

Award

2007 Leonard Medal for Michel Maurette

Michel Maurette is truly an extraordinary phenomenon in the meteoritical sciences. His profound scientific contributions and unforgettably melodic presentations have been fixtures in this field since he was a 1960s post-doc with Bob Walker at Washington University. Michel was the first French Lunar Sample PI and every meeting in the early “lunar days” seem to include Michel telling wonderful stories about what he was finding. Using exotic high-voltage electron microscopes in France, he discovered thin amorphous rims on lunar soil grains. He revelled both at showing spectacular dark-field images of these thin rims around crystalline grains and also describing technology behind the images. His early career dealt largely with radiation process and the effects of solar wind and energetic particles on meteoritic and lunar samples.

Continuing work on radiation and regolith studies, Michel also jumped feet first into the collection of small Earth-bound extraterrestrial particles. While cosmic dust samples had been collected from the stratosphere and deep sea sediments, Michel believed that polar ice regions could be an excellent source of the $\sim 100 \mu\text{m}$ particles that dominate the mass of extraterrestrial material currently accreted by Earth. The particles collected in the stratosphere are usually restricted to $10 \mu\text{m}$ size and, while ocean sediment particles are larger, they are sparsely distributed and altered by long term burial in sediments. Michel came up with the very clever idea of searching for cosmic dust in the melt zone that occurs near Greenland’s southern ice margin for about two months each summer. Particles that were buried in Greenland’s interior move toward the ice margin where, after a few thousand years of travel, they can be exposed by ice melting and runoff. The particles become highly concentrated on the bottoms of “blue-ice lakes,” and Michel mounted several expeditions to the exotic and remote region the Greenland’s seasonal lakes. In the summer, melting can become so severe that the ground melts out from underneath tents. At meetings, the intrepid cosmic dust hunter showed pictures of himself wading out into the glacial lakes like a swimming pool cleaner, with large vacuum hose in hand to suck sediment from the floors of the ice-bottom lakes. He was usually roped up during these activities because crevasses sometimes open up and suck the on-ice lakes and their contents into a subterranean conduit and out to sea. The Greenland expeditions were true adventures to one of the more bizarre places on Earth, a region of swiss cheese-like ice with holes



Michel Maurette.

large and small filled with water and a remarkable mix of cyanobacteria and cosmic dust. The Greenland efforts were a great success and collected large numbers of particles. The cosmic particles were well preserved, but some of the spherical particles had small surface pits where they had been attacked by cyanobacteria that thrives in the melt water. Michel pondered the fate of these materials and their implications on topics ranging from astrobiology to the storage of nuclear waste. I should point out that Michel’s Greenland projects were marvels of imaginative funding as well as science. One of the efforts is rumored to have been supported by a film crew shooting an underwear commercial.

Seeking even better-preserved particles, Michel began a grand series of adventures on the other side of the world in Antarctica. Travelling by boat through genuinely mountainous seas to the French Dumont d’Urville station, he began a series of industrial-scale programs of melting ice to recover its contents of precious cosmic particles. These heroic efforts required the heat from burning a ton of fuel to melt a ton of ice. Large quantities of ice were melted and the endeavors were highly successful in recovering large numbers of micrometeorites ranging in size from $10 \mu\text{m}$ to

nearly a millimeter. His success spawned similar programs by other groups to recover particles from melted ice. For even better preservation of samples, this work has evolved to particle recovery from snow deposits. Working with colleagues, the Concordia collections were made from snow at Dome C snow and these have yielded the best preserved extraterrestrial particles ever collected from the Earth's surface.

Michel's efforts have led the collection of large numbers of cosmic dust particles and their study by investigators around the world are leading to a greatly improved understanding of the materials carried by the tens of thousands of tons of asteroid and comet dust that falls to Earth

each year. Michel Maurette has greatly enriched the field of meteoritics, he has entertained us with fascinating scientific talks, and he has charmed us with French wine and unending stories about his travels, research, and life experiences. With his outstanding contributions to the science of meteoritics, it is highly appropriate that he be awarded the Leonard Medal for 2007.

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