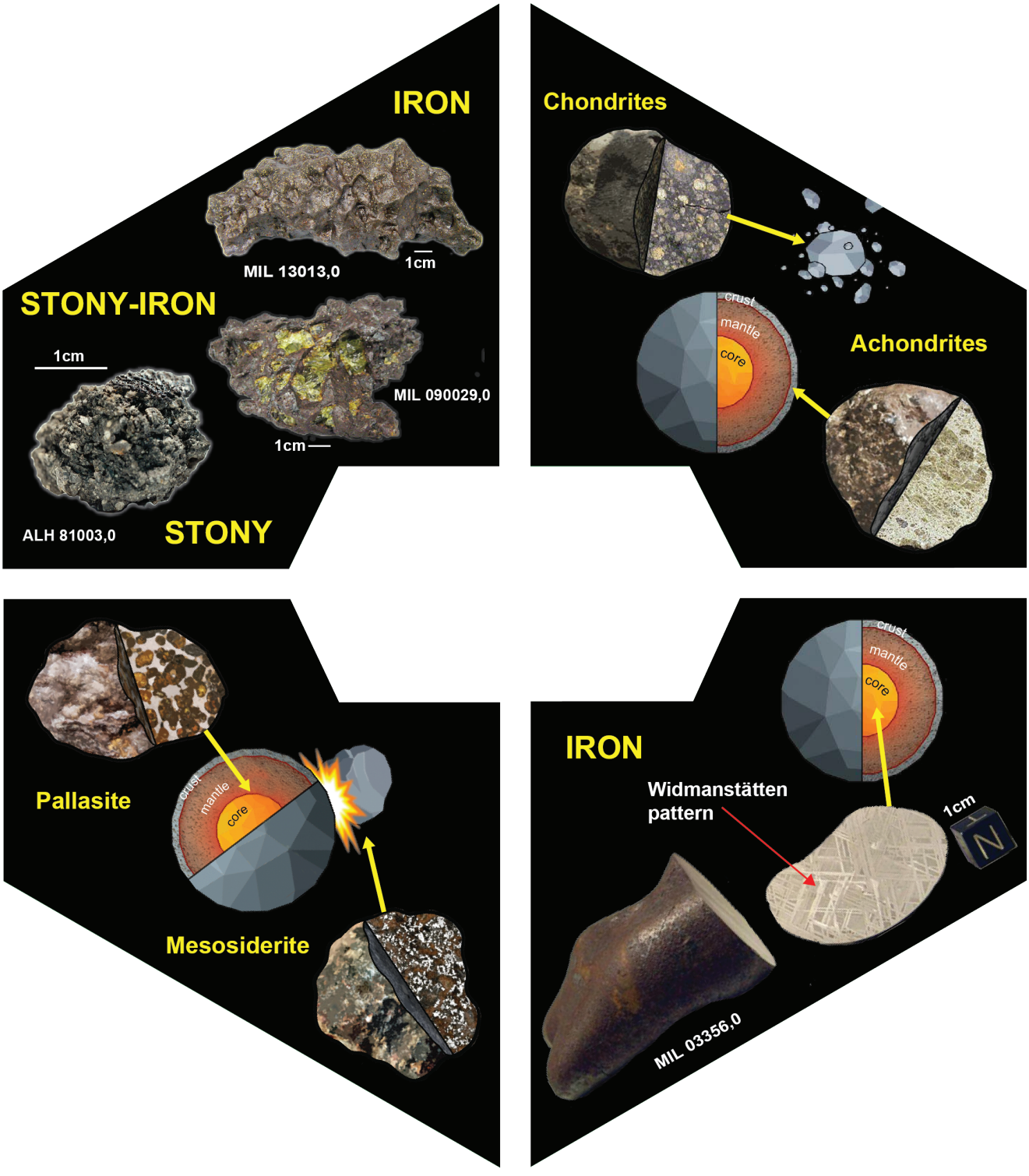

SOUTHERN OCEAN
EAST ANTARCTICA
WEST ANTARCTICA
Transantarctic Mountains

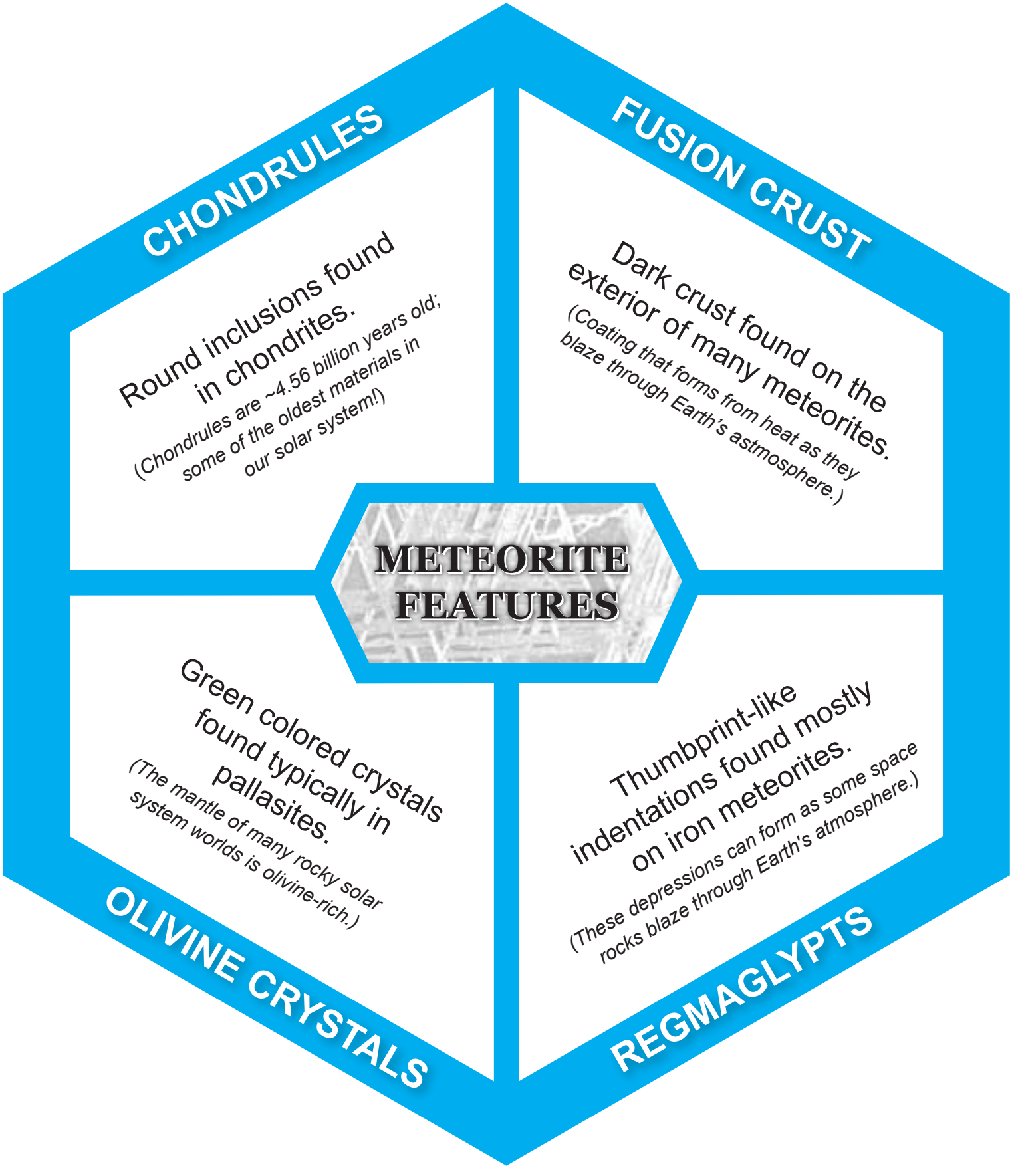

FROZEN CARGO
Collected samples are put in "ice chests" to keep them frozen in the field and as they travel to the lab.
(Antarctica to Houston, Texas)
STORAGE
Sealed bags containing samples are stored in freezers in the NASA Meteorite Lab until processed.
(Thawed, weighed, photographed, described, named, and chipped for further analysis.)
CURATING ANTARCTIC METEORITES
NASA'S METEORITE LAB
Samples are processed in a specialized clean lab before sending to scientists for research.
METEORITE NAME
Decoding sample name:
• 3 letters = site found
• 1st 2 #'s = year found (followed by assigned lab #)
• ,# = parent (,0) or split #

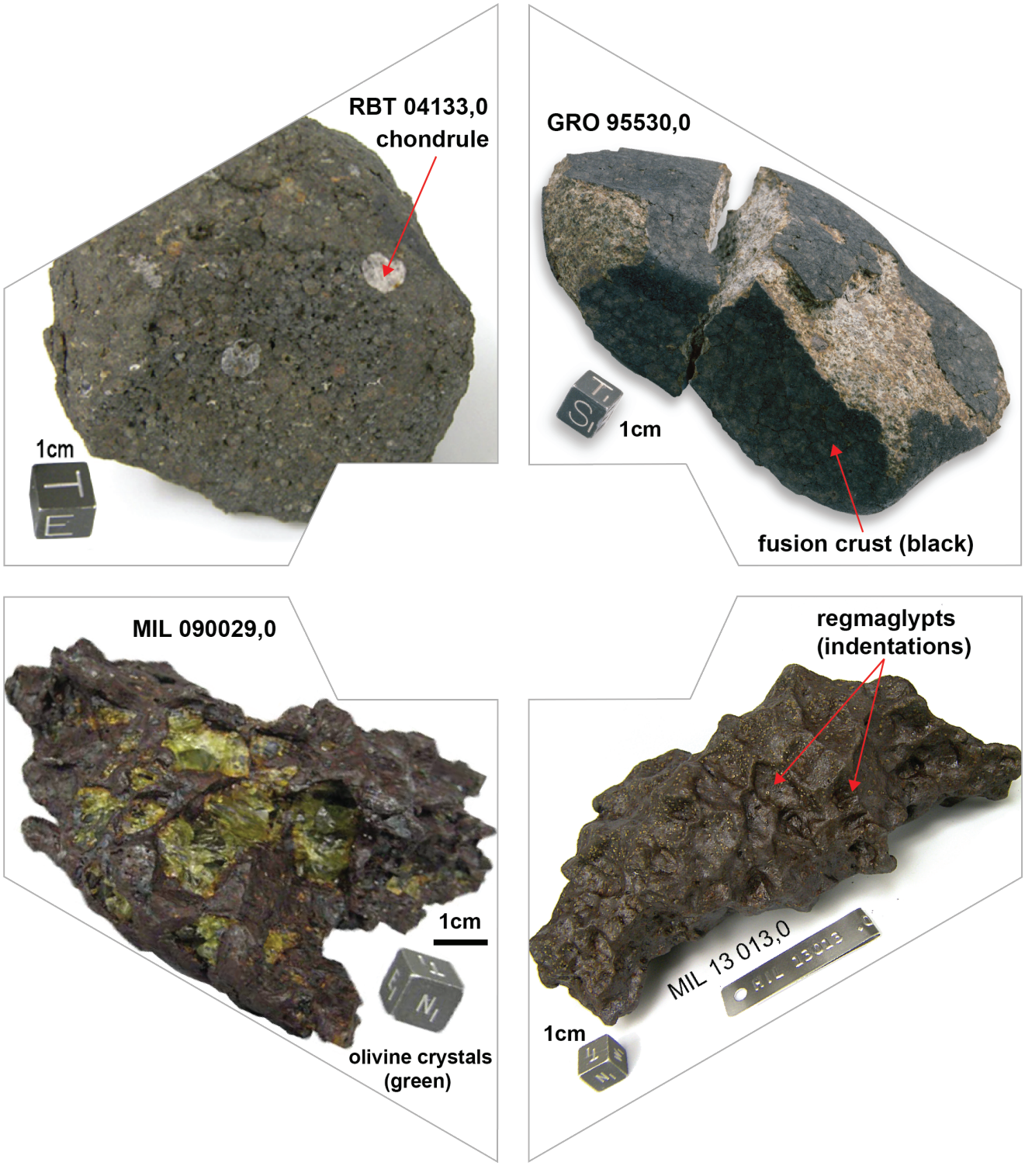

Meteorite Lab at NASA's
Johnson Space Center

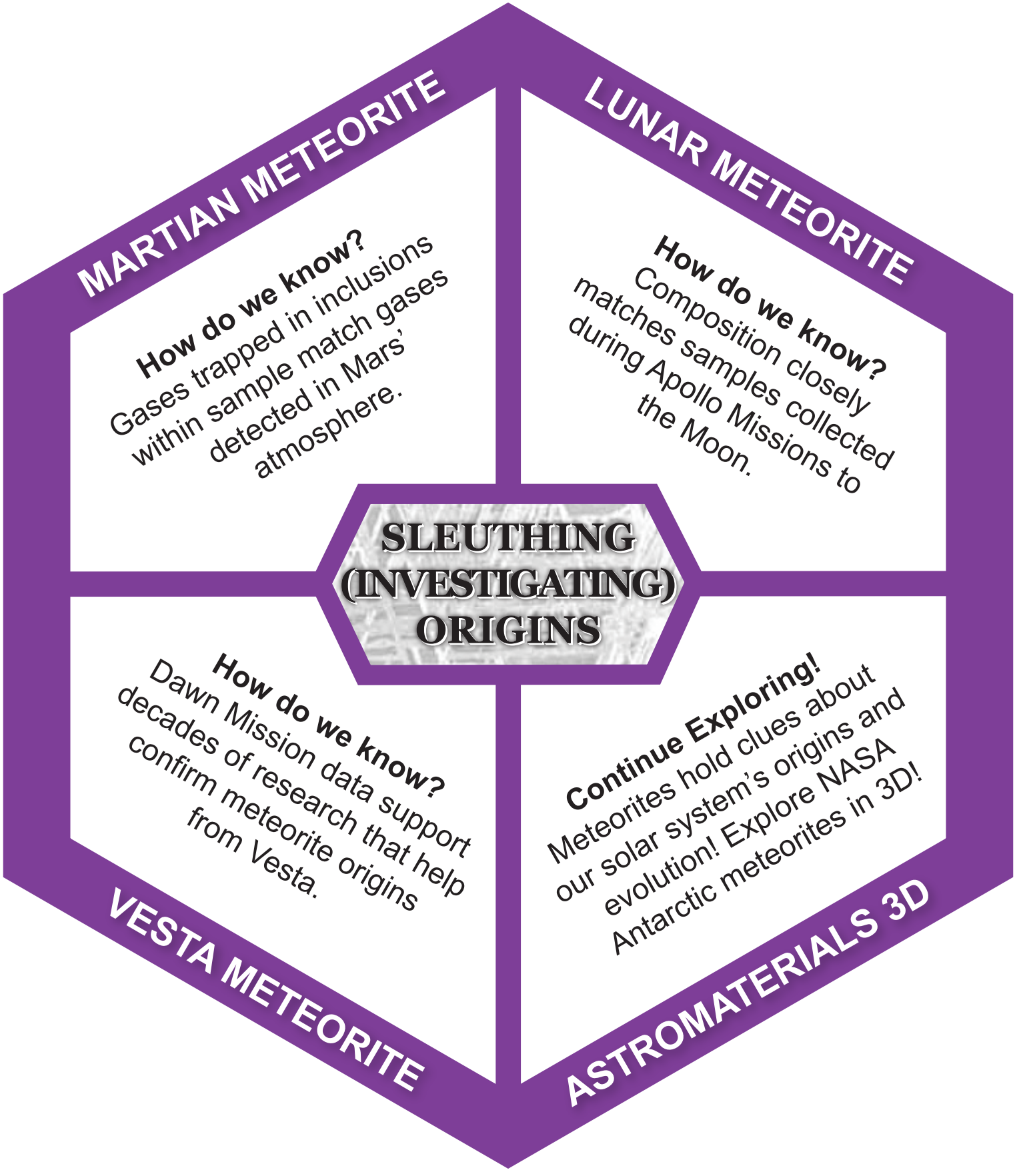

Meteorite Name
DOM 08027 ,5
Site found (DOM = Dominion Range)
Year found (08 = 2008)
Split # (,5)

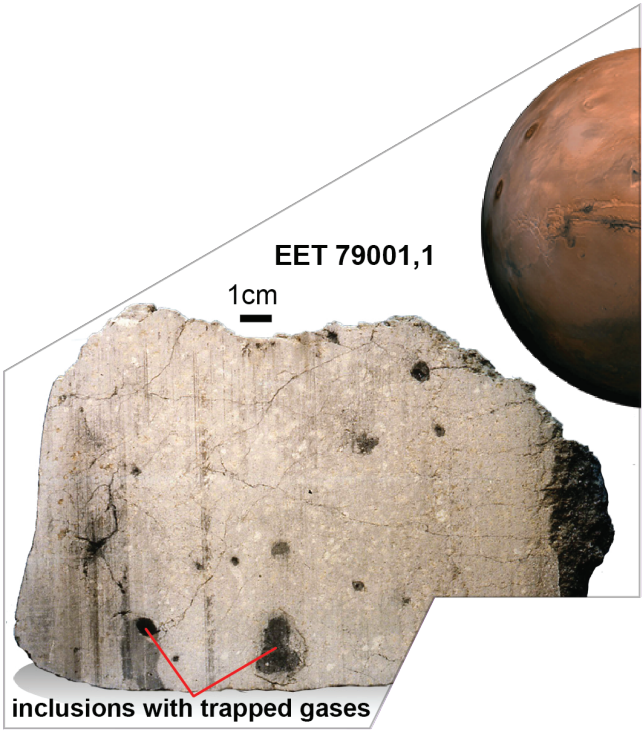

METEORITE TYPES
GENERAL TYPES
Meteorites can be divided into three general classifications:
STONY
STONY-IRON
IRON
STONY
Most common with two main subtypes:
Chondrites
(from undifferentiated worlds)
[did not separate out to form core, mantle, crust]
Achondrites
(from differentiated worlds)
[separated out to form core, mantle, crust]
STONY-IRON
Extremely rare with two main subtypes:
Pallasites
(believed to come from or form between the silicate mantle and molten metal core of a differentiated asteroid)
Mesosiderites
(likely formed by collisions of metal-rich and silicate-rich asteroids)
IRON
IRON meteorites are somewhat rare, dense, and heavy.
(from the core of differentiated worlds)
IRON

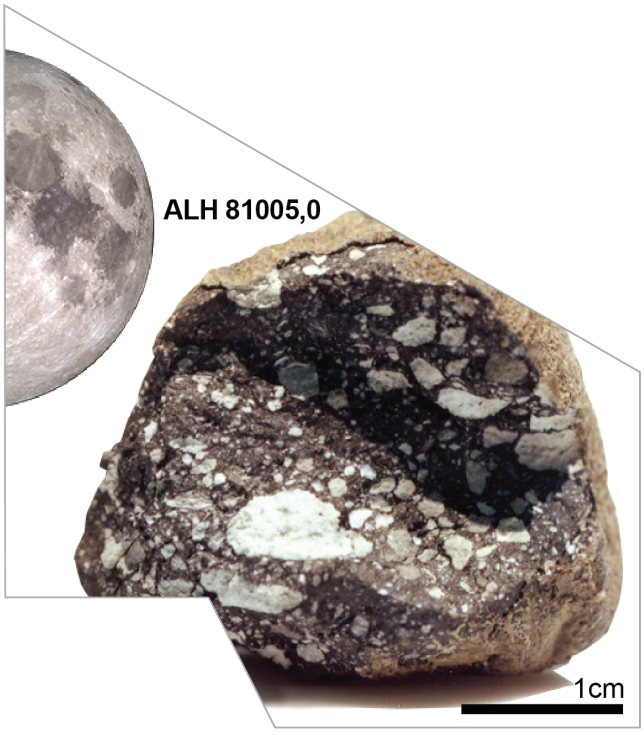

IRON
MIL 13013,0
1cm
STONY-IRON
1cm
MIL 090029,0
1cm
ALH 81003,0
STONY
Chondrites
crust
mantle
core
Achondrites
Pallasite
crust
mantle
core
Mesosiderite
crust
mantle
core
IRON
Widmanstätten
pattern
1cm
MIL 03356,0


METEORITE FEATURES
CHONDRULES
Round inclusions found in chondrites.
(Chondrules are ~4.56 billion years old; some of the oldest materials in our solar system!)
FUSION CRUST
Dark crust found on the exterior of many meteorites.
(Coating that forms from heat as they blaze through Earth's astmosphere.)
OLIVINE CRYSTALS
Green colored crystals found typically in pallasites.
(The mantle of many rocky solar system worlds is olivine-rich.)
REGMAGLYPTS
Thumbprint-like indentations found mostly on iron meteorites.
(These depressions can form as some space rocks blaze through Earth's atmosphere.)

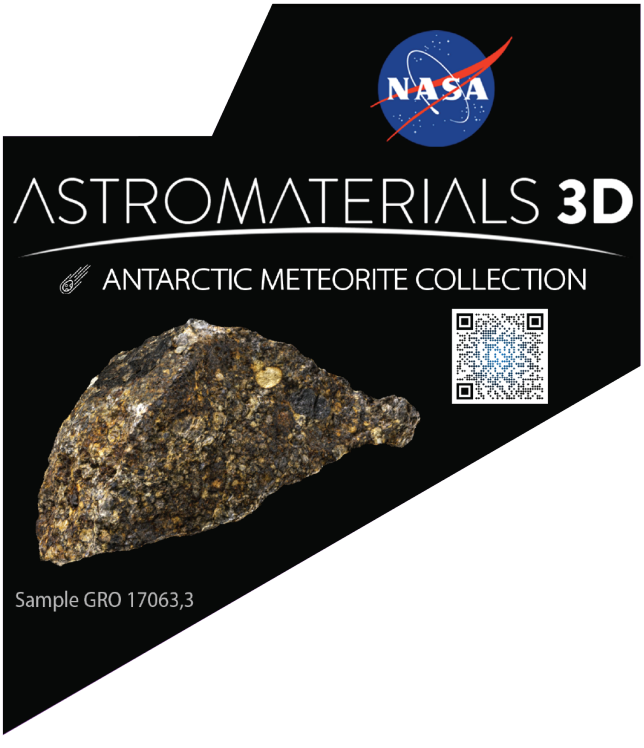

RBT 04133,0
chondrule
1cm
GRO 95530,0
1cm
fusion crust (black)
MIL 090029,0
1cm
olivine crystals
(green)
regmaglypts
(indentations)
MIL 13 013,0
1cm


MARTIAN METEORITE
How do we know?
Gases trapped in inclusions within sample match gases detected in Mars' atmosphere.
LUNAR METEORITE
How do we know?
Composition closely matches samples collected during Apollo Missions to the Moon.
SLEUTHING (INVESTIGATING) ORIGINS
VESTA METEORITE
How do we know?
Dawn Mission data support decades of research that help confirm meteorite origins from Vesta.
ASTROMATERIALS 3D
Continue Exploring!
Meteorites hold clues about our solar system's origins and evolution! Explore NASA Antarctic meteorites in 3D!


EET 79001,1
1cm
inclusions with trapped gases


ALH 81005,0
1cm


1cm
GRO 17049,0
Vesta


NASA
ASTROMATERIALS 3D
ANTARCTIC METEORITE COLLECTION
Sample GRO 17063,3