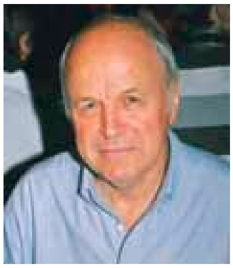
# SOMETHING IN THE AIR



David Vaughan

Very few mineralogists, geochemists or petrologists would regard airborne mineral particles (aerosols) as a part of their remit in terms of either research or teaching. Yet, as this issue of *Elements* magazine demonstrates very clearly, we "ground-based" Earth scientists have much to contribute to this field of investigation. In particular, we have approaches, techniques and skills which are not generally available to atmospheric scientists, who, in most cases, come from backgrounds in pure physics or chemistry. As well as our obvious knowledge of the rock types that are the source of mineral "dusts", we are familiar with the microanalysis of mineral grains, entailing detailed studies of their crystal structure, morphology, composition, textural relationships and parageneses. In many past studies, such crucially important details have been neglected, and the emphasis has been placed on particle size distributions derived from physical behaviour and on bulk composition obtained by complete dissolution of the various size fractions collected. Such an approach is analogous to a geologist collecting rock samples from a series of outcrops, dissolving them in strong acids, and analyzing the resulting solutions without examining the rocks in thin section to determine the minerals present and their textural and paragenetic relationships. We are also skilled in the handling of large, and often incomplete, data sets; such a skill is essential in interpreting data from mineral aerosols, where one brief airborne sampling expedition may yield thousands, if not millions, of particles.

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The subject of mineral aerosols provides an excellent example of a field of research where interdisciplinary approaches offer great advantages. To quote not a scientist but the theologian Paul Tillich, "The boundary is the best place for acquiring knowledge." Interdisciplinary approaches not only bring together a greater diversity of experimental and analytical methods, they also juxtapose fundamentally different philosophies of research – different "ways of thinking". The benefits of bringing together scientists from several disciplines to address complex research problems should be clear to all of us, yet as emphasized in several of the previous editorials published in this magazine, making this happen is commonly very difficult. This results partly from the reluctance of scientists to move into what are, for them, less familiar areas of science – areas where they are less comfortable.

But it also comes directly from the inherent conservatism of both research institutions, particularly universities, and funding agencies (or rather their panels and committees charged with deciding which projects to fund). There may be much talk of the value of interdisciplinary research, but when the time comes to decide where funds are directed, it is often the core disciplines which are protected. That is not to say that core areas, and core skills in particular, should be allowed to wither away. The neglect of optical mineralogy and petrography in many modern university courses is a great mistake which should be rectified before those skills are lost. We need a balanced approach, both to the funding of research and to the ways in which university teaching is organized, so as to take advantage of the great expertise available when several disciplines are brought together.

So what can be done to encourage interdisciplinary research and graduate-level courses in our universities that build upon the full range of available expertise? Partly for political reasons, especially now in this challenging economic climate when research funding is likely to be severely cut back, it is necessary for many scientists to be identified with "grand challenges". At this very difficult time in human history, the important challenges are surely centred upon the Earth sciences and are particularly concerned with climate change and with providing the resources (energy, water, minerals, food) to support a rapidly growing world population, without irreparable environmental damage. This is where we should now direct our main efforts. A key point to be made here is that the Earth sciences are inherently interdisciplinary, drawing as they do upon physics, chemistry, biology, mathematics and even engineering and the social sciences. Many of us are already relatively comfortable with collaborations involving colleagues from these other disciplines. It is appropriate that we be "centre stage" when it comes to pushing ahead the interdisciplinary agenda, both through our own work and through lobbying those who control the funding for research and teaching.

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