established scientists with good funding track records.

Additionally, the decision to specialize or diversify one's research program may be related to the type of employment a young scientist obtains. For example, one symposium participant who had recently accepted a faculty position at a liberal arts college noted that he could view two scenarios occurring with respect to specialization: "(1) The fact that the school has a smaller faculty than at a 'Research 1' university will necessitate my developing more diverse research interests to accommodate more short-term undergraduate projects. (2) My time for research will be limited, and I will need to specialize and focus on several key questions/methods."

The degree to which young scientists specialize or diversify in their research programs may also depend on the funding situation in their country of residence. One participant noted, "Given the lack of research positions within Australia (and funding to do research), it pays to be flexible. Without some willingness to adapt research methods to new systems and research questions, and without a large number of skills in one's toolbox, it would be virtually impossible to find employment within academia."

Therefore, while young scientists may be inclined to diversify during the early stages of their scientific careers, the extent to which this is realized may depend on external conditions. Given the current trends of funding interdisciplinary science, however, symposium participants believe that the careers of many young scientists will benefit from 'keeping some irons in the fire' and developing a diverse research program.

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MEETINGS

Interdisciplinary Intercomparison of Black Carbon Analysis in Soil and Sediment

Analysis and Characterization of Black Carbon in the Environment, Vienna, Austria, 18–19 April 2007

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Last April, a symposium was held to discuss new aspects of the rapidly growing field of research focusing on black carbon in soil, sediment, and the atmosphere. About 70 scientists attended the 2-day session during the European Geosciences Union General Assembly, in Vienna. Part of this symposium included a workshop on chemical reference materials, where results of an interdisciplinary intercomparison of black carbon (BC) measurements in different environmental matrices were released.

BC is the product of incomplete combustion of fossil fuels and biomass and is also called elemental carbon in the atmospheric sciences. BC moves between the atmosphere, oceans, and soils, in the process affecting human health, the Earth's radiative budget, ocean carbon cycling, and soil carbon storage. However, a lack of standards common to atmospheric scientists, oceanographers, soil scientists, and ecologists has made it challenging to assess the role of BC in the carbon cycle. In particular, quantification of BC in complex matrices has proven to be problematic, as was made clear in a recent intercomparative study of BC in soils, where BC concentrations measured by a range of techniques differed by 2 orders of magnitude. BC exists as a chemical continuum of combustion products, and some methods may be ideal for detecting only a fraction of the total BC pool (e.g., soot). Other methods may detect non-BC materials in some types of samples, and some may fail to detect BC in other sample types.

As a consequence, an international BC intercomparison project created a set of BC benchmark materials spanning the combustion continuum and considering the needs of soil scientists, oceanographers, and ecologists. This collection of standards was used in an international intercomparision study reported on during the April symposium.

The intercomparison is the first multimethod, multilaboratory, multisample study to include methods used for soil and sediment BC studies. While there have been many atmospheric intercomparisons, this is the first one additionally including sediment and soil, environments where BC plays important roles. The 12 recommended BC reference materials were quantified by 17 laboratories from different disciplines, using seven different methods. One major goal of this ring trial was to provide a basis on which to choose between the different BC quantification methods in soil and sediment studies.

A clear outcome is that there is no ideal BC method applicable to all scientific questions and all matrices. Instead, it is important to consider the strengths and weaknesses of each method carefully during project planning. Another major conclusion is that future projects that analyze BC in soils and sediments should include the common set of BC reference materials analyzed in the intercomparison, thereby anchoring new data to a larger body of literature. Without the anchor of standards, it will not be possible to compare BC data sets or construct global BC inventories. Further details are given by K. Hammes et al. (Comparison of quantification methods to measure fire-derived (black/elemental) carbon in soils and sediments using reference materials from soil, water, sediment, and the atmosphere, *Global Biogeochemical Cycles*, doi:10.1029/2006GB002871) and at the Web site http://www.geo.uzh.ch/phys/bc.

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