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Award

2005 Nier Prize for Nicolas Dauphas

Nicolas Dauphas was born in 1975 in Nantes, Brittany, France. After receiving an engineering degree from the Ecole Nationale Supérieure de Géologie in Nancy, he prepared a Masters degree at the Centre de Recherches Pétrographiques et Géochimiques, Nancy, France.

Nicolas was first given a subject on the isotopic quantification of late-arriving volatile elements to primitive Earth, and he quickly came to an interesting conclusion—the very low contribution of comets to early Earth (Dauphas et al. 2000). (Ironically, four years later Nicolas advocated an important role for comets as potential contributors to the budget of atmospheric rare gases [Dauphas 2003]).

Having resolved this problem in half of the planned time, Nicolas started a new project on the isotopic composition of nitrogen in the deep mantle from N isotope analyses of mantle plume material. This he found to be in the same range as sedimentary values, which suggested the possibility of a rapid exchange of N between the mantle and the Earth's surface (Dauphas and Marty 1999).

As Nicolas found basic science more exciting than an engineering career, he signed up for a Ph.D. degree in cosmochemistry of molybdenum isotopes. He concentrated his efforts on developing an extremely precise technique for measuring mass-independent anomalies of Mo in primitive and differentiated meteorites using a new multi-collector sector ICP-MS just delivered to CRPG. Nicolas was able to demonstrate that primitive meteorites contain Mo isotopes produced by both s-process and r+p process nucleosynthesis, with proportions varying from one meteorite clan to another as a result of incomplete mixing of the carriers of these isotopes during the early evolution of the solar nebula (Dauphas et al. 2002b). Furthermore, Nicolas showed that iron meteorites present systematic Mo isotope anomalies that are best explained by incomplete mixing of dust and gas on large scales relevant to source regions of planetary formation (Dauphas et al. 2002a). His results are in line with the subsequent discovery, by D. Papanastassiou and colleagues, of mass-independent isotope anomalies of ruthenium that were found to correlate with Mo isotope anomalies among several classes of meteorites. Incidentally, this correlation suggests strongly that the building blocks of the Earth remained unchanged, with respect to Mo and Ru isotope compositions, throughout the entire construction of our planet, including the latest stages.

After completing his Ph.D. thesis, Nicolas moved in 2002 to the Fermi Institute in Chicago, USA, as an associate researcher. In 2004, he became Assistant Professor at the Department of Geophysical Sciences of the University of Chicago. He has recently worked on developing the isotope geochemistry of tungsten and iron. With his colleague Mark van Zuilen of CRPG Nancy, he used Fe isotopes to demonstrate the sedimentary nature of the 3.86 Gyr rocks from the Akilia Island, Greenland, which were debated. These rocks have been shown to be the most ancient sediments on Earth, leaving open the possibility that they indeed contain traces of the earliest life (Dauphas et al. 2004).

Apart from his high-quality analytical work, Nicolas has developed several theoretical models such as a new open, nonlinear model of chemical evolution of the galaxy, and a new model for the origin and early evolution of the terrestrial atmosphere that takes into account the missing xenon paradox. Recently, he used meteoritic data to constrain the U/Th production ratio in stars, which, together with available U and Th observations in stars, led him to propose a cosmochemical age of the galaxy to be 14.5 Gyr (+2.8, –2.3 Gyr) (Dauphas Forthcoming).

Given his complementary skills in modelling and in isotope analysis, Nicolas has a great future ahead of him. Despite being less than 30 years old, he has already made major advances in our understanding of the origin of

elements in the solar system. Mr. President, it is with great pleasure that I present you Dr. Nicolas Dauphas for the 2005 Nier Prize of the Meteoritical Society.

Bernard Marty
Centre de Recherches
Pétrographiques et Géochimiques
Nancy, France

REFERENCES

Dauphas N. 2003. The dual origin of the terrestrial atmosphere. *Icarus* 165:326–339.

Dauphas N. Forthcoming. The U/Th production ratio and the radiometric age of the Milky Way. *Nature*.

Dauphas N. and Marty B. 1999. Heavy nitrogen in carbonatites of the Kola Peninsula: A possible signature of the deep mantle. *Science* 286:2488–2490.

Dauphas N., Robert F., and Marty B. 2000. The late asteroidal and cometary bombardment of the Earth as recorded in water deuterium to protium ratio. *Icarus* 148:508–512.

Dauphas N., Marty B., and Reisberg L. 2002a. Molybdenum evidence for inherited planetary scale isotope heterogeneity of the protosolar nebula. *The Astrophysical Journal* 565:640–644.

Dauphas N., Marty B., and Reisberg L. 2002b. Molybdenum nucleosynthetic dichotomy revealed in primitive meteorites. *The Astrophysical Journal* 569:L139-L142.

Dauphas N., van Zuilen M., Wadhwa M., Davis A. M., Marty B., and Janney P. E. 2004. Clues from iron isotope variations on the origin of early Archaean banded iron formations from Greenland. *Science* 306:2077–2080.