

Dedication to Dr Martin Angel and Prof. Mike Fasham FRS

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Dr Martin Angel

Martin Angel was born near London in 1937. He obtained a degree in natural sciences at Cambridge University in 1960, thereafter joining the University of Bristol as a Demonstrator in Zoology. His participation in the International Indian Ocean Expedition (1963-4), involving 10 months at sea, launched him into a career of many achievements associated with the open ocean. In particular it initiated his lifelong interest in oceanic ostracods, a group of small crustaceans living throughout the world's oceans as well as on land and in fresh water. These were the subject of his PhD, completed in 1967 shortly after joining the UK National Institute of Oceanography (NIO) and leading him to become one of the world's foremost authorities on the group.

Variation in time and space was to become an underlying theme of his approach to oceanography at a time when many believed wrongly that the open ocean was less variable than the coastal seas. His first task in the biology department at NIO was to analyze data from the 1965 SOND cruise, focusing on the vertical zonation of planktonic ostracods. This was to ascertain which pelagic species were responsible for so called Deep Scattering Layers. Mike Fasham had just joined the newly formed computing department, and was inveigled into helping in both the analysis and interpretation of the results, the start of a very fruitful partnership that lasted many years. In the 1970's Martin was a key player in biological oceanography combining a deep understanding of the biology of the individual plankton species with

observations on their temporal and spatial variability. There were very few people in the field who had the observational and intellectual skills to make this link and the insights gained continue to be a source of guidance for those who follow in his steps.

Through the involvement of the Biology Department in assessing the deep ocean for the disposal of high-level radioactive waste Martin began work on the structure and function of deep ocean communities. In particular this work encouraged the development of the nascent benthic group. In the early 1980s this group made a significant contribution to oceanography in the discovery of the rapid deposition of phytodetritus on the abyssal sea floor. Continuing his interest in the interactions between man and the environment, Martin made a significant contribution to the debate on the disposal of the Brent Spar oil platform and was a frequent spokesman to the House of Lords Select Committee.

Despite retiring in 1997 he has continued to work at NOCS and in 1998 gave the prestigious annual Buckland lecture with the title "Sustainable Use of the Open Oceans: Waste Disposal". He has sat on many committees, playing a substantial role in the wider scientific community. More specifically he co-edited *Progress in Oceanography* for 25 years, helped draw up the UK's Biodiversity Action Plan and has been a member of WWF-UK's Conservation Committee for 18 years, specializing in aspects of marine conservation and management. He has participated in over 30 research cruises and written over 150 scientific papers many of which are widely cited.

Prof. Mike Fasham FRS

Mike Fasham was born near London in 1942 and educated at Kilburn Grammar School and Birmingham University where he obtained a degree in physics in 1963, followed by a PhD in marine geophysics in 1968. In the same year he joined the National Institute of Oceanography and, with Jim Crease, developed one of the first shipboard computer systems in the world. He also began cooperating with Martin Angel, to use multivariate statistical techniques to analyse the zoogeographic distribution of zooplankton. This was a major achievement in a field which was largely descriptive at the time, and in 1973 he joined the Marine Biology department, where he brought his strong mathematical skills to bear on a range of topics.

In the late 70s and early 80s, Mike worked on the centuries old question of what produces spatial variability, or “patchiness”, in plankton, using both theoretical and observational approaches. He added an in situ fluorometer to the SeaSoar undulator to map the small-scale distribution of phytoplankton chlorophyll in the ocean and this led to a more general interest in ecosystem modelling. This was a field still in its infancy but ripe for development with the rapidly improving capabilities of computers. Mike exploited this opportunity with considerable vision, leading to the seminal Fasham-Ducklow-McKelvie marine ecosystem model. Their 1990 paper, "A nitrogen-based model of plankton dynamics in the oceanic mixed layer" is a landmark in the field, having been cited nearly 500 times, and has had a profound and long-lasting influence on marine ecosystem modelling. Mike quickly built on this, working with Jorge Sarmiento at Princeton University, and others, to embed this in an Atlantic physical model to provide the first 3D marine ecosystem simulation. The direct

descendants of this first coupled model are now being used to forecast how the marine ecosystem will respond to future changes.

Mike played a key role in the development of the international Joint Global Ocean Flux Study (JGOFS), serving on the National and International Committees and ultimately as chair of the International Committee from 1998 to 2000. He was awarded the Challenger Society Silver Medal in 2002 and in recognition of his major contributions to marine science he was elected a Fellow of the Royal Society in 2000.

After his “retirement” Mike remained as academically active as ever. He lectured to Masters students on ecological modelling, was a welcoming mine of information and advice for PhD students and continued research projects with a range of collaborators.

Mike sadly died in June 2008, after a long but courageous and dignified fight with cancer, at a time when he still had much to contribute to the science of oceanography.

Martin Angel's Bibliography

Angel M.V. (Rapporteur) 1998. Working group 1 report on Productivity regulation and ecosystem variability: Ecosystem manipulation. pp 11-17 in Ocean Harvest 97; A workshop on new concepts to increase the sustainable development of marine biological resources. SOC Report (edited by E.Hoe, D.S.M. Billet and J.G.Shepherd).

Angel M.V. 1982. The Atlantic halocyprid ostracods *Halocypris inflata* (Dana 1848) and *H. pelagica* Claus 1880, sibling species which possibly show character displacement. In *Fossil and Recent Ostracods*, R. Bate, E. Robinson and L. Sheppard (eds). Pp 327-343. Chichester: Ellis Horwood/ British Micropalaeontological Society.

Angel M.V. 2003. The pelagic environment of the open ocean. Chapter 3. In *Ecosystems of the Deep Oceans*. P.A.Tyler (Ed.) Ecosystems of the World Series. Elsevier Science. Pp39-79.

Angel M.V. and M.J.R. Fasham 1983. Eddies and biological processes. In: *Eddies in Marine Science*, A.R. Robinson (ed.), Pp. 492-524. Berlin: Springer-Verlag.

Angel M.V. and P.M. Hargreaves, 1992. Large scale patterns in the distributions of planktonic and micronektonic biomass in the N.E.Atlantic. *ICES Journal of Marine Science*, **49**: 403-411.

Angel, H.H. & Angel, M.V. 1967. Distribution pattern analysis: in a marine benthic community. *Helgolander wiss. Meeresunters*, **15**: 445-454.

Angel, M.V. & A.L. Rice, 1993. Biodiversity of the deep oceans. *NERC News* **27**: 34-36.

Angel, M.V. & Blachowiak-Samolyk, K, 2008. Insights gained from a web-based atlas of halocyprid ostracods of the Southern Ocean. *Revue de Micropaléontologie*, **51**, 339-348.

Angel, M.V. & Blachowiak-Samolyk, K. 2006. *Obtusoechia* (Halocyprida: Myodocopa:Ostracoda) a bipolar planktonic oceanic genus. Taxonomy, bathymetry and zoogeographical distribution. *Annales Zoologici*, **56**, 197-213.

Angel, M.V. & Rice, A.L. 1996. The ecology of the deep sea and its relevance to global waste management. *Journal of Applied Ecology*, **33**, 915-926.

Angel, M.V. (ed.) 1984. Marine science of the North-west Indian Ocean and adjacent waters. *Proceedings of the Mabahiss/John Murray International Symposium*, Egypt, 3-6 September 1983. *Deep-Sea Research*, **31**: 571-1035.

Angel, M.V. 1966. A histological and experimental approach to neurosecretion in *Daphnia magna*. In: *Neurosecretion*. Fourth International Symposium on Neurosecretion. F. Stutinsky (ed.). Pp. 229-237.

Angel, M.V. 1968. Bioluminescence in planktonic halocyprid ostracods. *J. mar. biol. Ass. U.K.*, **48**: 255-257.

Angel, M.V. 1968. *Conchoecia skogsbergi* Iles, a halocyprid ostracod new to the Norwegian Sea. *Sarsia*, **33**: 1-6.

Angel, M.V. 1968. The thermocline as an ecological boundary. *Sarsia*, **34**: 299-312.

Angel, M.V. 1969. Planktonic ostracods from the Canary Island region: their depth distributions, diurnal migrations and community organisation. *J. mar. biol. Ass. U.K.*, **49**: 515-553.

Angel, M.V. 1969. Repeated samples from a deep midwater planktonic ostracod community. *J. exp. mar. Biol. Ecol.*, **3**: 76-89.

Angel, M.V. 1969. The ostracod *Conchoecia porrecta* Claus redescribed compared with *C. spinirostris* Claus. *Crustaceana*, **17**: 35-44.

Angel, M.V. 1969. The redescription of three halocyprid ostracods, *Conchoecia hyalophyllum* Claus, *C. magna* Claus and *C. parthenoda* Müller from the North Atlantic. *Crustaceana*, **17**: 45-63.

Angel, M.V. 1970. *Bathyconchoecia subrufa* n. sp. and *B. septemspinosa* n. sp., two new halocyprids (Ostracoda, Myodocopida) from the tropical North Atlantic and the description of the larval development of *B. subrufa*. *Crustaceana*, **19**: 181-199.

Angel, M.V. 1970. Observations on the behaviour of *Conchoecia spinirostris*. *J. mar. biol. Ass. U.K.*, **50**: 731-736.

Angel, M.V. 1970. The redescription of *Conchoecia bispinosa* Claus, *C. haddoni* Brady & Norman and *C. secernenda* Vavra from the North Atlantic. *Crustaceana*, **18**: 147-166.

Angel, M.V. 1971. *Conchoecia* from the North Atlantic. The 'procera' group. *Bull. Br. Mus. nat. Hist., (Zool.)*, **21**: 259-283.

Angel, M.V. 1972. *Conchoecia pseudoparthenoda* (nov. sp.) a new halocyprid ostracod for the tropical North Atlantic. *Bull. Br. Mus. nat. Hist. (Zool.)*, **21**: 289-296.

Angel, M.V. 1972. Planktonic oceanic ostracods - historical, present and future. *Proc. Roy. Soc. Edinb. (B)*, **73**: 213-228.

Angel, M.V. 1973. The description of the female of *Bathyconchoecia sagittarius* Deevey, 1968 (Myodocopida, Halocyprididae). *Crustaceana*, **25**: 211-219.

Angel, M.V. 1976. *Bathyconchoecia arctica* n.sp., a new species of ostracod (Halocyprididae, Myodocopida) from the Arctic. *Crustaceana*, **31**: 59-65.

Angel, M.V. 1977. Discussion on sampling methods. In: *Proceedings of the Sixth International Ostracod Symposium*, H. Löffler and D. Danielopol (eds) Pp. 491-493.

Angel, M.V. 1977. Some speculation on the significance of carapace length in planktonic halocyprid ostracods. In: *Proceedings of the Sixth International Ostracod Symposium*, H. Löffler and D. Danielopol (eds) Pp. 45-54.

Angel, M.V. 1977. Studies on Atlantic halocyprid ostracods: vertical distributions of the species in the top 100m in the vicinity of 44°N, 13°W. *J. mar. biol. Ass. U.K.*, **57**: 239-252.

Angel, M.V. 1977. Windows into a sea of confusion: sampling limitations to the measurement of ecological parameters in oceanic mid-water environments. In: *Oceanic Sound Scattering Prediction*, N.R. Anderson and B.J. Zahuranec (eds) Pp. 217-248. New York: Plenum Press.

Angel, M.V. 1978. Biological Oceanography. In: *Advances in Oceanography*, H. Charnock and G.E.R. Deacon (eds), Pp 297-306. New York: Plenum Press.

- Angel, M.V. 1979. Studies on Atlantic halocyprid ostracods: Their vertical distributions and community structure in the central gyre region along latitude 30°N from off Africa to Bermuda. *Progress in Oceanography*, **8**: 1-122.
- Angel, M.V. 1979. Zoogeography of the Atlantic. In: *Zoogeography and Diversity in Plankton*, S.van der Spoel and A.C. Pierrot-Bults (eds), Pp 168-190. Utrecht: Bunge Scientific Publishers.
- Angel, M.V. 1981. *Conchoecia nasotuberculata* Muller 1906 and *C. kyrtophora* Muller 1906, two species which have often been confused. *Crustaceana*, **41**: 46-63.
- Angel, M.V. 1981. Ostracoda. In: *Atlas del zooplankton del Atlantico suboccidental y metodos de trabajo con el zooplancton marino*, D. Boltovskoy (ed.) Pp. 453-485. Mar del Plata, Argentina: INIDEP.
- Angel, M.V. 1982. Ocean trench conservation. *IUCN Commission on Ecology Papers*, **1**: 1-17. (*The Environmentalist*, **2**: Supplement no 1.)
- Angel, M.V. 1983 A vertical profile of planktonic ostracods at 42°N 17°W from depths of 1500-3900m. In: *Applications of Ostracoda*, R.F. Maddocks (ed.), Pp 549-559. Houston Texas: University of Houston Geoscience Department.
- Angel, M.V. 1983. A review on the progress of research on halocyprid and other oceanic planktonic ostracods 1972-82. In: *Applications of Ostracoda*, R.F. Maddocks (ed.), Pp 529-548. Houston Texas: University of Houston Geoscience Department.
- Angel, M.V. 1983. Are there any potentially important routes whereby radionuclides can be transferred by biological processes from the sea-bed towards the surface? In: *Ecological Aspects of Radionuclide Release*, P.J. Coughtrey (ed.), Pp. 161-176. British Ecological Society, Special Publication. **3**.
- Angel, M.V. 1984. Deepwater biological processes in the northwest region of the Indian Ocean. *Deep-Sea Research*, **31**: 935-950.
- Angel, M.V. 1984. Detrital organic fluxes through pelagic ecosystems. In: *Flows of Energy and Materials In Marine Ecosystems: Theory and Practice*, M.J.R. Fasham (ed.), Pp. 475-516. New York: Plenum Press.
- Angel, M.V. 1984. The diurnal migrations and distributions of a mesopelagic community in the North-east Atlantic. 3. Planktonic ostracods, a stable component in the community. *Progress in Oceanography*, **13**: 319-351.
- Angel, M.V. 1985. A review of biological processes within oceanic water columns relevant to the assessment of safety of disposal of waste, notably radioactive isotopes on or within the seabed. *Institute of Oceanographic Sciences Report*, No. **198**, 97pp.
- Angel, M.V. 1985. Vertical migrations in the oceanic realm: possible causes and probable effects. In: *Migration, Mechanisms and Adaptive Significance*, M.A. Rankin (ed.). Contributions in Marine Science, Texas, Supplement to vol. **27**: 45-70.
- Angel, M.V. 1986. Vertical distribution: Study and implications. In: *Pelagic Biogeography: Proceedings of an International Conference*, The Netherlands 29 May-5 June 1985. Paris, UNESCO. [*UNESCO Technical Papers in Marine Science*, No **49**], 3-8.
- Angel, M.V. 1987. Criteria for protected areas and other conservation measures in the Antarctic Region. *Environmental Conservation*, **13**: 105-114.

- Angel, M.V. 1988. The deep-ocean option for the disposal of sewage sludge. *The Environmentalist*, **8**: 19-26.
- Angel, M.V. 1989. Does mesopelagic biology affect the vertical flux? In: *Productivity of the Oceans: Past and present*. [Proceedings of Dahlem Workshop on...] eds W.H. Berger, V.S.Smetacek and G. Wefer. John Wiley, pp. 155-173.
- Angel, M.V. 1989. Going through the motions. *Parliamentary Maritime Review*.
- Angel, M.V. 1989. Vertical profiles of pelagic communities in the vicinity of the Azores Front and their implications to deep ocean ecology. *Progress in Oceanography*. **22**: 1-46.
- Angel, M.V. 1990. Food in the deep ocean. Pp. 273-285 in *Ostracoda and global events*, eds R. Whatley and C. Maybury, Proceedings of the tenth Ostracod Symposium, Aberystwyth, July 1988. Chapman and Hall, London.
- Angel, M.V. 1990. Life in the benthic boundary layer: connections to the mid-water and sea floor. *Phil. Trans. R. Soc. Lond., A* **331**: 15-28.
- Angel, M.V. 1990. The deep ocean option for waste disposal. *Underwater Technology*, **16**: 15-24.
- Angel, M.V. 1991. Biodiversity in the oceans. *Ocean Challenge*, **2**, (Spring), 28-36.
- Angel, M.V. 1991. Review:- Antarctic ecosystems: ecological change and conservation (K.R. Kerry & G.Hempel Springer-Verlag, 427pp, 1990). *Ocean Challenge*, **2** (Summer/Autumn): 49-50.
- Angel, M.V. 1991. Review:- Conserving the world's biodiversity (J.A.McNeeley et al. IUCN 174pp 1990). *Environmentalist*, **11**: 156-157.
- Angel, M.V. 1991. Review:- Marine reserves for New Zealand (W.J. Ballentine, Leigh Laboratory Bulletin 25, University of Auckland 1990). *Ocean Challenge*, **2** (Winter): 37.
- Angel, M.V. 1991. Variations in time and space: is biogeography relevant to studies of long-time scale change? *J. mar. biol. Ass. U.K.*, **71**: 191-206.
- Angel, M.V. 1992. Deep abyssal plains, do they offer a viable option for disposal of large bulk low-toxicity waste? Pp 61-75 in *The Science and Technology of Ocean Management*, [Proceedings of SUT/Challenger Society Meeting on...] H. Smith (ed.), London: Routledge.
- Angel, M.V. 1993. A brief review of research activities 1983-1993 relevant to the assessment of low-level radioactive waste disposal with special reference to NERC capabilities. *Confidential report for Director MASD*.
- Angel, M.V. 1993. Eat or be eaten: gambling for survival. Pp 93-109 in, *The Oceans: a celebration*, L. Silcock (ed.), Ebury Press London 224pp.
- Angel, M.V. 1993. *Pelagic Marine Ostracoda*. Synopses of the British Fauna (New Series), (eds. D.M. Kermack, R.S.K. Barnes and J.H. Crothers), **48**, published for Linnean Society of London and The Estuarine and Coastal Sciences Association by the Field Studies Council. 239pp.

- Angel, M.V. 1993. Review:- Ecosystem Experiments, H.A. Mooney, E. Medina, D.W. Schindler, E.-D.Schulze and B.H. Walker (eds), John Wiley and Sons, Chichester and New York, 1991. 268pp. *The Environmentalist* **13**, 307-308.
- Angel, M.V. 1993. Review:- Systematics, Ecology and the Biodiversity Crisis, Niles Eldredge (ed.) Columbia University Press. *The Environmentalist* **13**, 231-232.
- Angel, M.V. 1994. Getting into deep water. Review of Global Marine Biological Diversity: A Strategy for building conservation into decision making. E.A.Norse (ed) Island Press, Washington DC, *Nature, London*, **367**: 126-127.
- Angel, M.V. 1994. Long-term, large scale patterns in marine pelagic systems. Pp 403-439 in Proceedings of the 34th British Ecological Society Symposium *Aquatic Ecology: scale, pattern and process*, Giller, P.S., Hildrew, A.G. & Raffaelli D.G. (Eds). Blackwell Scientific Publications.
- Angel, M.V. 1994. Monitoring the deep ocean for risk assessment: another role for GOOS. (7pp) in *Oceanology International 94*, Conference Proceedings, 1 Brighton, Spearhead Exhibitions Ltd.
- Angel, M.V. 1994. Spatial distribution of marine organisms: pattern and process. Pp. 59-109, in Proceedings of the 35th British Ecological Society Symposium, *Large Scale Ecology and Conservation Biology*, Edwards, P.J., May, R., & Webb N.R. (Eds), Blackwell Scientific Publications.
- Angel, M.V. 1995. Brent Spar: no hiding place. *Biologist*, **42**, 192.
- Angel, M.V. 1995. Final burial at sea. *The Scotsman* p.16 Magazine, Environment section. 6th June 1995.
- Angel, M.V. 1995. Plankton sampling. *Porcupine Newsletter*, **6** (3). 76-78.
- Angel, M.V. 1995. The Discovery Collections: 70 years of sampling the ocean's fauna. *Ocean Challenge*, **5**, 34-39.
- Angel, M.V. 1996. Biodiversity of the pelagic ocean. Pp 192-206 in, *Oceanography: Contemporary Readings in Ocean Science* (3rd edition), R. Gordon Pirie (ed.). Oxford University Press. New York, Oxford.
- Angel, M.V. 1996. *Ocean diversity*. Chapter 15 pp 228-243, in *Oceanography* S.Thorpe and C.P.Summerhayes (eds), Manson Press, London.
- Angel, M.V. 1996. Oceanic biodiversity: Origins and maintenance. Pp 33-60 In: *Atti dell'11° Congresso dell'Associazione Italiana di Oceanologia e Limnologia* (Sorrento, 16-28 Ottobre 1994). Eds G.Albertelli, A De Maio & M.Piccazzo. A.I.O.L., Genova.
- Angel, M.V. 1996. Ostracoda. Chapter 7 in: *Introduccion al estudio del Zooplankton Marino* Gasca, R. and Suae E. (eds). El Colegio de la Frontera Sur (ECOSUR), CONACYT, Mexico, pp. 213-247.
- Angel, M.V. 1996. The biology of continental slopes. Pp, 113-119, In *Ocean storage of carbon dioxide: Workshop 2 - Environmental Impact*. Bill Ormerod and Martin Angel (eds). IEA Greenhouse Gas R&D Programme, Cheltenham. 131pp.
- Angel, M.V. 1996. The deep ocean - A sustainable option for waste disposal? In *Marine Environmental Management: Review of events in 1995 and future trends*, edited Bob Earll. Published by Bob Earll, Kempley Glos. 138pp.

- Angel, M.V. 1996. Waste disposal in the ocean. Chapter 22 pp 338-345, in *Oceanography* S.Thorpe and C.P.Summerhayes (eds), Manson Press, London.
- Angel, M.V. 1997 The biodiversity action plan: Insights from the deep ocean. Pp 43-48, in: *Marine Environmental Management Review of 1996 and future trends*, ed. R. Earll. Candle Cottage, Kempsey, Gloucestershire GL18 2BU.
- Angel, M.V. 1997. Pelagic biodiversity. Pp. 35-68, in *Marine Biodiversity: Patterns and Processes* R.F.G. Ormond, J.Gage and M.V.Angel (eds), Cambridge University Press.
- Angel, M.V. 1997. What is the Deep-sea? Pp 2-41, In *Deep-Sea Fishes*. eds D.J. Randall & A.P. Farrell, Academic Press, pp 388. Fish Physiology series 16.
- Angel, M.V. 1998. Importance of biogeography in global change and biodiversity studies. pp 27-35, In: *Proceedings of ICOPB 2 Symposium*, July 1995, *Intergovernmental Oceanographic Commission, Workshop Report 142*.
- Angel, M.V. 2000. Lessons from the OSPAR Quality Status Report Approach, In: *Marine Environmental Management Review of 1999 and future trends*, ed. R. Earll. Candle Cottage, Kempsey, Gloucestershire GL18 2BU.
- Angel, M.V. 2000. Marine Planktonic Ostracods. *World Biodiversity Database CD-ROM Series*. Biodiversity Center of ETI, Multimedia Interactive Software.
- Angel, M.V. 2002. The Quality Status Report 2000: from science to policy. Pp 133-149, In: J.P. Ducrotoy, S.M. Shastri and M. Barry, editors *The Marine Environment: Science and Law*, Proceedings of the 2000 CERC Conference. IECS, University of Hull.
- Angel, M.V. 2005. The Southern Ocean Ecosystem. *Archives of natural history*, **32**, 281-300.
- Angel, M.V. and A. de C. Baker 1982. Vertical standing crop of plankton and micronekton at three stations in the Northeast Atlantic. *Biological Oceanography*, **2**: 1-30.
- Angel, M.V. and A.P.M. Lockwood (eds) 1985. Mabahiss/John Murray 50th anniversary: Marine science of the Northwest Indian Ocean and adjacent waters. Report of the Symposium on the occasion of the 50th anniversary of the Mabahiss/John Murray Expedition (1933/34), University of Alexandria, Egypt 3-7 September 1983. *UNESCO Report in Marine Sciences*, No **31**: 145pp.
- Angel, M.V. and C.J. Ellis 1981. *Conchoecia histrix* n. sp. a new halocyprid ostracod for the Porcupine Bight region of the Northeastern Atlantic. *Bull. Br. Mus. nat. hist. (Zool.)*, **40**: 129-135.
- Angel, M.V. and M.J.R. Fasham 1973. SOND cruise 1965. Factor and cluster analyses of the plankton results, A general summary. *J. mar. biol. Ass. U.K.*, **53**: 185-231.
- Angel, M.V. and M.J.R. Fasham 1974. SOND Cruise 1965: further factor analyses of the plankton data. *J. mar. biol. Ass. U.K.*, **54**: 879-894.

Angel, M.V. and M.J.R. Fasham 1975. Analysis of the vertical and geographic distribution of the abundant species of planktonic ostracods in the North-east Atlantic. *J. mar. biol. Ass. U.K.*, **55**: 709-737.

Angel, M.V. and Pugh, P.R. 2000. Quantification of diel vertical migration in micronektonic taxa in the Northeast Atlantic. In: M.B. Jones, J.M.N. Azevedo, A.I. Neto, A.C.Costa, and A.M.Frias (eds) *Islands, Ocean and Deep-Sea Biology*. Kluwer Academic Publishers, Netherlands. Pp 161-179.

Angel, M.V. and T. Harris 1977. *Animals of the Ocean; the Ecology of Marine Life*. London: Eurobooks 156pp.

Angel, M.V. and T.M. Iliffe 1987. *Spelaeoecia bermudensis* nov.sp., nov. gen., a new halocyprid ostracod from marine caves in Bermuda. *Journal of Crustacean Biology*, **7**: 541-553.

Angel, M.V. and W.N. Bonner (eds) 1987. Scientific Requirements for Antarctic Conservation. *Environmental Conservation*, **13**: 144pp.

Angel, M.V.(editor) 1977. *A Voyage of Discovery*. George Deacon Anniversary Volume. Oxford: Pergamon Press. [Supplement to Deep-Sea Research]

Angel, M.V., 1991. The ups and downs of life in the ocean: Vertical migration of pelagic animals. *Ocean Challenge*, **2** (Winter): 31-35.

Angel, M.V., 1992. Managing biodiversity in the oceans. Pp 23-59 in *Diversity of oceanic life: an evaluative review*, M.N.A. Peterson (ed), CSIS Significant Issue Series 14 (12). Washington, D.C.: Center for Strategic and International Studies.

Angel, M.V., 1993. Biodiversity of the pelagic ocean. *Biological Conservation*, **7**, 760-772.

Angel, M.V., 1999. Ostracoda. Pp 815-868, in *South Atlantic Zooplankton*, edited D.Boltovskoy, Backhuys Publishers Leiden, 1706pp.

Angel, M.V., 2000. The Buckland lecture 1998: The rational use of ocean resources. *Buckland Occasional Papers* No 5, 35pp.

Angel, M.V., Blachowiak-Samolyk, K, & Chavtur, V.G. 2008. Atlas of Atlantic Planktonic Ostracods. <http://www.nhm.ac.uk/research-curation/research/projects/atlantic-ostracods/index.html>.

Angel, M.V., Blachowiak-Samolyk, K., Drapun, I., & Castillo, R. (2007). Changes in the composition of planktonic ostracod populations across a range of latitudes in the North-east Atlantic. *Progress in Oceanography*, **71**, 60-78.

Angel, M.V., D.M. Checkley and S.I. Heaney 1985. Plankton migrations: Introduction. In: *Migration, Mechanisms and Adaptive Significance*, M.A. Rankin (ed.). Contributions in Marine Science, Texas, Supplement to vol. **27**: 43-44.

Angel, M.V., M.A. Baars, R.T. Barber, F.P. Chavez, M. Kastner, M. Leinen, J.R.E. Lutjeharms, G. Reverdin, G.B. Shimmield. 1995. How do Open Ocean Upwelling Systems Operate as Integrated Physical, Chemical and Biological Systems and Influence the Geologic Record? Pp 193-220, in: *Upwelling in the ocean: Modern processes and ancient records*. Editors, C.P. Summerhayes, K.-C. Emeis, M.V.

- Angel, R.L. Smith and B. Zeitschel, John Wiley & Sons Ltd, Chichester and New York.
- Angel, M.V., M.J.R. Fasham and A.L. Rice 1981. Marine Biology needed to assess the safety of a program of high level radioactive waste in the oceans. In: *Marine Environmental Pollution, Vol. 2, Dumping and Mining*, R.A. Geyer (ed.) Pp. 297-312. Elsevier Oceanography Series.
- Angel, M.V., P. Hargreaves, P. Kirkpatrick and P. Domanski 1982. Low variability in planktonic and micronektonic populations at 1000m depth in the vicinity of 42°N 17°W; Evidence against diel vertical migratory behaviour in the majority of species. *Biological Oceanography*, **1**: 287-319.
- Angel, Martin and Pugh, David, 1999. International Year of the Ocean 1998: A report of activities in the UK. IACMST Information Document, 55pp (Inter-Agency Committee on Marine Science and Technology, see www.marine.gov.uk)
- Baker, J.M. and M.V. Angel 1987. Marine processes. In: *Arctic heritage: proceedings of a Symposium*. J.G.Nelson, R.Needham and L.Norton (eds), Ottawa, Association of Canadian Universities for Northern Studies. Pp 50-74.
- Benassi G., Ferrari I., Rossi V., Sei S., Angel M.V. & McKenzie K.G., 1998. Distribution and taxonomy of planktonic ostracods of the Eolian Islands (Mediterranean Sea). In: Crasquin-Soleau S., Braccini E. & Lethiers F. (Eds.) *What About Ostracoda! 3ème Congrès Européen des Ostracodologistes. Paris-Bierville, France, 8-12 juillet 1996*: 3-25.
- Blachowiak-Samolyk, K & Angel M.V. 2004. An Atlas of Southern Ocean Planktonic Ostracods. <http://ocean.iopam.gda.pl/ostracoda>.
- Blachowiak-Samolyk, K & Angel M.V. 2007. A year round comparative study on the population structures of pelagic Ostracoda in Admiralty Bay (Southern Ocean). *Hydrobiologia*, **585**, 67-77.
- Chavtur, V.G. & Angel, M.V. in press. Tribe Metaconchoecini: a systematic revision of pelagic ostracods (Ostracoda: Halocyprididae) formerly in the genus *Metaconchoecia* and the description of a new species.
- Ellis, C.J., D.S.M. Billett and M.V. Angel 1983. The distribution of oceanic cirripedes in the North-east Atlantic in summer 1983 and the connotations of the results to the problems of *Conchoderma* fouling. *IOS Internal Document*, **193**: 19pp.
- Fasham, M.J.R. and M.V. Angel 1975. The relationship of the zoogeographic distributions of the planktonic ostracods in the North-east Atlantic to the water masses. *J. mar. biol. Ass. U.K.*, **55**: 739-757.
- Fasham, M.J.R., Angel, M.V. and H.S.J. Roe 1974. An investigation of the spatial pattern of zooplankton using the Longhurst-Hardy Plankton Recorder. *J. exp. mar. Biol. Ecol.*, **16**: 93-112.
- Ferrari, I., G. Benassi, S. Sei, M.V. Angel and K.G. McKenzie. 1995. Mediterranean planktonic Ostracods in Italian waters off the islands of Panarea and Stromboli. Caratterizzazione ambientale marina del sistemi Eolie e dei bacini limitrofi di Cefalu e Gioia (EOCUMM94). *Data Report*. Fararanda F.M. (Ed) 199-222.

German, C.R. and M.V. Angel 1994. Watery wastes. *Chemistry in Britain*, July 1994, 560-561.

German, C.R. and M.V. Angel, 1994. Hydrothermal fluxes of metals to the oceans: A comparison with anthropogenic discharge. Pp 365-372 in *Hydrothermal Vents and Processes*, Parson, L.M., Walker, C.L. & Dixon D.R. (eds), Geological Society Special Publication **87**.

Glegg, G., Angel, M.V., Lewis, G., McGlashan, D., Mann, M., Pullen, S., & Richards, J. 2002. Integrating science and environmental legislation. Pp 195-205. In: J.P. Ducrotoy, S.M. Shastri and M. Barry, editors *The Marine Environment: Science and Law*, Proceedings of the 2000 CERC Conference. IECS, University of Hull.

Gooday, A.J. and M.V. Angel, 1977. Distribution of planktonic Ostracoda (Halocyprididae) in the North Adriatic with the description of a new subspecies, *Conchoecia porrecta adriatica*. *Crustaceana*. **32**: 139-154.

Grassle, F., M.V. Angel, T. Brattegard, D. Desbruyeres, P. Lobel & G. Schriever (1991) Response of benthic ecosystems to perturbations. Pp 48-56 in *An abyssal ocean option for waste management*. Report of a Workshop, 7-10 January 1991, Woods Hole Oceanographic Institution, Edited D.W. Spencer. Woods Hole Oceanographic Institution. 111pp.

Green, A., P.A. Tyler, M.V. Angel and J.D. Gage. 1994. Gametogenesis in deep- and surface-dwelling oceanic stalked barnacles from the NE Atlantic Ocean. *Journal of experimental Marine Biology and Ecology*, **184**: 143-158.

Hargreaves, P.M., C.J. Ellis and M.V. Angel 1984. An assessment of biological processes close to the sea bed in a slope region and its significance to the assessment of sea bed disposal of radioactive waste. *IOS Report* **185**: 121pp.

Herring, P.J., Angel, M.V., Crisp, N., Fasham, M.J.R., Hargreaves, P.M., Hemmings, J.C., Lampitt, R.S.L., Pugh, P.R. and Roe, H.S.J. 1996. Shelf break ecosystems off Europe, North Africa and the Northwest Indian Ocean. *Blue Skies final report to DRA from GDDOP at SOC*, 111 pp

Ianson, D., Jackson, G.A., Angel, M.V., Lampitt, R.S. & Burd, A.O. 2004. The effect of net avoidance on estimates of diel vertical migration. *Limnology and Oceanography*, **49**, 2297-2303.

IOS 1987. Report of a desk study into the feasibility of deep-ocean disposal of dredge spoil and Eurotunnel spoil with recommendations on research requirements including site selection, dumping procedures and necessary monitoring. *IOS Confidential Report*. pp.

IOS Report 1986. Report on a desk study into the feasibility of deep-ocean disposal of sewage sludge from the U.K. with recommendations on research requirements including site selection, dumping procedures and necessary monitoring. 66pp.

Kornicker, L.S. and M.V. Angel 1975. Morphology and ontogeny of *Bathyconchoecia septemspinosa* Angel, 1970 (Ostracoda: Halocyprididae). *Smithsonian Contributions to Zoology*, **195**: 1-21.

Krause, D.C. and M.V. Angel 1994. Marine biogeography, climate change and societal needs. *Progress in Oceanography*, **34**: 221-237.

- Lampitt, R.S., K.F. Wishner, C.M. Turley and M.V. Angel, 1993. Marine snow studies in the Northeast Atlantic Ocean: distribution, composition and role as a food source for migrating plankton. *Marine Biology*, **116**: 689-702.
- McKenzie, K.G., Angel, M.V. Becker, G., Hinz-Schallreuter, I., Kontrovitz M., Parker, A.R. Schallreuter, E.R., and Swanson, K.M. 1999. Ostracods. Chapter 33, pp. 459-508, in *Functional Morphology of the Invertebrate Skeleton* (edited by E. Savazzi), John Wiley & Sons, Chichester. 706pp.
- Moguilevsky, A. and M.V. Angel 1975. Halocyprids in Atlantic neuston. *Marine Biology*, **32**: 295-302.
- Ormerod, B. and Angel, M. 1998. *Ocean fertilisation as a CO₂ sequestration option*. Report by IEA Greenhouse Gas R&D Programme, Cheltenham, UK 50pp.
- Ormerod, Bill and Martin Angel (editors) 1996. *Ocean storage of carbon dioxide: Workshop 2 - Environmental Impact*. IEA Greenhouse Gas R&D Programme, Cheltenham. 131pp.
- Ormond, R.F.G., J.Gage and M.V. Angel (eds), 1997. *Marine Biodiversity: Patterns and processes* Cambridge University Press 427pp.
- OSPAR, 2000. Quality Status Report 2000: Region V - The Wider Atlantic. OSPAR Commission, London, 110pp. (Lead writer)
- P.J.Herring, M.J.R.Fasham, A.R.Weeks, J.C.Hemmings, H.S.J.Roe, P.R.Pugh, S.Holley, N.Crisp & M.V.Angel, 1998. Across-slope relations between the biological populations, the euphotic zone and the oxygen minimum layer off the coast of Oman during the Southwest Monsoon. *Progress in Oceanography*, **41**, 69-109.
- Pugh, D., Angel M.V., Sayer, J. and Shaw, D. 1999. Managing the marine environment - unregulated exploitation or sustainable management - The International Year of the Ocean. Pp. 115-124, in: *Marine Environmental Management Review of 1998 and future trends*, ed. R. Earll. Candle Cottage, Kempsey, Gloucestershire GL18 2BU.
- Rice, A.L., Angel, M.V. Grassle, J.F. Hargrave, B., Hessler, R.R., Horikoshi, M., Lochte, K., Sibuet, M., Smith, K.L. Thiel, H. and Vinogradova, N. 1994. Suggested criteria for describing deep-sea benthic communities; the final report of SCOR Working Group 76. *Progress in Oceanography*, **34**: 81-100.
- Roe, H.S.J., M.V. Angel, J. Badcock, P. Domanski, P.T. James, P.R. Pugh and M.R. Thurston 1984. The diurnal migrations and distributions of a mesopelagic community in the North-east Atlantic. 1. Introduction and sampling procedures. *Progress in Oceanography*, **13**: 245-268.
- Savidge, G., D.R. Turner, P.H. Burkill, A.J. Watson, M.V. Angel, R.D. Pingree, H. Leech and K.J. Richards, 1992. The BOFS 1990 Spring Bloom Experiment: Temporal evolution and spatial variability of the hydrographic field. *Progress in Oceanography*, **29**: 235-281.
- Summerhayes, C.P., Emeis, K.-C., Angel M.V., Smith, R.L. and Zeitzschel, B. 1995. Upwelling in the ocean: Modern processes and ancient records. Pp 1-37, in: *Upwelling in the ocean: Modern processes and ancient records*. Editors, C.P. Summerhayes, K.-C. Emeis, M.V. Angel, R.L. Smith and B. Zeitschel, John Wiley & Sons Ltd, Chichester and New York.

Summerhayes, C.P., K.-C.Emeis, M.V.Angel, R.L.Smith and B. Zeitschel, editors. 1995. *Upwelling in the ocean: Modern processes and ancient records*. John Wiley & Sons Ltd, Chichester and New York. 418pp.

Thiel H., M.V. Angel, E.J. Foell, A.L. Rice and G. Schriever. 1997. *Environmental risks from large-scale ecological research in the Deep Sea: A desk study*. Report for the Commission of the European Communities Directorate-General for Science, Research and Development under Contract No MAS2-CT94-0086. 210pp.

Van Couwelaar, M., M.V.Angel and L.P.Madin. 1997. The distribution and biology of the swimming crab *Charybdis smithii* McLeay 1838 (Crustacea: Brachyura; Portunidae) in the NW Indian Ocean. In: *Topical Studies in Oceanography*, Netherlands Indian Ocean Program 1992-1993: First results, T.C.E.Van Weering, W.Helder and P.Schalk Eds., *Deep-Sea Research II*, **44**, 1251-1280.

Vuorinen, I., J. Hänninen, E. Bonsdorf, B. Boorman and M.V. Angel 1994. Testing the cascading trophic interactions - theory in the Southern Ocean. *Antarctic Reports of Finland* **4**: 36-38.

Vuorinen, I., J. Hanninen, E. Bonsdorff, B. Boorman, and M.V.Angel. 1997. Temporal and spatial variation of dominant pelagic Copepoda (Crustacea) in the Weddell Sea (Southern Ocean) 1929 to 1993. *Polar Biology*, **18**, 280-291.

Wiebe, P.H., Bucklin, A., Madin, L., Angel, M.V., Sutton, T., Pages, F., Hopcroft, R.R. & Lindsay, D. Deep-sea holoplankton species diversity in the Sargasso Sea, Northwestern Atlantic Ocean. *Deep-Sea Research II*, in press.

Wilson, T.R.S., P. Killworth, M.V. Angel and A.S. Laughton 1991. Deep ocean disposal for carbon dioxide. *IOS Confidential Report prepared for British Coal Corporation*, 81pp.

Mike Fasham's Bibliography

Allen, J. T. et al., 2001. RRS Discovery Cruise 253, 04 May-20 Jun 2001. Faeroes, Iceland, Scotland Hydrographic and Environmental Survey (FISHES). Southampton Oceanography Centre Cruise Report. Southampton, UK, University of Southampton.

Anderson, T. A., V. A. Ryabchenko, et al., 2007. Denitrification in the Arabian Sea: a 3D ecosystem modelling study. *Deep-Sea Research I* 54(12): 2082-2119.

Anderson, T. R., S. A. Spall, et al., 2001. Global fields of sea surface dimethylsulfide predicted from chlorophyll, nutrients and light. *Journal of Marine Systems* 30(1-2): 1-20.

Angel, M. V. and M. J. R. Fasham, 1971. Species assemblages and their depth distributions off the Canary Islands. Proceedings of Joint Oceanographic Assembly, IAPSO, IABO, SCOR, Tokyo, Japan Society for the Promotion of Science.

Angel, M. V. and M. J. R. Fasham, 1973. SOND cruise 1965 – factor and cluster analyses of plankton results, a general summary. *Journal of the Marine Biological Association of the United Kingdom* 53(1): 185-231.

Angel, M. V. and M. J. R. Fasham, 1974. SOND cruise 1965 – further factor-analyses of plankton data. *Journal of the Marine Biological Association of the United Kingdom* 54(4): 879-894.

Angel, M. V. and M. J. R. Fasham, 1975. Analysis of vertical and geographic distribution of abundant species of planktonic ostracods in Northeast Atlantic. *Journal of the Marine Biological Association of the United Kingdom* 55(3): 709-737.

Angel, M.V. and M. J. R. Fasham, 1983. Eddies and biological processes. In: *Eddies in marine science*, A.R. Robinson Ed. Pp. 492-524. Springer Verlag.

Angel, M.V., Fasham, M.J.R. and A.L. Rice, 1981. Marine biology needed to assess the safety of a program of disposal of high level radioactive wastes. In: *Marine Environmental Pollution*, vol. 2, Dumping and Mining P.A. Geyer, Ed. Pp. 297-312. Elsevier Oceanography Series.

Balino, B. M., M. J. R. Fasham, et al., 2001. Ocean biogeochemistry and global change: JGOFS research highlights 1988-2000. *IGBP Science No. 2*: 1-32.

Denman, K., M. Fasham, et al., 1990. Joint Global Ocean Flux Study (JGOFS). *Oceanology International* 90(1): 101-108.

Ducklow, H. W. and M. J. R. Fasham, 1992. Bacteria in the greenhouse: modelling the role of oceanic plankton in the global carbon cycle." Mitchell, R. (Ed.). *Wiley Series in Ecological and Applied Microbiology: Environmental Microbiology*. Xi+411p. Wiley-Liss, Inc.: New York, New York, USA; Chichester, England, UK.

Ducklow, H., Fasham, M. J. R. and Vezina, A., 1989. Derivation and analysis of flow networks for open ocean plankton ecosystems. In: *Network analysis in marine ecology*, (eds. F. Wulff, J.G. Field and K.H. Mann). *Coastal and Estuarine Studies*, 32: 159-205.

Evans, G. T. and M. J. R. Fasham, Eds., 1993. *Towards a Model of Ocean Biogeochemical Processes*. Proceedings of the NATO Advanced Research Workshop, Springer-Verlag.

Fasham, M. J. R., 1970. The use of a shipborne computer for navigation. *Proceedings of the conference on electronic engineering in ocean technology*, 259-70.

Fasham, M. J. R., 1971. Gravity survey of Bovey Tracy basin, Devon. *Geological Magazine* 108(2): 119.

Fasham, M. J. R., 1971. Sea-going computers. *Deep Oceans*. M. R. Clarke and P. J. Herring eds. London, Arthur Barker Ltd: 58-60.

Fasham, M. J. R., 1975. Correction. *Journal of Experimental Marine Biology and Ecology* 19(1): U1-U1.

Fasham, M. J. R., 1976. Misalignment angle and calibration of a 2-component electromagnet log. *Journal of Navigation* 29(1): 76-81.

Fasham, M. J. R., 1977. Comparison of nonmetric multidimensional-scaling, principal components and reciprocal averaging for ordination of simulated coenoclines and coenoplanes. *Ecology* 58(3): 551-561.

Fasham, M. J. R., 1978. The statistical and mathematical analysis of plankton patchiness. *Oceanogr. Mar. Biol. Ann. Rev.*, **16**: 43-79.

Fasham, M. J. R., 1978. The application of some stochastic processes to the study of plankton patchiness. In: *Spatial pattern in plankton communities*, J.H. Steele, Ed. Pp. 131-156. New York: Plenum Press.

Fasham, M. J. R., 1981. Analytic food web models. In: *Mathematical models in biological oceanography*, T. Platt, K.H. Mann, and R.E. Ulanowicz, Eds. Pp. 54-65. Paris: UNESCO Press.

Fasham, M. J. R., 1981. Statistical mechanics. In: *Mathematical models in biological oceanography*, T. Platt, K.H. Mann and R.E. Ulanowicz, Eds. Pp. 79-85. Paris: UNESCO Press.

Fasham, M. J. R., 1981. Stochastic modelling and power spectral representation. In: *Mathematical models in biological oceanography*, T. Platt, K.H. Mann and R.E. Ulanowicz, Eds. Pp. 86-91. Paris: UNESCO Press.

Fasham, M. J. R., Ed., 1984. *Flows of energy and materials in marine ecosystems: theory and practice*. Proceedings of a NATO Advanced Research Institute. Carcans, France.

Fasham, M. J. R., 1985. A flow analysis of material in the marine euphotic zone. In: *Ecosystem theory for biological oceanography*, R.E. Ulanowicz and T. Platt Eds. *Can. Bull. Fish. Aquat. Sci.* **213**: 139-162.

Fasham, M. J. R., 1986. UK ocean fluxes modelling: a discussion. US GOFS Planning Report, No. 4, 42-50.

Fasham, M. J. R., 1986. An ecosystem model of the carbon flow in the Celtic Sea. *Challenger Society Newsletter*, No. 22, 10-11.

Fasham, M. J. R. Ed., 1990. *The Joint Global Ocean Flux Study Science Plan*. Scientific Committee on Oceanic Research, 59pp.

Fasham, M.J.R., 1993. Modelling the marine biota. In: *The Global Carbon Cycle*, (ed. M. Heimann). Springer-Verlag: Berlin. 599pp

Fasham, M. J. R., 1995. Variations in the seasonal cycle of biological production in sub-arctic oceans – a model sensitivity analysis. *Deep-Sea Research Part I-Oceanographic Research Papers* 42(7): 1111-1149.

Fasham, M. J. R., 2003. JGOFS: a retrospective view. *Ocean biogeochemistry: the role of the ocean carbon cycle in global change*. M. J. R. Fasham. Berlin, Germany, Springer-Verlag: 269-277.

Fasham, M. J. R., Ed., 2003. *Ocean Biogeochemistry: The Role of the Ocean Carbon Cycle in Global Change*. Global Change - The IGBP Series, Springer.

Fasham, M. J. R., et al., 1979. RRS "Challenger" Cruise 79/5, 10 April - 23 April 1979. Physical and biological sampling on the Nymphe Bank, Celtic Sea and in the vicinity of the Goban Spur using a batfish and continuous surface water sampling. Institute of Oceanographic Sciences Cruise Report, 81. Wormley, UK, University of Southampton.

Fasham, M. J. R., et al., 1981. RRS Discovery Cruise 120, 9 May - 1 June 1981. Biological and physical investigations of the oceanic front to the south-west of the Azores. Institute of Oceanographic Sciences Cruise Report, 124. Wormley, UK, University of Southampton.

Fasham, M. J. R., et al., 1990. RRS Discovery Cruise 182, 8 May - 8 June 1989. BOFS Cruise Leg 1: Investigations in the region of 47N, 20W and 60N, 20W. Institute of Oceanographic Sciences Deacon Laboratory Cruise Report. Wormley, UK, University of Southampton.

Fasham, M. J. R. and M. V. Angel, 1975. Relationship of zoogeographic distributions of plankton ostracods in northeast Atlantic to water masses. *Journal of the Marine Biological Association of the United Kingdom* 55(3): 739-757.

Fasham, M. J. R., M. V. Angel, et al., 1974. Investigation of spatial pattern of zooplankton using Longhurst-Hardy Plankton Recorder. *Journal of Experimental Marine Biology and Ecology* 16(2): 93-112.

Fasham, M. J. R., B. M. Balino, et al., 2001. A new vision of ocean biogeochemistry after a decade of the Joint Global Ocean Flux Study (JGOFS). *Ambio*: 4-31.

Fasham, M. J. R., P. W. Boyd, et al., 1999. Modeling the relative contributions of autotrophs and heterotrophs to carbon flow at a Lagrangian JGOFS station in the Northeast Atlantic: The importance of DOC. *Limnology and Oceanography* 44(1): 80-94.

Fasham, M.J.R., Denman, K. & Brewer, P.G., 1991. Joint Global Ocean Flux Study: goals and objectives. Pp. 245-246 in: *Global environment change*, (eds. R.W. Corell & P.A. Anderson). Springer-Verlag: Berlin.

Fasham, M. J. R., H. W. Ducklow, et al., 1990. A nitrogen-based model of plankton dynamics in the oceanic mixed layer. *Journal of Marine Research* 48(3): 591-639.

Fasham, M. J. R. and G. T. Evans, 1995. The use of optimization techniques to model marine ecosystem dynamics at the JGOFS station at 47N 20W. *Philosophical Transactions of the Royal Society of London Series B-Biological Sciences* 348(1324): 203-209.

Fasham, M. J. R. and G. T. Evans, 2000. Advances in ecosystem modelling within JGOFS. *The Changing Ocean Carbon Cycle: a Mid-term Synthesis of the Joint Global Ocean Flux Study*. R. Hanson, H. W. Ducklow and J. G. Field. Cambridge, UK, Cambridge University Press: 417-446.

Fasham, M. J. R., K. J. Flynn, et al., 2006. Development of a robust marine ecosystem model to predict the role of iron in biogeochemical cycles: A comparison of results

for iron-replete and iron-limited areas, and the SOIREE iron-enrichment experiment. *Deep-Sea Research Part I-Oceanographic Research Papers* 53(2): 333-366.

Fasham, M. J. R. and P. Foxton, 1979. Zonal distribution of pelagic Decapoda (Crustacea) in the eastern North Atlantic and its relation to the physical oceanography. *Journal of Experimental Marine Biology and Ecology* 37(3): 225-253.

Fasham, M. J. R., P. M. Holligan, et al., 1983. The spatial and temporal development of the spring phytoplankton bloom in the Celtic Sea, April 1979. *Progress in Oceanography* 12(1): 87-145.

Fasham, M. J. R. and T. Platt, 1983. Photosynthetic response of phytoplankton to light – a physiological model. *Proceedings of the Royal Society of London Series B-Biological Sciences* 219(1217): 355-370.

Fasham, M. J. R., T. Platt, et al., 1985. Factors affecting the spatial pattern of the deep chlorophyll maximum in the region of the Azores Front. *Progress in Oceanography* 14(1-4): 129-165.

Fasham, M. J. R. and P. R. Pugh, 1976. Observations on horizontal coherence of chlorophyll-alpha and temperature. *Deep-Sea Research* 23(6): 527-538.

Fasham, M. J. R. and P. R. Pugh, 1977. Horizontal patchiness of plankton caused by internal waves. *Deep-Sea Research* 24(3): 323-323.

Fasham, M. J. R., P. R. Pugh, et al., 1981. 'Subaquatracka': a submersible fluorimeter for the detection of chlorophyll. *Electronics for Ocean Technology*: 49-58

Fasham, M. J. R., P. R. Pugh, et al., 1983. A submersible fluorometer for the detection of chlorophyll. *Radio and Electronic Engineer* 53(1): 21-24.

Fasham, M. J. R., J. L. Sarmiento, et al., 1993. Ecosystem behaviour at Bermuda Station S and Ocean Weather Station INDIA – A general circulation model and observational analysis. *Global Biogeochemical Cycles* 7(2): 379-415.

Field, J.G., Wulff, F.V., Allen, P.M., Fasham, M.J.R., Flos, J., Frontier, S., Kay, J.J., Silvert, W. and Trainor, L., 1986. Ecosystem theory in relation to unexploited marine ecosystems. *Canadian Bulletin of Fisheries and Aquatic Sciences*, No. 213, 241-247.

Findlay, H. S., A. Yool, et al., 2006. Modelling of autumn plankton bloom dynamics. *Journal of Plankton Research* 28(2): 209-220.

Flynn, K. J. and M. J. R. Fasham, 1997. A short version of the ammonium-nitrate interaction model. *Journal of Plankton Research* 19(12): 1881-1897.

Flynn, K. J. and M. J. R. Fasham, 2002. A modelling exploration of vertical migration by phytoplankton. *Journal of Theoretical Biology* 218(4): 471-484.

Flynn, K. J. and M. J. R. Fasham, 2003. Operation of light-dark cycles within simple ecosystem models of primary production and the consequences of using

phytoplankton models with different abilities to assimilate N in darkness. *Journal of Plankton Research* 25(1): 83-92.

Flynn, K. J., M. J. R. Fasham, et al., 1997. Modelling the interactions between ammonium and nitrate uptake in marine phytoplankton. *Philosophical Transactions of the Royal Society of London Series B-Biological Sciences* 352(1361): 1625-1645.

Guirey, E. J., M. A. Bees, et al., 2007. Emergent features due to grid-cell biology: Synchronisation in biophysical models. *Bulletin of Mathematical Biology* 69: 1401-1422.

Hemmings, J. C. P., M. A. Srokosz, et al., 2003. Assimilating satellite ocean-colour observations into oceanic ecosystem models. *Philosophical Transactions of the Royal Society of London A* 361(1802): 33-39.

Hemmings, J. C. P., M. A. Srokosz, et al., 2004. Split-domain calibration of an ecosystem model using satellite ocean colour data. *Journal of Marine Systems* 50(3-4): 141-179.

Herring, P. J., M. J. R. Fasham, et al., 1998. Across-slope relations between the biological populations, the euphotic zone and the oxygen minimum layer off the coast of Oman during the southwest monsoon (August, 1994). *Progress in Oceanography* 41(1): 69-109.

Heyraud, M., P. Domanski, et al., 1988. Natural tracers in dietary studies – data for Po210 and Pb210 in decapod shrimp and other pelagic organisms in the northeast Atlantic Ocean. *Marine Biology* 97(4): 507-519.

Irwin, B., Platt, T., Lindley, P., Fasham, M.J.R. and K. Jones, 1983. Phytoplankton productivity in the vicinity of a front, S.W. of the Azores during May 1981. Bedford Institute of Oceanography Data Report, No. 19.

B.A.Kagan, E.E.Popova, V.A.Ryabchenko and M.J.R.Fasham, 1995. Short-term oscillations in the ecosystem of the ocean upper mixed layer: the existence domain. *Dokl. Akademii Nauk*, 345, 544-548. In Russian.

Kagan, B.A., Popova E.E., Ryabchenko V.A., Fasham M.J.R., 1996. Short-period fluctuations in the ecosystem of the upper mixed layer of the ocean and regions of their existence. *Transactions of the Russian Academy of Science, Earth Science Section*, 345A(9), 166-171.

Kahn, D. A., P. R. Pugh, et al., 1975. Underwater logarithmic irradiance meter for primary production and associated studies. *Instrumentation in Oceanography*: 81-90.

Kahn, D. A., P. R. Pugh, et al., 1975. Underwater logarithmic irradiance meter for primary production and associated studies. *Conference on Instrumentation in Oceanography, Bangor, IERE Conference Proceedings*.

Legendre, L., Collos, Y., Elbrachter, M., Fasham, M.J.R., Gieskes, W.W.C. Herbland, A., Holligan, P.M., Margalef, R., Perry, M.J., Platt, T., Sakshaug, E. and Smith, D.F., 1984. Studies on marine autotrophs: recommendations for the 1980's. Pp. 629-639 in: *Flows of energy and material in marine ecosystems: theory and practice*, (ed. M.J.R. Fasham). New York: Plenum Press.

Lochte, K., H. W. Ducklow, et al., 1993. Plankton succession and carbon cycling at 47N 20W during the JGOFS North Atlantic Bloom Experiment. *Deep-Sea Research Part II-Topical Studies in Oceanography* 40(1-2): 91-114.

Martin, A. P., K. J. Richards, et al., 2001. Phytoplankton production and community structure in an unstable frontal region. *Journal of Marine Systems* 28(1-2): 65-89.

Martin, A. P., M. V. Zubkov, et al., 2008. Microbial spatial variability: An example from the Celtic Sea. *Progress in Oceanography* 76(4): 443-465.

Merrett, N. R. and M. J. R. Fasham, 1998. Demersal ichthyofaunal distribution in the abyssal North Atlantic revisited: the effect of sample size on ordination. *Marine Ecology-Progress Series* 173: 267-274.

Mitra, A., K. J. Flynn, et al., 2007. Accounting for grazing dynamics in nitrogen-phytoplankton-zooplankton models. *Limnology and Oceanography* 52(2): 649-661.

Popova, E. E., A. C. Coward, et al., 2006. Mechanisms controlling primary and new production in a global ecosystem model Part I: Validation of the biological simulation. *Ocean Science* 2(2): 249-266.

Popova, E. E., M. J. R. Fasham, A.V. Osipov and V.A. Ryabchenko, 1997. Chaotic behaviour of an ocean ecosystem model under seasonal external forcing. *Journal of Plankton Research* 19(10): 1495-1515.

Popova, E. E., C. J. Lozano, et al., 2002. Coupled 3D physical and biological modelling of the mesoscale variability observed in North-East Atlantic in spring 1997: biological processes. *Deep-Sea Research Part I-Oceanographic Research Papers* 49(10): 1741-1768.

Popova, E. E., V. A. Ryabchenko, et al., 2000. Biological pump and vertical mixing in the Southern Ocean: Their impact on atmospheric CO₂. *Global Biogeochemical Cycles* 14(1): 477-498.

Robinson, A. R., D. J. McGillicuddy, et al., 1993. Mesoscale and upper ocean variabilities during the 1989 JGOFS bloom study. *Deep-Sea Research Part II-Topical Studies in Oceanography* 40(1-2): 9.

Roe, H. S. J., J. Badcock, et al., 1987. Great Meteor East: a biological characterisation. Institute of Oceanographic Sciences Deacon Laboratory Report. Wormley, UK, University of Southampton.

Roe, H. S. J., P. A. Domanski, et al., 1986. Great Meteor East: an interim report on biological sampling and general relationship to physical oceanography. Institute of Oceanographic Sciences Report. Wormley, UK, University of Southampton.

- Ryabchenko, V. A., M. J. R. Fasham, B.A. Kagan, E.E. Popova, 1997. What causes short-term oscillations in ecosystem models of the ocean mixed layer? *Journal of Marine Systems* 13(1-4): 33-50.
- Ryabchenko, V. A., V. A. Gorchakov, et al., 1998. Seasonal dynamics and biological productivity in the Arabian Sea euphotic zone as simulated by a three-dimensional ecosystem model. *Global Biogeochemical Cycles* 12(3): 501-530.
- Sarmiento, J.L., Fasham, M.J.R. and U. Siegenthaler, 1989. Simulations of the carbon cycle in the oceans. U.S. Department of Energy 1989 Annual Technical Report, 47pp and 20 pages.
- Sarmiento, J.L., Fasham, M.J.R., Siegenthaler, U., Najjar, R. and Togweiler, R., 1989. Models of chemical cycling in the oceans: Progress Report II. Princeton University, Princeton NJ, Ocean Tracers Laboratory Technical Report, No. 6.
- Sarmiento, J.L., Fasham, M.J.R., Slater, R., Togweiler, J.R. and Ducklow, H.W., 1993. The role of biology in the chemistry of CO₂ in the ocean. In: *Chemistry of the greenhouse effect*, (ed. M. Farrell). Lewis Publ. New York.
- Sarmiento, J. L., R. D. Slater, et al., 1993. A seasonal three-dimensional ecosystem model of nitrogen cycling in the North Atlantic euphotic zone. *Global Biogeochemical Cycles* 7(2): 417-450.
- Simpson, W. R., T. J. P. Gwilliam, et al., 1987. In situ deep water particle sampler and real-time sensor package with data from the Madeira Abyssal-Plain. *Deep-Sea Research Part a-Oceanographic Research Papers* 34(8): 1477-.
- Smith, C. L., K. J. Richards, et al., 1996. The impact of mesoscale eddies on plankton dynamics in the upper ocean. *Deep-Sea Research Part I-Oceanographic Research Papers* 43(11-12): 1807-1832.
- Srokosz, M. A., A. P. Martin, et al., 2003. On the role of biological dynamics in plankton patchiness at the mesoscale: An example from the eastern North Atlantic Ocean. *Journal of Marine Research* 61(4): 517-537.
- Stacey, A. P., M. J. R. Fasham, et al., 1971. Design and application of digital filters for the Graf-Askania Gss2, No.11 sea gravity meter. *Marine Geophysical Researches* 1(2): 220-32.
- Wallhead, P. J., A. P. Martin, et al., 2006. Accounting for unresolved spatial variability in marine ecosystems using time lags. *Journal of Marine Research* 64(6): 881-914.
- Watson, A. J., C. Robinson, et al., 1991. Spatial variability in the sink for atmospheric carbon dioxide in the North Atlantic. *Nature* 350(6313): 50-53.
- Weeks, A.R., Aiken, J., Bellan, I., Harbour, D. & Fasham, M.J.R., 1990. The seasonal development of the spring bloom in the North Atlantic in 1989. *Eos: Transactions of the American Geophysical Union*, 71 (43): p. 1411. [Abstract of a paper presented at the AGU Fall Meeting, San Francisco, December 1990].

Weeks, A. R., M. J. R. Fasham, et al., 1993. The spatial and temporal development of the spring bloom during the JGOFS North Atlantic Bloom Experiment, 1989. *Journal of the Marine Biological Association of the United Kingdom* 73(2): 253-282.

Yool, A. and M. J. R. Fasham, 2001. An examination of the "continental shelf pump" in an open ocean general circulation model. *Global Biogeochemical Cycles* 15(4): 831-844.

