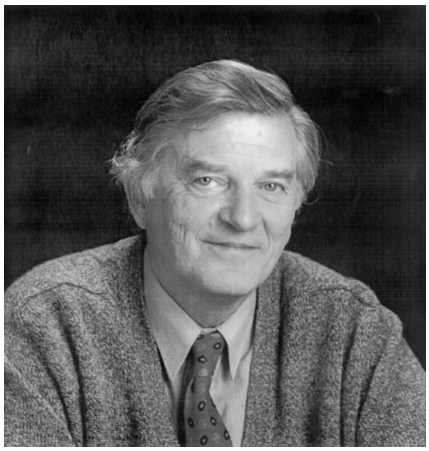

Graeme Bonham-Carter was born in 1939, on the eve of World War II, in London, England. He attended Cambridge University, receiving a Bachelor of Science in Natural Sciences and Geology in 1962. Between his junior and senior years, accompanied by five other Cambridge undergraduates, Graeme spent the summer of 1961 climbing mountains in the Pangnirtung Pass area of Baffin Island. Also that summer, he visited the Geological Survey of Canada in Ottawa, where he met John Andrews and Jack Ives, who were interested in whether some of the Baffin peaks showed evidence of being nunataks, or summits that had not been covered by ice sheets. He also met Tuzo Wilson at the Ottawa home of Graham Rowley, who had carried out archaeological investigations on Baffin Island in the 1930s. Rowley suggested that Graeme should study geophysics, a suggestion that Graeme took to heart. Thus, Graeme's initial experience in the Canadian arctic and early contact with Canadian geoscientists influenced him to pursue a geological career so that he could "better understand what was beneath his feet."

Frank Beales visited Cambridge when Graeme was about to graduate, and invited him to do graduate work at the University of Toronto, where he could focus on carbonate sedimentation and stratigraphy. Not surprisingly, Graeme accepted the offer and enrolled at the University of Toronto to work under Beales' supervision on Devonian carbonates in Alberta and Pennsylvanian carbonates of the Sverdrup Basin in the Canadian Arctic Islands. The work led to an M.S. in 1963 and Ph.D. in 1966.

While at Toronto, Graeme became interested in applying multivariate statistical methods for analyzing compositional variations in carbonate microfacies and in making paleoenvironmental interpretations. Even in those early days, multivariate statistics demanded computers, so Graeme was soon immersed in computing, an involvement that has persisted ever since.

Several key experiences stimulated his entry into computing and mathematics. The first was reading papers by John Imbrie and Ed Purdy on cluster and factor analysis applied to modern carbonate sediments of the Great Bahama Bank. Graeme later visited Imbrie at Columbia University, where he also met Ed Klovan, a student of Imbrie who became well known for research in factor analysis. Cluster and factor analysis proved to be useful in interpreting microfacies in the Pennsylvanian reefs on Ellesmere Island that formed part of Graeme's Ph.D. dissertation. He had also read the book by Sokal and Sneath published in the early 1960s on numerical taxonomy, which conveniently included an algorithm for cluster analysis.

Another key experience was attending bag-lunch sessions organized by Gordon Smith at the University of Toronto. Smith wrote an early book on computing for geologists that stressed

Fortran programming. Graeme found Smith to be very inspiring in a one-on-one situation and Smith encouraged Graeme to take up Fortran programming.

Graeme's first program involved cluster analysis and was published in 1966 in the Kansas Geological Survey's Computer Contribution Series. By that time he had "the programming bug" and was in contact with geological researchers involved in computing. Recall at that time that computing was a dramatically new venture for geologists, so the handful of geologists then involved in computing knew each other and traded programs.

Graeme credits some of my early papers applying factor analysis and simulation to limestones to be relevant to his dissertation work. At Frank Beales' suggestion, Graeme contacted me with respect to a postdoctoral at Stanford. Following a preliminary visit to Stanford before he finished at Toronto, Graeme and I agreed to collaborate, and a proposal to the Office of Naval Research led to a contract that provided funds for Graeme's postdoctoral work from 1966 to 1969. Graeme proved to be the right person at the right time. We were in luck!

The three years that Graeme spent at Stanford were productive and exciting. During his first year, Graeme collaborated closely with a visiting civil engineer from New Zealand, Alex Sutherland, who was working in sedimentation mechanics. The two of them developed Fortran code for simulating the dispersal of sediment and creation of deltas at river mouths. The program probably was the first truly rigorous process simulation model to be developed in sedimentary geology, and for that matter, one of the earliest multidimensional geological process simulation models of any kind.

Early in 1968, I proposed to Graeme that he and I should write a book on the general role of computer simulation in geology, which was then new and revolutionary. Graeme accepted enthusiastically and we plunged into the work. Given the scant precedent for applying simulation in geology, we had to start from scratch, which required considerable effort to decide what to put in the book.

As the book writing went underway, I invited Graeme to share my office, which had plenty of space. We worked side by side for a year and half, with daily discussions about where we were headed and how we could incorporate a spectrum of example simulation models. As Graeme acknowledges, sharing the office had the effect of producing constant interaction between us and helping keep our noses to the grindstone. It was a wonderful period for both of us, and we got great satisfaction from the work, which was stimulating and enjoyable. Graeme and I look back on the period as a highlight in our respective careers. It was also at that time that Graeme met Dan Merriam, who invited Graeme to participate in several geocomputing colloquia that Dan organized in Lawrence, Kansas, early in the heady days of the "computer revolution."

In the fall of 1969, Graeme took a teaching job at the University of Rochester, where he met David Raup and worked with David Pollard, both of whom were pioneers in mathematical and computing approaches to paleontology and structural geology, respectively. Interestingly, Graeme and Pollard had shared an office during Graeme's first year at Stanford.

At Rochester, Graeme developed another fruitful interaction with an engineer, this time with Jack Thomas, with whom he developed a model for wind- driven circulation in the Rochester Embayment of Lake Ontario. Rochester is close to Syracuse, and Graeme frequently visited Syracuse University soon after Dan Merriam started the numerical geology program there in 1970. Another Syracuse friend, Terry Smith, now professor of computer science and geography at the University of California at Santa Barbara, was interested in mathematical modeling and coincidently raised goats as an avocation. During the late 1970s, Graeme admits that he went through a "mid-life crisis" and decided to give up geology and return to England to take up farming. Graeme had grown up on a dairy farm in Somerset, so he knew about the life of a farmer. So his family of seven, including his first wife and five children, settled on a beautiful farm on the Somerset-Devon border, milking 60 Friesian cows and growing seed potatoes and winter barley. It was hard work and hardly the life of a "gentleman farmer," but it was a great change!

While life in rural England had its charms, Graeme did not escape completely from the influence of the geomathematical enthusiasts. A succession of them visited the farm, including Dan Merriam, which in turn led to invitations to professional meetings, including functions hosted in London by Graham Lea of GeoAbstracts fame.

As Graeme relates, "It's hard to imagine an occupation further from geomathematics than farming, but farming does have its counterpart of mathematical applications. Milk-production records from individual cows provided a database for decisions about breeding, feeding and culling the cows, as well as managing the herd for beef production." But, he recalls that Dan Merriam was horrified that the excellent beefsteak at Graeme's house had come from Emil, an Angus steer raised for meat. Graeme further relates that "memories of fetching the cows for milking in the early morning, at least in good weather, linger still. Less good, however, are memories of milking for a neighbor who had taken a week's holiday over Christmas, so we had double milking morning and evening. Once we arrived after dark to find that the neighbor's cows had broken through an electric fence and were grazing on a crop of kale. The cows were in no mood to behave because they were having a grand feast, rain notwithstanding. It was a muddy nightmare! This also was the period when James Herriot's books and TV shows were popular, but we had some farming experiences to match his veterinary tales in the Yorkshire dales."

"I suppose sanity prevailed, and there was the need for more income for my growing family, so we returned to Canada, and even tried farming there for a while on the shores of Lake Ontario. Notable experiences included growing acres of cauliflower and cabbage."

"A great lifesaver occurred when Dan Merriam offered me a term of teaching at Syracuse, filling a slot that became available when John Cubitt left the Syracuse faculty for a job in industry. This got me back into the geological milieu, for which I'll be eternally grateful, and in turn led to my getting a job with Frits Agterberg's geomathematics group at the Geological Survey of Canada. Of course the GSC has been a very good experience for me ever since, not least of which has been the opportunity to work with Frits."

Given the close ties between Frits Agterberg and Graeme, it is appropriate that Frits describe their long-standing collegial relationships. Frits writes that "Graeme Bonham-Carter has been my colleague in the Geomathematics Section of the Geological Survey of Canada since 1980, and later also as adjunct professor in the Department of Geology of the University of Ottawa. Graeme's 400-page book, entitled Geographic Information Systems for Geoscientists: Modelling with GIS, was first published in 1994, and remains a tremendous success and has increased the interest of many scientists in our profession. More than 20 universities use the book as a text, and it is now in its third printing, with more than 5000 copies sold to date. The course that he has taught dealing with GIS has been well received by graduate students at the University of Ottawa. His support of the IAMG has been strong, and since 1995 he has served as Editor-in-Chief of Computers & Geosciences, an important task requiring diligence and persistence, in addition to broad knowledge in this interdisciplinary field. The association with Graeme has been a real privilege for me, and has included the joint editing of the volume on Statistical Applications in the Earth Sciences published in 1988 by the Geological Survey of Canada."

Graeme has made significant contributions to the design and implementation of major multidisciplinary projects, particularly in development of geographic information systems for integrated mineral-potential mapping. He pioneered the 'weights of evidence' technology for pattern analysis and prediction, and collaborated on the design of a multiparticipant approach in the environmental initiative of the Canadian government. His research on spatial data analysis and innovative mathematical modeling of geochemical datasets are examples of outstanding contributions. Since 1990 he has published 65 papers in the &664257;eld of geomathematics and GIS, including 24 as first or sole author.

Graeme's creativity stems from his ability to link geological and mathematical ideas, and to implement them in a computational framework. Expert-system and statistical GIS models, with strong emphasis on exploration knowledge, have been hallmarks of his creative mineral potential studies in Canada, including Nova Scotia, Snow Lake, Parry Islands and Slave Province. Incorporation of uncertainty (due to missing data) into weights of evidence and his recognition of the mathematical linkages between weights and relative density of discrete events in 2D provide other examples of his creative abilities.

His recent nonlinear approach to modeling dispersion of metals around smelters, with automatic determination of the geological background provides an example of a new concept useful in future studies on metals in the environment. Earlier work now in frequent use, includes a mathematical-mixing model as the basis for catchment analysis in exploration geochemistry. Since the 1960s he has demonstrated how diverse mathematical skills can be applied to a wide range of geoscience problems.

In 1995, Graeme was selected as Editor-in-Chief of the IAMG's Computers & Geosciences, the premier international journal dealing with computational applications in geosciences that is now in its 25th year. Presently, ten issues a year are published, with more than 200 papers submitted a year, of which about 70 percent are selected for publication. As editor, Graeme interfaces with an editorial board of 35, as well as 600 institutional subscribers.

“He has made major changes to improve the quality and impact of C&G, that include launching an FTP site for computer code associated with published articles so the code can be accessed directly through a searchable directory on the Internet, which has led to dispersion of more than a thousand copies of programs per month. He also initiated Computers & Geosciences Online, which has established C&G as one of the first premier geoscience journals to be fully online.” In closing, it is appropriate that the International Association for Mathematical Geology recognize Graeme’s contributions to the IAMG and to the geoscience profession as a whole, by awarding him the IAMG’s highest award, the William Christian Krumbein Medal.

John W. Harbaugh
Department of Geological Sciences
Stanford University