SAMBA

Search for Antarctica Meteorites : Belgium activities

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Meteorites are the left over building blocks of the Solar System. As such they provide valuable clues to its origin and evolution as well as to the formation of the planets. The majority comes from the asteroid belt between Mars and Jupiter, extremely rare ones were ejected from the deep crust of the Moon and Mars during large impact events. The meteorites are classified in groups corresponding to different evolution-phases of the Solar Nebula. The most primitive, the carbonaceous chondrites, together with the other chrondrites, originated from the break-up of small size undifferentiated planetary bodies. The Orgueil carbonaceous chondrite has almost the same chemical composition as the sun and resulted from the condensation of the solar nebula almost without any fractionation. Carbonaceous chondrites also contain complex organic compounds (ex. amino acids) and contribute to understand the origin of life on Earth. The other groups of meteorites (iron, stony-iron and achondrites) originate from more evolved planetary bodies that have undergone several episodes of differentiation comparable to the formation of the core, mantle and crust on Earth, and well as episode(s) of shock metamorphism during planetary collisions.
The value of meteorites to document astronomical, solar system and terrestrial processes does not have to be further demonstrate. They have and continue to provide data on stellar evolution and nucleosynthesis, the chronology of the solar system, the formation of planets, cosmic rays bombardment, the deep crust of Mars and the Moon.

In 1970 less than about 2000 meteorites had been recovered all over the entire land surface of the Earth. In the last 35 years, the samples collected in Antarctica have more than tripled the world's collection of meteorites. The ice fields of Antarctica do concentrate rare and precious meteorites. This concentration occurs when the flowing ice is stopped or slowed down by a barrier, such as mountains. When a meteorite falls over Antarctica, it is buried in snow, and sinks deeper over the seasons to end up enclosed in ice as the snow crystallizes under pressure. Ice flows as a sluggish hydraulic system. The meteorite follows the ice movement outward towards the edge of the continent, and ultimately into the ocean. When the ice flow is stopped or slowed down by an obstacle, the wind strips the superficial snow and leads to the slow ablation of the ice. Over time, the meteorites trapped deep in the ice layers are brought to the surface as the lost by ablation is replenished by upstream ice at depth. The patches of stagnant ice flow are referred to as meteorite stranding surfaces. The low temperature reduces the weathering of the exposed meteorites. With patience and a good eye, numerous meteorites can be collected in the ice fields of Antarctica.

Exploration of the ice field around the Belgian base will provide new meteorites. The goal of te SAMBA project is to recover and study them which will contribute to further the understanding of the evolution of the Solar System and the planets.