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Numerical Palaeobiology

Comparative analysis of fossil abundance
and diversity using numerical
ecological models

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Summary: Numerical palaeobiology is a new approach to the analysis of fossil abundance and diversity data. It involves the use of numerical models to simulate the patterns of fossil abundance and diversity that would be expected under different hypotheses about the processes that have shaped the fossil record. The models are then compared with the observed patterns of fossil abundance and diversity to test the hypotheses. Numerical palaeobiology has the potential to revolutionize the way in which fossil abundance and diversity data are analysed, and to provide a more rigorous and quantitative approach to the study of the fossil record.

Numerical Palaeobiology Computer Based Modelling And Analysis Of Fossils And Their Distributions

Shasha Hu



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Numerical Palaeobiology D. A. T. Harper, 1999-07-09 Numerical Palaeobiology Computer Based Modelling and Analysis of Fossils and their Distributions Edited by David A T Harper University of Copenhagen Denmark Microcomputers have become an everyday part of the palaeobiologists tool kit Moreover there is now a wide range of computer software available to handle all sorts of palaeontological data and problems This book aimed at final year undergraduates graduate students and professional palaeontologists biologists and geologists brings together the many strands of contemporary palaeontology through the medium of numeracy It provides a comprehensive review with applications of the many computer based techniques available for the analysis and modelling of palaeontological data The first part of the book covers classical phenetic taxonomy through cladistics and the computer generated reconstructions of fossils to actual models for fossil growth This leads onto distribution analysis and modelling of fossils in time and space Detailed stratigraphical distributions of fossils are described in quantitative terms together with the larger scale patterns in the history of life itself while palaeoecology palynofacies trace fossils and palaeogeography are all introduced through a spectrum of numerical algorithms The majority of the studies are linked to specific software packages and many are illustrated with case histories Although there are a number of books available on computer modelling and data analysis in geology no study has integrated the two with such a range of palaeontological subject material Techniques for Virtual Palaeontology, Enhanced Edition Mark Sutton, Imran Rahman, Russell Garwood, 2014-02-05 Virtual palaeontology the use of interactive three dimensional digital models as a supplement or alternative to physical specimens for scientific study and communication is rapidly becoming important to scientists and researchers in the field Using non invasive techniques the method allows the capture of large quantities of useful data without damaging the fossils being studied Techniques for Virtual Palaeontology guides palaeontologists through the decisions involved in designing a virtual palaeontology workflow and gives a comprehensive overview providing discussions of underlying theory applications historical development details of practical methodologies and case studies Techniques covered include physical optical tomography serial sectioning focused ion beam tomography all forms of X ray CT neutron tomography magnetic resonance imaging optical tomography laser scanning and photogrammetry Visualization techniques and data file formats are also discussed in detail Readership All palaeontologists and students interested in three dimensional visualization and analysis New Analytical Methods in Earth and Environmental Science Because of the plethora of analytical techniques now available and the acceleration of technological advance many earth scientists find it difficult to know where to turn for reliable information on the latest tools at their disposal and may lack the expertise to assess the relative strengths or limitations of a particular technique This new series will address these difficulties by providing accessible introductions to important new techniques lab and field protocols suggestions for data handling and interpretation and useful case studies The series represents an invaluable and trusted source of information for

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Garwood,2013-10-23 Virtual palaeontology the use of interactive three dimensional digital models as a supplement or alternative to physical specimens for scientific study and communication is rapidly becoming important to advanced students and researchers Using non invasive techniques the method allows the capture of large quantities of useful data without damaging the fossils being studied Techniques for Virtual Palaeontology guides palaeontologists through the decisions involved in designing a virtual palaeontology workflow and gives a comprehensive overview providing discussions of underlying theory applications historical development details of practical methodologies and case studies Techniques covered include physical optical tomography serial sectioning focused ion beam tomography all forms of X ray CT neutron tomography magnetic resonance imaging optical tomography laser scanning and photogrammetry Visualization techniques and data file formats are also discussed in detail Readership All palaeontologists and students interested in three dimensional visualization and analysis New Analytical Methods in Earth and Environmental Science Because of the plethora of analytical techniques now available and the acceleration of technological advance many earth scientists find it difficult to know where to turn for reliable information on the latest tools at their disposal and may lack the expertise to assess the relative strengths or limitations of a particular technique This new series will address these difficulties by providing accessible introductions to important new techniques lab and field protocols suggestions for data handling and interpretation and useful case studies The series represents an invaluable and trusted source of information for researchers advanced students and applied earth scientists wishing to familiarise themselves with emerging techniques in their field All titles in this series are available in a variety of full colour searchable eBook formats Titles are also available in an enhanced eBook edition which may include additional features such as DOI linking high resolution graphics and video **Computational Paleontology** Ashraf M.T.

Elewa,2011-03-04 Computational paleontology is simply a term applied to using computers and its facilities in the field of paleontology However we should be exactly precise in describing the term through explaining the main themes of this motivating and attractive scientific field The uppermost aim of this book is to explain how computation could be competent in fetching fossils to life and the past to present Computers for paleontologists save time and costs interpret mysterious events precisely and accurately visualize the ancient life definitely and undeniably [Trace Fossils as Indicators of Sedimentary Environments](#) Dirk Knaust,Richard G. Bromley,2012-12-31 Integration of ichnological information into sedimentological models and vice versa is one of the main means by which we can improve our understanding of ancient depositional environments Mainly intended for sedimentologists this book aims to make ichnological methods as part of facies

interpretation more popular providing an analytical review of the ichnology of all major depositional environments and the use of ichnology in biostratigraphic and sequence stratigraphic analysis It starts with an introduction to the historical aspect of ichnology introducing common concepts and methods and then continues with parts treating the main depositional systems from continental shallow marine and deep marine siliciclastics and marine carbonates The last part is dedicated to the ichnology in hydrocarbon reservoir and aquifer characterization First overview in 25 years of the status of ichnological studies in facies reconstructions of all major depositional environments Written by a selected well experienced and specialized international authorship Provides easy access to the comprehensive and widespread literature

The Rise and Fall of the Ediacaran Biota Patricia Vickers-Rich, Patricia Komarower, 2007 The Proterozoic and early Phanerozoic was a time punctuated by a series of significant events in Earth history Glaciations of global scale wracked the planet interfingering with dramatic changes in oceanic and atmospheric chemistry and marked changes in continental configuration It was during these dynamic and weedy times that metazoans first appeared diversified culminating in the appearance of hard tissue skeletons and deep farming of the marine substrate in late Proterozoic and first few millions of years of the Phanerozoic This book is the culmination of two symposia of UNESCO International Geological Correlation Project 493 one in Prato Italy in 2004 the second in Kyoto Japan in 2006 Both dealt specifically with the precise timing of physical events and teasing out of the effects which these changing environments climates global chemistry and palaeogeography had on the development and diversification of animals culminating in the spectacular Ediacaran Vendian faunas of the late Precambrian

Applied Palaeontology Robert Wynn Jones, 2006-05-04 This book was first published in 2006 Palaeontology has developed from a descriptive science to an analytical science used to interpret relationships between earth and life history Applied Palaeontology adopts a holistic integrated approach to palaeontology highlighting its key role in the study of the evolving earth life history and environmental processes After an introduction to fossils and their classification each of the principal fossil groups are studied in detail covering their biology morphology classification palaeobiology and biostratigraphy The latter sections focus on the applications of fossils in the interpretation of earth and life processes and environments It concludes with case histories of how our knowledge of fossils is applied in industry and elsewhere This is a valuable reference for anyone involved in the applications of palaeontology including earth life and environmental scientists and petroleum minerals mining and engineering professionals

Museums at the Forefront of the History and Philosophy of Geology Gary D. Rosenberg, Renee M. Clary, 2018 Information on museum activities around the world

Science in the Archives Lorraine Daston, 2022-12-22 Archives bring to mind rooms filled with old papers and dusty artifacts But for scientists the detritus of the past can be a treasure trove of material vital to present and future research fossils collected by geologists data banks assembled by geneticists weather diaries trawled by climate scientists libraries visited by historians These are the vital collections assembled and maintained over decades centuries and even millennia which define the

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Brachiopods Howard Brunton,L. Robin M. Cocks,Sarah L Long,2001-11-29 The growth history of a brachiopod is entombed in its shell but research on fossil and living brachiopods has generated unanswered questions about these marine invertebrates Several contributors to Brachiopods Past and Present comment on their differing structures and morphological detail They use these as examples of ontogenetic and evolutionar

Biodiversity of Vegetation and Flora in Tropical Africa Luís Catarino,Maria M. Romeiras,2020-12-03 African ecosystems comprise a wealthy repository of biodiversity with a high proportion of native and endemic plant species which makes them biologically unique and providers of a wide range of ecosystem services A large part of African populations in both rural and urban areas depend on plants for their survival and welfare but many ecosystems are being degraded mostly due to the growing impacts of climate change and other anthropogenic actions and environmental problems Loss of habitat and biodiversity affects livelihoods water supply and food security and reduces the resilience of ecosystems in the African continent The knowledge about the great African plant and ecosystem diversity and the structure composition and processes involved in vegetation dynamics is crucial to promote their sustainable use and to preserve one of the most understudied regions in the world This Special Issue aimed to gather contributions that update and improve such knowledge

Spatial Heterogeneity of Forest-Steppes Laszlo Erdos,2021-06-03 Forest steppes occupy a wide zone between Eurasian closed canopy forests and open steppes and feature a mosaic of woody and herbaceous vegetation Due to the occurrence of structurally compositionally and environmentally strongly different habitats in close proximity high spatial heterogeneity is one of the key characteristics of forest steppe ecosystems This volume presents ten contributions examining forest steppe heterogeneity and its effects on environmental factors plant communities and animals

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