CURRICULUM VITAE

PERSONAL RECORD

Name: ***Dr. Stuart Hardy***

Date of birth: 31st July 1963 (age 58)

Nationality: British

Marital status: Married with twins of 7 years

Education:

Dates	Institution
1975-1980	Kilsyth Academy, Kilsyth, Scotland
1980-1984	University of Glasgow, Scotland (Undergraduate)
1986-1987	Bradford University (Postgraduate (Taught+Research))
1989-1994	University of London (Postgraduate (Research))

Qualifications

BSc Geology 1984 (Glasgow University - First Class Honours)

MSc Computing 1987 (Bradford University)

PhD 1994 (Royal Holloway, University of London - thesis title *Mathematical Modelling of Sedimentation in Active Tectonic Settings)*

Present appointment

ICREA Research Professor at the University of Barcelona, Facultat de Ciències de la Terra, Departament de Dinàmica de la Terra i de l'Oceà

Previous employment and appointments held

Jan 1998- Jan 2003	University of Manchester, UK	Lecturer in Geology
January 1997- January 1998	Princeton University, USA	Post-Doctoral Researcher
January 1995- January 1997	Institute of Earth Sciences, CSIC, Barcelona, Spain	Royal Society European Science Exchange Post-Doctoral Fello

KEY ACHIEVEMENTS SINCE TAKING UP ICREA POSITION

Publications

I have 78 internationally reviewed scientific publications to my name. Since taking up my ICREA position in January 2003, and considering the nineteen years up to January 2022, I have succeeded in getting 48 scientific articles published in international scientific journals, proceedings and books. All of these publications were subject to rigorous peer review and are in serious, internationally-recognised scientific journals, memoirs or special publications. Thus, since taking up the ICREA position, I am averaging c. 2.6 international scientific papers per year. Most of these publications are in "high-impact" journals and a very significant proportion of them are single or joint-authored (only 2 authors).

Clearly, whilst the *number* of publications is important, the usefulness and impact of a researcher´s output is perhaps better reflected by both the number of citations he/she receives and by the various metrics derived from them (depending on the field of study obviously). Using Google Scholar, I appear to have 3425 citations and an h-index of 32 and an i10-index of 54. In addition, 2019 and 2021 were amongst my high-citation years ever (1st and 3rd respectively), indicating the importance and growing impact of my work.

Numerical Modelling Laboratory

As part of the “Geomodels” programme (see below) I have succeeded in setting up a small, but growing, HPC (High Performance Computing) cluster for modelling of geological structures in the upper crust. This is based in the Facultat de Ciències de la Terra, Departament de Dinàmica de la Terra i de l'Oceà, Universitat de Barcelona.

The cluster started with four dual-processor G5 Macs (8x2.0 Ghz giving a total of 16 Ghz), networked into a cluster using XGrid, one of the machines running Mac OSX Server (10.4.11) the others running simply the normal client version of OSX (10.4.11 or 10.5.5). Absoft Fortran and Xcode C/C++ and Intel compilers are available. These machines are locally clustered using an 10/100 Ethernet switch, with wider internet access also provided. However, since its initiation the laboratory has grown in a more organic manner, with a variety of individual multicore machines being added and their processing power taken advantage of as necessary. Currently our most powerful machine is capable of running 48 threads/tasks simultaneously.

The idea of this cluster is to enable numerical modelling 'jobs' to be run 24/7, and distributed amongst the processing power provided by the available machines. These jobs (initially) need not be parallelized, the more important issue here being dedicated processing power, easy control of model jobs, minimal queueing and local data management. The cluster can also be easily added to as/when new machines become available. These machines are also used is conjunction with our existing (shared) resources at CESCA (Centre de Supercomputació de Catalunya).

Much of our recent computational modelling has been achieved through the use of the OpenMP framework which allows relatively straightforward parallelization and portability of intensive numerical codes with only moderate effort on the part of the scientist. All coding of models, parallelization of algorithms and visualization of results is done in house. As a result of this parallelisation, I am now able to run codes up to c. 40 times faster than previously and can tackle scales and complexities of problems previously

unattainable. Such parallelization and optimization has important implications for reproducibility and determinism in numerical codes, a topic of much of my recent research (see paper #60).

Combining mechanical models of deformation and process-based models of sedimentation in 3D

A major objective and achievement has been the combination/integration of a mechanical model of deformation and a process-based model of sedimentation in three dimensions. This has been done using my own discrete element code and the SIMSAFADIM process-based sedimentary modelling code of Oscar Gratacos of my host department. This has been a complex and difficult task but has been a success, with our approach being presented at various conferences and published internationally (***publications #46,50,59,62,64 & 65***).

Demonstrating the influence of "growth strata" on faults and fault-related folding in both extensional and contractional settings

A major objective and achievement has been the inclusion of "growth strata" , (syn-tectonic sediments) within my discrete element codes. This was a non-trivial problem but has now been achieved and generalised to both extensional and contractional geologic settings. The results of these studies have shown that growth strata can now no longer be thought of as *passive* markers of tectonic activity but rather are part of a feedback system where their mechanical effects are important and can influence fault activity. This has been a complex and difficult task but has been a success, with the idea that "Tectonics and Sedimentation" can easily be re-cast as "Sedimentation and Tectonics" now beginning be be widely understood and accepted (***publications #73 & 77***).

Using output from mechanical models of deformation as templates for seismic simulation in 2D and 3D

In collaboration with Nestor Cardozo (University of Stavanger) and Isabelle Lecompte (Norsar) we have successfully used the results produced by my discrete element models of faulting/folding as templates for seismic simulation. This has been done by using the calculated strain in the discrete element models to condition the velocities and densities used as input to a ray-based seismic modelling scheme. Such results will be of great interest to both industry and academia and have already resulted in several publications (***#58 & 63***).

Expanding the processes included in, and the applicability of, discrete element models

In the last 3 years much effort has been into expanding my discrete element codes to include suite of new processes:

Deltaic sedimentation - the codes have been expanded to simulate coarse-grained deltaic sedimentation per se rather than just deforming pre-existing a preexisting sedimentary section. This is a major advance as it allows sedimentary bodies to grow, deform, slump and collapse due to their internal mechanics rather than external forcing (see publication #72).

Viscous (salt) flow - the discrete element model can now combine a viscous (linear Newtonian) substrate and a frictional-cohesive, or elastic cover. Salt is notoriously difficult to model internally and to couple to rigid materials but this has been successfully done (see publication #68) and opens up wide range of future applications of the modelling approach.

Growth monoclines and Flexural slip - the role of mechanical stratigraphy or fault-fault-propagation and fold growth can now be investigated through the inclusion of flexural slip in the modelling scheme. Previous simulations of such structures using frictional or simple elastic materials produced results that lacked many key features observed in nature; new results provide a much better framework to understand the geometries of pre-growth and growth strata and their implications (see publication ***#70)***.

*Martian tectonic*s - models of dike growth and pit crater collapse on Mars are a current focus of code expansion and research. Previous studies by other authors produced results which were puzzling but were used promote/refute models of graben formation and pit crater development on Mars. My recent studies have shown that some of these studies were erroneous and that some refuted theories are in fact viable and useful (see publications ***#61,78)***

Such diverse processes and results will be of great interest to both industry and academia and have already resulted in several publications.

Academic Link - Collaboration with TerraActiva, S.L.

Currently I am formalising a formal industrial-academic link between myself (based at University of Barcelona) and a recently-formed Catalan startup Geological Exploration Consultancy - Terractiva, S.L. (https://terractiva.net/). The idea behind this link would be a two-way exchange of ideas/research particularly in the field of geomechanical modelling. This would facilitate industrial needs and data to drive academic research and enable a small, Catalan startup company to benefit, in a timely manner, from leading-edge academic research funded by the Generalitat.

Creation of a desktop and iPad application for macOS and iOS of cdem modelling software

A version now exists of a macOS version of my discrete element modelling software "cdem". Discrete element codes are typically prohibitively expensive, difficult to use or create, and outwith the reach of most Universities, research groups or research scientists and/or restricted to use on supercomputers. This has been the driving force behind the creation of a professional, modern application for macOS. This application is not intended to be solely a teaching tool, it will also be able to undertake serious research experiments and includes a suite of functionality present in my published papers and research. The final manner of providing it to its intended audience has to be finalised (via experts at the Parc Cientific, Bosch y Guimpera etc) and in consultation with ICREA - but will hopefully provide a method of providing addition research funds, high-visibility of ICREA/Generalitat funded research to a worldwide research and teaching audience (see publication ***#79)***.

Keynote Presentation in Beijing, China

In June/July 2005 I was invited to be a keynote speaker at an International Conference in Beijing, China on "Theory and Application of Fault-Related Folding in Foreland Basins". Such conferences are only held approximately every 5-10 years and it was a rare opportunity to meet colleagues in one of my key areas of interest. As a direct result of this conference, I have had 2 papers accepted and published (***publications #51 and #52***). I also acted as chairman of one of the sessions at the conference.

Elected a Fellow of the IAMM

In December 2020 I was Elected as a Fellow of the International Association of Advanced Materials, "Advanced Material Modelling of Structures in the Earth's Upper Crust , Parallelization & Determinism" IAAM Fellow Lecture in the Advanced Materials Lecture Series.

Grants/Awards

In have, along with Josep Anton Muñoz, gained major research funding from Norsk Hydro which ran until mid 2010. The project involved numerical modelling and field based studies of the 3D geometries of tectonic structures and associated sediments both in Catalunya and abroad. It took the form of a multidisciplinary project "***4D Modelling Based on Field Descriptions***", with a total budget of €453,000.

- 4D Modelling Based on Field Descriptions
  Norsk Hydro SA
  From: 2007 To: 2010 (3 years)
  453,000 Euros €

In addition, since arriving in my host department (Geodinàmica i Geofísica, Facultat de Geologia, Universitat de Barcelona) in Jan. 2003, I have taken, or am taking, part in 5 large research grant proposals, GEOMOD 3D, GEOMODELS, MODES 4D, SALTCONBELT and INVERSIÓN POSITIVA DE ESTRUCTURAS TECTONICAS SALINA, (as an "Investigador"). As can be seen, these proposals started, and funds became available, at the start of 2005, and since then they have provided an excellent environment and data/ resources with which to push forward my research efforts.

- SALTCONBELT
  Ministerio de Economía, Industria y Competitividad
  PROYECTOS DE I+D (EXCELENCIA) - CONVOCATORIA 2017
  From 01/01/2018 to 31/12/2020
  181.500 Euros
  (SALTCONBELT -- Codi: CGL2017-85532-P)

- GEOMOD 3D
  MINISTERIO DE EDUCACIÓN Y CIENCIA
  Programa Nacional de Biodiversidad, Ciencias de La Tierra y Cambio Global
  From: 13/12/2004 To:13/12/2007

147.000,00 Euros €
TÍTULO COMPLETO: Construcción de Modelos Estructurales 3D Nº Ref: CGL2004-05816-C02-01/BTE

- GEOMODELS
  DURSI/IGME
  "Centre Mixt d'Investigació Geomodels" ORGANISMOS PARTICIPANTES: Universitat de Barcelona, Universitat Politècnica de Catalunya, Departament d'Universitats Recerca i Societat de la Informació (DURSI), Instituto Geológico y Minero de España (IGME)
  From: 1/1/2005 To: annually renewed
  DOTACION ANUAL: 150.000,00 euros/anuales (DURSI), 150.000,00euros/anuales (IGME) €

- INVERSIÓN POSITIVA DE ESTRUCTURAS TECTONICAS SALINA
  REFERENCIA: CGL2010-21968-C02-01
  From: 01/01/2011 to 31/12/2013
  IMPORTE CONCEDIDO: 275.880,00€

- Modelización Estructural 4D (MODES4D)
  REFERENCIA: CGL2007-66431-C02-01
  ENTIDAD FINANCIADORA: Ministerio de Ciencia e Innovación
  IMPORTE CONCEDIDO: 215.380,00€
  DURACIÓN: DESDE 01/10/2007 AL 30/09/2010

In addition, I had the following smaller award:

- Awarded Supercomputer Time (4000HC) at CESCA (Centre de Supercomputació de Catalunya) for numerically intensive discrete element models of faulting and folding. Grant/Award started 1/12/2004 (renewable annually).

External Collaboration

In 2012 I was part of a team that was awarded a grant in Stavanger, Norway entitled "Seismic Imaging of Fault Zones" funded by NFR. As a result of this project an additional high-performance computing laboratory has been established in Stavanger and I shared 1 post-graduate, and 3 masters students with Nestor Cardozo.

RESEARCH AND ACADEMIC/PROFESSIONAL STANDING

Statement on research

My fundamental research interests lie in the quantification of sedimentary and tectonic processes and thus a better understanding of tectono-sedimentary relationships preserved in the geological record. This work has been developed by combining my skills and knowledge of numerical/computer modelling, and its application to geological

processes, with that of more traditional structural geologists, sedimentologists and stratigraphers. This has led to me working in, and alongside, a variety of projects on such diverse topics as carbonate platform development, kinematics of fault-propagation folding, sequence-stratigraphy of Pleistocene fan-deltas in the Gulf of Corinth, the interaction of delta progradation and salt movement, the kinematics of hanging-wall deformation, and the modelling of the 3D interaction of sedimentation and tectonics in foreland basins.

The majority of this work has been undertaken at the sub-basin to fault-block scale. However, some of my more recent work has focused on problems of a more regional nature where three-dimensional effects, both tectonic and sedimentary, are extremely important. I am particularly interested in the problems associated with the interpretation of 2-dimensional data (and the application of sequence stratigraphy) in basins where 3-dimensional effects are important. I have also become particularly interested in the application and development of discrete element models of geological processes since taking up my ICREA position, I am one of the first to apply this technique to geological problems such as trishear , extensional fault-propagation folding , detachment folding, viscous flow, sedimentation, martian tectonics and basement-involved structures.

My work has involved extensive collaboration with both industry-driven research groups and individuals whose interests and expertise compliment my own. My work with the Fault Dynamics Project entailed collaboration with six major oil companies (British Petroleum, Sun Oil, Conoco, Arco, Brasoil, Mobil) and involved writing of numerical modelling software, participation in short-courses, lectures and visits to a variety of company offices. My post-doctoral position at Princeton involved close cooperation with structural geologists from several oil companies, involving visits and presentations at the international research labs of Chevron (La Habra, Los Angeles) and Elf Aquitaine (Pau, France). My lectureship at Manchester was sponsored by Saga Petroleum SA (now Norsk Hydro), and involved close cooperation with exploration and production geologists and regular visits to Oslo and Bergen for reporting and research purposes. I also agreed a major research funding programme with Norsk Hydro, which started in early 2006. Current academic collaborations include: tectonic geomorphology with Dr. Karl Mueller at the University of Colorado; modelling and outcrop studies of trishear-like deformation with Prof. Rick Allmendinger at Cornell University; modelling of tectonic deformation with Prof. Ken McClay at Royal Holloway, University of London; tectonics, geomorphology and sedimentation in the Gulf of Corinth, Greece with Prof. Mike Leeder at the University of East Anglia.

My research focuses on the stratigraphy and tectonics of sedimentary basins and understanding the processes that control the dynamics of sedimentary/tectonic systems and stratigraphic evolution. As such my current research interests cover four main themes:

1) To identify the manner in which structure, sediment supply, sediment type, climate, sea-level change and physiography interact to control surface processes and stratigraphy.

2) To determine the structural style of sedimentary basins, and the rates and magnitudes of structural processes controlling landscape, basin form and evolution.

3) To apply fundamental research into basin structure, stratigraphy, sedimentology and evolution to exploration- and production-scale problems in the subsurface.

4) To use novel numerical modelling techniques to investigate the meso-scale evolution of fault and fold structures in both compressional and extensional tectonic settings.

These areas of research involve the integration of structural geology/tectonics, sedimentology, geophysics and geomorphological analysis. In particular, the work involves: i) examination of recent sedimentary systems and mountain belts, ii) analysis of ancient stratigraphy (outcrop and subsurface), iii) numerical simulation/computer visualisation of geological structures, stratigraphy and landscape evolution, and iv) determination of rates of geological processes associated with erosion, deposition and structural development.

My research activity is funded both by Research Councils and industry. The industrial funding is largely from the hydrocarbon industry, reflecting the applicability of aspects of my own, and my host group's (GGAC Universitat de Barcelona), research to both exploration for, and exploitation of, oil and gas. The industry-funded research, like that funded by the Research Councils, deals with fundamental aspects of the tectonic and stratigraphic development of sedimentary basins. Recent research funding has arisen in part due to the impact of in-house modelling studies, which have driven our computationally oriented research programme. One of the main advantages of collaborating with industry on these research topics is access to subsurface (seismic and borehole) datasets. Although these data are generally acquired for industrial objectives, they may contain information that is crucial to solving basic/strategic research problems. The datasets are usually confidential to individual companies but none of the industry-funded research projects I have established has special conditions attached, nor are presentations at research conferences and publication of results restricted.

Fully Refereed Publications

1 Sutcliffe,J.V., Milford,J.R., Dugdale,G. & **Hardy,S**. 1989 Use of Satellite Derived Rainfall Estimates as Inputs to Flow Prediction in the River Senegal. *in* New Directions for Surface Water Modeling. Proceedings of a Symposium held in Baltimore, Maryland, May 1989. IAHS Publication Issue 181.

2 Dugdale,G., **Hardy, S**. & Milford, J.R. 1991 International Workshop on Precipitation Measurement 5. Daily Catchment Rainfall Estimated from Meteosat. Hydrological Process, 5, 261-270.

3 Waltham,D., **Hardy,S**. & Abousetta,A. 1992 Sediment geometries and domino faulting. *In*: Williams,G.D. & Dobb,A. (eds). "Tectonics and Seismic Sequence Stratigraphy", Special Publication of the Geological Society of London No. 71, pp 67-85.

4 **Hardy,S**. & Waltham,D. 1992 Computer modelling of tectonics, eustacy and sedimentation using the Macintosh. Geobyte, 7(6), 42-52.

5 **Hardy,S**. 1993 Numerical modelling of the response to variable stretching rate of a domino fault block system. Marine and Petroleum Geology, 10(2), 145-152.

6 **Hardy,S**. & Poblet,J. 1994 Geometric and Numerical Model of Progressive Limb Rotation in Detachment Folds. Geology, 22, 371-374.

7 **Hardy,S**., Dart,C. & Waltham,D. 1994 Computer modelling of the influence of tectonics upon sequence architecture of coarse-grained fan deltas. Marine & Petroleum Geology, 11, 561-574.

8 Waltham,D. & **Hardy,S**. 1995 The velocity description of deformation. Paper 1: theory. Marine and Petroleum Geology, 12, 153-163.

9 **Hardy,S**. & Poblet,J. 1995 The velocity description of deformation. Paper 2: sediment geometries associated with fault-bend and fault-propagation folds. Marine and Petroleum Geology, 12, 165-176.

10 Poblet,J. & **Hardy,S**. 1995 Reverse modelling of the Pico del Aguila Anticline, Spain. Journal of Structural Geology, 17(12),1707-1724.

11 **Hardy,S**. 1995 A method for quantifying the kinematics of fault-bend folding. Journal of Structural Geology, 17(12), 1785-1788.

12 **Hardy,S**., Poblet,J., McClay,K. & Waltham,D. 1996 Mathematical modelling of growth strata associated with fault-related fold structures. *In:* Buchanan,P.G. & Nieuland,D.A. (eds) "Modern Developments in Structural Interpretation, Validation and Modelling", Geological Society of London Special Publication No. 99, pp 265-282.

13 Cohen,H.A. & **Hardy,S**. 1996 Numerical modelling of stratal architectures resulting from differential loading of a mobile substrate. *In:* Alsop,G.I., Blundell,D.J. & Davison,I (eds) "Salt Tectonics", Geological Society of London Special Publication No. 100, pp 265-273.

14 Molinero,J., Colombo,F. & **Hardy,S.** 1996 Disposición geométrica profunda de los materiales terciarios en el corte del río Najerilla (Sector Riojano de la cuenca del Ebro) Geogaceta, 20(4), 792-795.

15 Ford,M., Williams,E., Artoni,A., Vergés,J. & **Hardy,S**. 1997 Progressive evolution of a fault propagation fold pair from growth strata geometries, Sant Llorenç de Morunys, SE Pyrenees. Journal of Structural Geology, 19, 413-441.

16 **Hardy,S**. 1997 A velocity description of constant-thickness fault propagation folding. Journal of Structural Geology, 19, 893-896.

17 **Hardy,S.** & Ford,M. 1997 Numerical modelling of trishear fault-propagation folding. Tectonics, 16, 841-854

18 Tari,G.C., Georgiev,G., **Hardy,S**., Poblet,J. & Stefanescu,M. 1997 Late Triassic Cimmerian structures beneath the Moesian platform (Romania/Bulgaria). Leading Edge, 16, 1153-1158.

19 Bosence,D., Cross,N. & **Hardy,S**. 1998 Depositional sequences from fault-block carbonate platforms; a combined field and computer modelling analysis. Marine and Petroleum Geology, 15, 203-221.

20 **Hardy,S**., Duncan,C., Masek,J. & Brown,D. 1998 Minimium work, fault activity and the growth of critical wedges in fold and thrust belts. Basin Research, 10, 365-373.

21 **Hardy,S**. & Gawthorpe,R. 1998 Effects of variations in fault slip rate on sequence stratigraphy in fan deltas: Insights from numerical modelling. Geology, 26, 911-914.

22 **Hardy,S**. & McClay,K. 1999 Kinematic modelling of extensional fault-propagation folding. Journal of Structural Geology, 21, 695-702.

23 Ritchie,B., **Hardy,S**. & Gawthorpe,R. 1999 Three-dimensional modelling of coarse-grained clastic deposition in sedimentary basins. Journal of Geophysical Research, 104, 17759-17780.

24 Erickson,G., **Hardy,S**. & Suppe,J. 2000 Sequential restoration and unstraining of structural cross-sections: Applications to extensional terranes. American Association of Petroleum Geologists Bulletin, 84, 234-249.

25 Grelaud,S., Buil,D., **Hardy,S**. & Frizon de Lamotte,D. 2000 Trishear kinematic model of fault-propagation folding and sequential development of minor structures: the Oupia anticline(NE Pyrenees, France) case study. Bulletin of the Geological Society of France, 171(4), 441-449.

26 Young,M.J., Gawthorpe,R.L. & **Hardy,S**. 2001 Growth and Linkage of a Segmented Normal Fault Zone; The Late Jurassic Murchison-Statfjord North Fault, Northern North Sea. Journal of Structural Geology, 23, 1933-1952.

27 Gawthorpe, R. & **Hardy, S**. 2002 Extensional fault-propagation folding and base-level change as controls on growth strata geometries. Sedimentary Geology, 146, 47-56.

28 Bernal,A. & **Hardy,S**. 2002 Syn-tectonic sedimentation associated with three-dimensional fault-bend fold structures: A numerical approach. Journal of Structural Geology, 24, 609-635.

29 Erickson S.G., **Hardy S**, & Suppe J. 2002 Sequential restoration and unstraining of structural cross sections: Applications to extensional terranes: Reply. American Association of Petroleum Geologists Bulletin, 86, 185-185.

30 **Hardy,S**. & Gawthorpe,R. 2002 Normal fault control on sediment supply to extensional basins: insights from numerical modelling. Journal of Geophysical Research, 107(10), 10.1029/2001JB000166 2002.

Papers published since commencement of ICREA position

31 Finch,E., **Hardy,S**. & Gawthorpe,R.L. 2003 Discrete element modelling of contractional fault-propagation folding above rigid basement fault blocks. Journal of Structural Geology, 25(4), 515-528.

32 Gawthorpe,R.L., **Hardy,S**. & Ritchie,B.D. 2003 Numerical modelling of sedimentation in half graben settings. Sedimentology, 50, 169-185.

33 Cooper,K., **Hardy,S.** & Gawthorpe,R.L. 2003 Stratigraphic and structural expression of the lateral growth of fault-propagation folds: results and implications from kinematic modelling. Basin Research, 15(2), 165-182.

34 Ritchie,B.D., Gawthorpe,R.L. & **Hardy,S**. 2004 Three-dimensional numerical modeling of deltaic depositional sequences 1: Influence of the rate and magnitude of sea-level change. Journal of Sedimentary Research, 74(2), 203-220.

35 Ritchie,B.D., Gawthorpe,R.L. & **Hardy,S**. 2004 Three-dimensional numerical modeling of deltaic depositional sequences 2: Influence of local controls. Journal of Sedimentary Research, 74(2), 221-238.

36 Poblet, J., Bulnes, M., McClay, K. & **Hardy, S**. 2004 Plots of crestal structural relief and fold core area versus shortening: a graphical technique to unravel the kinematics of thrust-related folds. American Association of Petroleum Geologists Memoir "Thrust Tectonics", 82, pp 372-379.

37 Gelabert,B., Sàbat,F., **Hardy,S**. & Rodriguez-Perea,A. 2004 Significance of Inherited Normal Faults during Inversion Tectonics: an example from the Tramuntana Range, Mallorca. Geodinamica Acta, 17(6), 363-373.

38 Finch,E., **Hardy,S**. & Gawthorpe,R.L. 2004 Discrete element modelling of extensional fault-propagation folding above rigid basement fault blocks, Basin Research, 16(4), 489-506.

39 Bernal,A., **Hardy,S**., Gawthorpe,R.L. & Finch,E. 2004 Stratigraphic expression of the lateral propagation and growth of isolated fault-related uplifts. Basin Research, 16(2), 219-233.

40 **Hardy,S.** & Poblet,J. 2005 A method for relating fault geometry, slip rate and uplift data above fault-propagation folds. Basin Research, 17(3), 417-424.

41 **Hardy,S**. & Finch,E. 2005 Discrete-element modelling of detachment folding. Basin Research, 17(4), 507-520.

42 **Hardy,S.** & Connors,C.D. 2006 Short Note: A Velocity Description of Shear Fault-Bend Folding. Journal of Structural Geology, 28, 536-543.

43 **Hardy,S**. & Finch,E. 2006 Discrete Element Modelling of The Influence of Cover Strength on Basement-Involved Fault-Propagation Folding. Tectonophysics, 415, 225-238.

44 **Hardy,S**. & Finch,E. 2007 Mechanical stratigraphy and the transition from trishear to kink-band fault-propagation fold forms above blind basement thrust faults: a discrete element study. Marine and Petroleum Geology, 42, 75-90.

45 **Hardy,S**. 2008 Structural evolution of calderas: Insights from two-dimensional discrete element simulations. Geology, 36(12), 927-930.

46 Carmona,A., Calvera,R., Gratacós,O. & **Hardy,S**. 2008 Combining discrete element modelling and process-based models: Initial Results. Bollettino di Geofisica Teorica e Applicata, 49 (N2), 358-364.

47 Vidal-Royo,O., Koyi,H.A., **Hardy,S.** & Muñoz,J.A. 2008 Analogue and numerical modelling contributions to the structural evolution of Central External Sierras (Southern Pyrenees, Spain). Bollettino di Geofisica Teorica e Applicata, 49 (N2), 295-299.

48 **Hardy,S**. McClay,K.R. & Muñoz,J.A. 2009 Deformation and fault activity in space and time in high-resolution numerical models of doubly-vergent thrust wedges (doi:10.1016/j.marpetgeo. 2007.12.003). Marine and Petroleum Geology, 26, 232-248.

49 Vidal-Royo,O., **Hardy,S**. & Muñoz,J.A. 2009 Influence of multiple décollement stratigraphy and growth strata on a detachment fold development: insights from 2D Discrete-Element modelling and application to Pico del Águila anticline (External Sierras, Spanish Southern Pyrenees). Trabajos de Geología, 29, 813-818.

50 Carmona,A., Clavera-Gispert,R., Gratacós,O. & **Hardy,S**. 2010 Modeling Syntectonic Sedimentation: Combining a Discrete Element Model of Tectonic Deformation and a Process-based Sedimentary Model in 3D. Mathematical Geosciences, 42, 519-534. DOI: 10.1007/ s11004-010-9293-6

51 Mencos,J., Muñoz,J.A. & **Hardy,S**. 2011 3D geometry and numerical modelling of the Sant Corneli anticline (southern Pyrenees, Spain) *In*: Thrust Related Folding, AAPG Memoir 94, eds K.R. McClay, J.Suppe & J.Shaw, pp283-300..

52 **Hardy,S**. & Allmendinger,R.W. 2011 Trishear: A review of Kinematics, Mechanics and Applications. *In*: Thrust Related Folding, AAPG Memoir 94, eds K.R. McClay, J.Suppe & J.Shaw, pp95-119.

53 **Hardy,S**. 2011 Cover deformation above steep, basement normal faults: Insights from 2D discrete element modeling. Marine and Petroleum Geology, 28, 5, 966-972. doi:10.1016/j.marpetgeo.2010.11.005.

54 Vidal-Royo,O., **Hardy,S**. & Muñoz,J.A. 2011 The roles of complex mechanical stratigraphy and syn-kinematic sedimentation in fold development: insights from discrete-element modelling and application to the Pico del Águila anticline (External Sierras, Southern Pyrenees). *In*: Kinematic Evolution and Structural Styles of Fold-and-Thrust Belts, Poblet,J. & Lisle,R.J. (eds), Geological Society, London, Special Publications, 349, 45-60. DOI: 10.1144/SP349.3

55 Vidal-Royo,O., Cardozo,N., Muñoz,J.A., **Hardy,S**. & Maerten,L. 2012 Multiple mechanisms driving detachment folding as deduced from 3D reconstruction and geomechanical restoration: The Pico del Águila anticline (External Sierras, Southern Pyrenees). Basin Research, 24, 3, 295-313.

56 Vidal-Royo,O., Muñoz,J.A., **Hardy,S**., Koyi,H.A. & Cardozo,N. 2013 Integration of modelling techniques in the understanding of the structural evolution of the Pico del Águila anticline (External Sierras, Southern Pyrenees). Geologica Acta. 11, 1, 1-26.

57 **Hardy,S.** 2013. Propagation of blind normal faults to the surface in basaltic sequences: Insights from 2D discrete element modelling. Marine and Petroleum Geology, 48, 149-159.

58 Botter,C., Cardozo,N., **Hardy,S**., Lecomte,I. & Escalona,A. 2014 From mechanical modeling to seismic imaging of faults: A synthetic workflow to study the impact of faults on seismic. Marine and Petroleum Geology, 57, 187-207.

59 Carmona,A., Clavera-Gispert,R., Gratacós,O., **Hardy,S**. & Muñoz de la Fuente, J.A. 2014 Modelling Syntectonic Sedimentation in an Extensional Faults System, *in* Elger, K., Haug, Ø. T., Ritter, M (eds), Proceedings of GeoMod2014 - Modelling in Geosciences: Programme and Extended Abstracts, Potsdam, Germany, 75-78.

60 **Hardy,S.** 2015 The Devil truly is in the detail. A cautionary note on computational determinism: Implications for structural geology numerical codes and interpretation of their results. Interpretation, 3(4), ppSAA29-SAA35.

61 **Hardy,S**. 2016 Does shallow dike intrusion and widening remain a possible mechanism for graben formation on Mars? Geology, 44, 107-110.

62 Carmona,A., Gratacós,O., Clavera-Gispert,R., Muñoz,J.A. & **Hardy,S.** 2016. Numerical Modelling of Syntectonic Subaqueous Sedimentation: The Effect of Normal Faulting and a Relay Ramp on Sediment Dispersal. Tectonophysics, 684,100-118.

63 Botter,C., Cardozo,N., **Hardy,S**., Lecomte,I., Paton,G. & Escalona,A. 2016. Seismic characterisation of fault damage in and seismic modelling in 3D using mechanical and seismic modelling. Marine and Petroleum Geology, 77, 973-990.

64 Gratacós, O.; Carmona, A.; Clavera-Gispert, R.; Muñoz, J.A.; **Hardy, S.** 2016. Modelación numérica de sedimentación subacuática sintectónica: efecto de la presencia de fallas normales y zonas de relevo en la distribución de sedimento. Geo-Temas, 2016, vol. 16, núm. 1, p. 141-144.

65 Carmona,A., Gratacós,O., López-Blanco,M Muñoz,J.A., Clavera-Gispert,R., Arbues,P. & **Hardy,S.** 2016 The Effect of syntectonic sedimentation on fold geometry: Insights from numerical modelling. Proceedings GeoMod 2016 conference Montpellier, France | 17–20 October 2016. pp119-121.

66 Valencia,D., Botter,C., **Hardy,S.** & Cardozo,N. 2016. Seismic Imaging of Salt-influenced Compressional Folds. Conference Paper 78th EAGE Conference and Exhibition 2016 Vienna. DOI: 10.3997/2214-4609.201601613

67 Pla,O., Carmona,A., Izquierdo,E., Roca,E., Muñoz,J.A., Ferrer,O., **Hardy,S**., Xie,H., Neng,Y., Huang,S., Rowan,M. 2016. Geometry of a fold-and-thrust belt generated by multiple décollements (Kuqa basin, NW china): Insights from analogue and numerical models. International Conference and Exhibition, Barcelona, Spain, 3-6 April 2016. pp274-274. Publisher Society of Exploration Geophysicists and American Association of Petroleum Geologists.

68 **Hardy,S**. 2018. "Coupling a frictional-cohesive cover and a viscous substrate in a discrete element model: First results of application to thick- and thin-skinned extensional tectonics" Marine and Petroleum Geology, 97, 32-44.

69 **Hardy,S**. 2018. Novel discrete element modelling of Gilbert-type delta formation in an active tectonic setting - first results. Proceedings GeoMod 2018 conference Barcelona, Spain, 1–4 October 2018. pp176-177.

70 Bernal,A, **Hardy,S** & Gawthorpe,R.L. 2018 "Three-Dimensional Growth of Flexural Slip Fault-Bend and Fault-Propagation Folds and Their Geomorphic Expression" Geosciences 2018, 8, 110;

71 **Hardy,S**. 2018. Coupling a frictional-cohesive cover and a viscous substrate in a discrete element model: first results of application to thick- and thin-skinned extensional tectonics. Proceedings GeoMod 2018 conference Barcelona, Spain, 1–4 October 2018. pp20-21.

72 **Hardy,S**. 2019 "Novel discrete element modelling of Gilbert-type delta formation in an active tectonic setting - first results." Basin Research, 31, 1, pp 77-91. DOI:10.1111/bre.12309

73 **Hardy,S**. 2019. Discrete element modelling of extensional, growth, fault-propagation folds. Basin Research, 31, 3, pp584-599. DOI: 10.1111/bre.12335

74 **Hardy,S**. 2019. Internal structural evolution of calderas: First results from 3D discrete element simulations. Geosciences, 2019, 9, pp. 419.

75 **Hardy,S.** 2020, 'Discrete Element Modeling of the Interaction of a Mobile Substrate, Pre-Growth Sedimentary Cover, and Growth Strata' *70th GCAGS/GCSSEPM Transactions*, volume 9.

76 **Hardy,S.** 2020, 'Modeling Deltaic Sedimentation and Internal Delta Deformation Using Discrete Elements'*70th GCAGS/GCSSEPM Transactions,* volume 9.

77 **Hardy,S**. & Cardozo, N 2021, 'Discrete Element Modelling of Sedimentation and Tectonics:Implications for the Growth of Thrust Faults and Thrust Wedges in Space and Time, and the Interpretation of Syn-Tectonic (Growth) Strata', *Frontiers In Earth Science*, 9, 742204.

78. **Hardy S**. 2021, ´Discrete Element Modelling of Pit Crater Formation on Mars´. *Geosciences*, vol. *11*, no. 7, pp 268.

Publications in Review/Revision/Preparation

79 Cardozo, N. & **Hardy,S**. 2022. "cdem: a macOS program for discrete element modelling of tectonic structures". Geosphere. (*in prep*).

80 **Hardy,S**., Cardozo, N. & Mueller,K. 2022. "Fault activity, discrete lava flows and resurfacing, their combined effect on surficial structure in Iceland and other active settings ". Journal of Structural Geology, (*in prep*).

Supervision of research students

Name, dates and funding	Topic	Role - other supervisors shown in ()	Level of degree	Date submitted	Outcome
Bryan Ritchie 1997- 2001 (Industry)	Local controls on sequence variability	Supervisor (Hunt & Gawthorpe)	PhD	2001	Awarded June 2001
Tiago Alves 1998-2003 (Portugal)	Seismic and sequence stratigraphic evolution of the Portugeese Atlantic Margin	Supervisor (Hunt & Gawthorpe)	PhD	2003	Awarded 2003
Javier Cortes del Rio 1998 (self)	Structural and stratigraphic evolution of the Magnus Basin, N Sea	Supervisor (Hunt & Gawthorpe)	MSc	1999	Awarded (Distinction)
Kate Cooper 1998- 2002(CASE)	Growth stratigraphy in compressional settings	Supervisor (Gawthorpe)	PhD	2002	Awarded
Fahar Al-Rabeei 1998-(Industry)	3D modelling of carbonate-clastic interactions	Supervisor (Hunt & Gawthorpe)	MPhil	–	–
Astrubal Bernal Pasos 1999- 2003(Industry)	Structural and stratigraphic evolution of thrusts and thrust-related folding in 3D	Supervisor (Gawthorpe)	PhD	2003	Awarded
Guillaume L'Henoret 2000 (self)	3D Modelling of orogenic wedge development	Supervisor	MSc	2001	Awarded (Distinction)
Christopher Leppard 2000-2004 (NERC tied studentship)	Spatial and temporal evolution of normal fault zones	Supervisor (Gawthorpe)	PhD	2005	Awarded
Catherine Canner (2001 -2006 CASE)	Seqeunce stratigraphy and baselevel fall	Supervisor (Gawthorpe& Corfield)	PhD	2006	Awarded
Oskar Vidal (2005-2010)	Detachment Folding and Growth Strata	Co-Direcor (Muñoz)	PhD	2010	Awarded (Distinction)
Joana Mencos (2004-2011)	3D Structural Studies	Co_Director (Muñoz)	PhD	2011	Awarded (Distinction)
Ana Carmona (2005-2016)	Combining discrete element and technique and process based models.	Co-Director (Gratacos)	PhD	2016	Awarded (Distinction)
Charlotte Botter (2012-2016)	Combining discrete element and seismic modelling	Co-Director (Cardozo)	PhD	2016	Awarded

Rosita Haftbaradaran (2016)	Seismic imaging of salt-influenced extensional forced folding	Co-Director (Cardozo)	MSc	2016	Awarded
Muhammed Mahmoud Abdelrhman Elsheikh (2016)	Mechanical modeling of salt-influenced forced folding	Co-Director (Cardozo)	MSc	2016	Awarded
Diana Valencia (2016)	Seismic imaging of salt influenced compressional folds	Co-Director (Cardozo)	MSc	2016	Awarded
Hanne Gilje (2021)	Structural evolution of basement fault bounded fold structures using forward modelling methods: Application to the Beta structure in the Smeaheia area.	Co-Director (Cardozo)	MSc	2022	In progress

Organisation and promotion of research

Previous Research grants and industry-funded research

PI = Principal Investigator; PDRA = postdoctoral research assistant

1999-2001	Manchester University: Application of high performance computing to 3D numerical modelling and visualization of structure and stratigraphy. (joint PI with Gawthorpe). 1 PDRA (50% supported by industry).	£40,000
1999-	Geological software donation from Schlumberger, Paradigm and gOcad	$800,000
1999-2001	PDVSA (Venezula) – studentship to A.Bernal	£40,000
2002-2002	Royal Society small grant for fieldwork in the Catalan Coastal Ranges	£3,000
2003.	Joint principal investigator (with Gawthorpe) on NERC ROPA award 1 PDRA	£96,500
2004.	Joint principal investigator with Gawthorpe, Norsk Hydro funded 3D seismic investigation of structure, stratigraphy – 1 Senior Research Fellow	£210,000
2001.	Joint with Gawthorpe, 3D seismic and visualization facility, 60K Manchester University funding, 30K Norsk Hydro funding	£90,000

Professional advisory or consultancy work

I frequently act as a referee for scientific papers submitted for publication in international academic journals covering the subject areas of numerical modelling, structure, stratigraphy and basin analysis. Academic journals include: Journal of the Geological Society, Marine and Petroleum Geology, Geology, Bulletin of the Geological Society of America, Journal of Asian Earth Sciences, Sedimentary Geology, Journal of Structural Geology, Basin Research, Geophysical Research Letters, Computers and Geosciences, IAS Special Publications, AAPG Memoir "Thrust Tectonics", and Tectonics. I also act as a referee on NERC

research grant proposals, for the Dutch Research Council, and have recently acted as referee for several large NSF grant proposals.

Services as an external examiner

PhD examinations

1. Cuss,L. University of Manchester, UK April 1998.
2. Oliveira, L., University of London, UK Jan 2000.
3. Lee,A. University of Manchester, UK May 2001.
4. Barrier,L. University of Rennes, France Feb 2002.
5. Baker,Y. University of London, UK July 2002.
6. Gratacós Torrà,O. Universitat de Barcelona, Spain Oct. 2004.

D.Sc. examinations

1. Bertrand Maillot, University of Cergy, France Sept. 2009. HDR ("Habilitation à Diriger des Recherches")

Conferences and seminars

Recent conferences attended and forthcoming conferences include:

International

1990

- Petroleum Geology and Geophysics Research in Academia, London, Oct. 1 paper.

1991

- Tectonics and Seismic Sequence Stratigraphy, London, Feb, 1 paper.
- Tectonics and Seismic Sequence Stratigraphy - Highlights Meeting, London, Sept., 1 paper.

1992

- Carbonate Stratigraphic Sequences : Sequence Boundaries, La Seu, Spain. Aug/Sept. 1 paper.

1993

- AAPG Annual Convention,New Orleans, USA., April 1 paper.
- Geological Society of America Fall Meeting, Boston, USA. Oct., 1 poster.

1994

- Modern developments in section validation techniques, London, Feb., 1 paper.
- Highlights meeting of Modern developments in section validation techniques, London, April., 1 paper.
- Salt Tectonics, London, June, 1 poster.

1995

- Congreso Espanol de Sedimentologia, Teruel, June, 1 paper.
- Invited talk at Penrose Conference on Fault-related Folding, Banff, Canada, August, 1 paper
- SEPM special conference on alluvial fans, Death Valley, Oct. 1 paper.

1996

- Invited Talk at ETH Zurich, Switzerland. Jan. 1 paper

1997

- Invited talk at The Fault Dynamics Symposium, London, May, 1 paper

- Invited talk at AAPG Hedberg conference Reservoir scale deformation: characterization and prediction, Utah, June, 1 paper.
- Geological Society of America Annual Meeting, Utah, Oct., 2 papers.

1998

- Characterisation of carbonate Reservoir Rocks, London, Feb. 1998. 1 paper.

1999

- Thrust Tectonics 1999, London, April. 1 paper and 1 poster.
- American Association of Petroleum Geologists Annual Convention, San Antonio, April. 4 papers.
- International Association of Mathematical Geology Annual Conference, Trondheim, August, 1 Keynote paper.
- Society of Exploration Geophysicits Annual Meeting, Houston, November. 1 keynote paper (best of AAPG Annual Meeting 1999).

2000

- American Association of Petroleum Geologists Annual Convention, New Orleans, April. 2 papers and 1 poster.
- American Geophysical Union Fall Meeting , San Franciso, December. 2 papers.

2001

- American Association of Petroleum Geologists Annual Convention, Denver, April. 2 papers and 1 poster.

2002

- American Association of Petroleum Geologists Annual Convention, Houston, April. 2 papers.

2003

- American Association of Petroleum Geologists International Conference, Feb. 2002, Barcelona, Spain. *(attendee)*

- Three-Dimensional Analysis: A Basic Approach to Understanding Geological Structures, Feb. 2003, Seminar, University of Barcelona.

2005

- AAPG Annual Meeting Calgary, June 2005. "The Effect of Cover Strength on Extensional Fault Propagation", Finch, Gawthorpe, Hardy (paper)
- AAPG Annual Meeting, Calgary, June 2005. "The Development of Incised Valleys in a Three-Dimensional Numerical Model of Deltaic", Finch,Hardy,Gawthorpe (paper)
- Invited Keynote Address on Fault-Related Folding in Beijing, China, International Conference on Theory and Application of Fault-Related Folding in Foreland Basins, June/July 2005.
- International Conference on Theory and Application of Fault-Related Folding in Foreland Basins, June/July 2005. Presentation/Poster w/ J.A. Muñoz & J. Mencos.

2008

- AAPG 2008 Annual Convention - San Antonio. 3-D Structural and Analog Modeling Integration Applied to Pico Del Águila Anticline (Sierras Exteriores, Southern Pyrenees): Vidal,O., Muñoz,J.A., Koyi,H.A & Hardy,S. (poster)
- Geomod2008 Florence, Italy Sept. 2008. Analogue and Numerical Modelling contributions to the structural evolution of Central External Sierras (Southern Pyrenees, Spain): Vidal Royo, O., Koyi,H.A., Hardy,S. and Muñoz,J.A. (poster)
- Geomod2008 Florence, Italy Sept. 2008. Combining Discrete Element Modelling and Process-Base Models: Initial Results: Ana Carmona, Roger Clavera, Oscar Gratacos, Stuart Hardy. (poster)

2009

• EGU General Assembly 2009 - April Vienna, Austria - Invited talk “2D and 3D Numerical Modelling of Caldera Development” in the session on "Volcano deformation, dynamics and deep structure" (GMPV3)

2012

• EAGE Meeting- Conference name: Fault and Top Seals 2012, October, Montpellier, France - "Mechanical Modelling and Seismic Imaging of Fault Zones" , Botter, Cardozo, Hardy, Lecompte and Escalona. (Talk)

2014

• Tectonic Studies Group Meeting- January, Cardiff, Wales - Invited Talk "From mechanical modelling to seismic imaging of faults" , Cardozo, Botter, Hardy, Lecompte and Escalona.

• AAPG International Conference & Exhibition Sept. 2014, Istanbul. From Geomechanical Modelling to Seismic Imaging of 3D Faults. Botter, Charlotte; Cardozo, Nestor; Hardy, Stuart; Lecomte, Isabelle; Escalona, Alejandro; Cooke, Nicholas; Paton, Gaynor. (Talk)

• Geomod 2014, Sept. Potsdam, Germany. Carmona A., Clavera-Gispert R., Gratacós O., Hardy S., Muñoz de la Fuente J.A.: Modelling Syntectonic Sedimentation in an Extensional Faults System, Proceedings of GeoMod2014 - Modelling in Geosciences: Programme and Extended Abstracts 31 August-5 September 2014, pag 75-78. (Poster).

• 76th EAGE Conference & Exhibition 2014, Netherlands. From Geomechanical Modelling to Seismic Imaging of 3D Faults. Botter, Charlotte; Cardozo, Nestor; Hardy, Stuart; Lecomte, Isabelle; Escalona, Alejandro; Cooke, Nicholas; Paton, Gaynor. (Talk).

• AAPG Europe Region Conference, Barcelona May 2014. Carmona A., Clavera-Gispert R., Gratacós O., Hardy S., Muñoz de la Fuente J.A.. Modelling Syntectonic Sedimentation in a Relay Ramp of an Extensional Fault System. (Talk).

• AAPG Europe Region Conference, Barcelona May 2014. From mechanical modeling to seismic imaging of faults: A synthetic workflow to study the impact of faults on seismic
Stuart Hardy, Charlotte Botter, Nestor Cardozo, Isabelle Lecomte and Alejandro Escalona. (Talk).

• AAPG Europe Region Conference, Barcelona May 2014. Propagation of blind normal faults to the surface in strong, cohesive stratigraphic sequences: Insights from 2D discrete element modelling Stuart Hardy. (Talk).

2018

• Geomod 2018, Oct. Barcelona, Spain. Hardy S.: Coupling a frictional-cohesive cover and a viscous substrate in a discrete element model: first results of application to thick- and thin-skinned extensional tectonics., Proceedings of GeoMod2018 - Modelling in Geosciences: 1 October - 4 October 2018, (Talk).

• Geomod 2018, Oct. Barcelona, Spain. Hardy S.: Novel discrete element modelling of Gilbert-type delta formation in an active tectonic setting - first results.., Proceedings of GeoMod2018 - Modelling in Geosciences: 1 October - 4 October 2018, (Poster).

2020

• 70th GCAGS/GCSSEPM Convention and Exposition Sept. 30–Oct. 2, 2020 • Lafayette, Louisiana, USA. Hardy,S. KEYNOTE PRESENTATION: Discrete Element Modeling of the Interaction of a Mobile Substrate, Pre-Growth Sedimentary Cover, and Growth Strata (Talk).

2020

• 70th GCAGS/GCSSEPM Convention and Exposition Sept. 30–Oct. 2, 2020 • Lafayette, Louisiana, USA. Hardy,S. Modeling Deltaic Sedimentation and Internal Delta Deformation Using Discrete Elements (Talk).

2021

• Geomod 2021, Sept. Utrecht, The Netherlands. Cardozo, N and Hardy,S. cdem: A unique software suite for discrete element modelling of tectonic structures. September 19-23, Utrecht, The Netherlands. (Poster)

National

1990

- Tectonic Studies Group, Liverpool, 1 poster.

1991

- Tectonic Studies Group, Edinburgh, Dec., 1 poster.
- Earth Surface Studies Group, Leeds, Oct., 1 paper.

1992

- Geoscience Information Group & Computer Teaching Initiative meeting on Geological Education Software. Keele, April, 1 paper.
- Computer Modelling Applications in petroleum exploration and development, Aberdeen, April, 1 paper.
- Collaborative Research Programmes in Petroleum Geoscience, London, Nov. 1 paper.
- British Sedimentological Research Group Annual Meeting, Southampton, Dec., 1 paper.

1993

- Tectonic Studies Group, Dublin, Dec., 1 paper.
- British Sedimentological Research Group Annual Meeting, Manchester, Dec., 2 papers.

1997

- British Sedimentological Research Group Annual Meeting, Liverpool, December. 2 papers.

2000

• Tectonic Studies Group Annual Meeting, Manchester, January. 1 paper.

2003

• British Sedimentological Research Group Annual Meeting, Norwich, December. 1 Invited Keynote paper.

2008

• YORSGET, Oviedo, Spain. July 2008. Influence of multiple decollement stratigraphy and growth strata in a detachment fold construction: insights from 2D Discrete-Element modelling. Application to Pico del Águila anticline (External Sierras, Spanish Southern Pyrenees). Vidal Royo,O., Hardy,S. and Muñoz,J.A.

In addition to the above conferences, I have been invited by several oil and gas exploration companies to give presentations in the UK, Europe and USA. Companies include: British Petroleum, Enterprise Oil and Texaco, Conoco, Shell, Mobil in the UK; Saga Petroleum and Norsk Hydro in Norway; Exxon Production Research, Amoco, Conoco and Texaco in the USA.

ADMINISTRATION

Major Departmental/Faculty academic activities

Postgraduate Course, Universitat de Barcelona, Dept. de Geodinamica i Geofisica. (Modelización Númerica de Estructuras y Cuencas Sedimentarias) 7-11 June 2004

Postgraduate Course, Universitat de Barcelona, Dept. de Geodinamica i Geofisica. (Modelización Númerica de Estructuras y Cuencas Sedimentarias) 24th Jan – 4th Feb 2005

Postgraduate Course, Universitat de Barcelona, Dept. de Geodinamica i Geofisica. (Modelización Númerica de Estructuras y Cuencas Sedimentarias) 6th Feb – 17th Feb 2006

Postgraduate Course, Universitat de Barcelona, Dept. de Geodinamica i Geofisica. (Modelización Númerica de Estructuras y Cuencas Sedimentarias) 5th Feb – 16th Feb 2007

Postgraduate Course, Universitat de Barcelona, Dept. de Geodinamica i Geofisica. (Modelización Númerica de Estructuras y Cuencas Sedimentarias) 17th Jan – 22nd Jan 2008

Postgraduate Course, Universitat de Barcelona, Dept. de Geodinamica i Geofisica. (Modelización Númerica de Estructuras y Cuencas Sedimentarias) Jan 2009

Postgraduate Course, Universitat de Barcelona, Dept. de Geodinamica i Geofisica. (Modelización Númerica de Estructuras y Cuencas Sedimentarias) Jan 2010

Postgraduate Course, Universitat de Barcelona, Dept. de Geodinamica i Geofisica. (Modelización Númerica de Estructuras y Cuencas Sedimentarias) Feb 2011

Postgraduate Course, Universitat de Barcelona, Dept. de Geodinamica i Geofisica. (Modelización Númerica de Estructuras y Cuencas Sedimentarias) Feb 2012

Postgraduate Course, Universitat de Barcelona, Dept. de Geodinamica i Geofisica. (Modelización Númerica de Estructuras y Cuencas Sedimentarias) Feb 2013

Undergraduate Talk, Universitat de Barcelona, Dept. de Geodinamica i Geofisica. (Modelling in structural geology) April 2013

Undergraduate Talk, Universitat de Barcelona, Dept. de Geodinamica i Geofisica. (Modelling in structural geology) April 2014

Undergraduate Talk, Universitat de Barcelona, Dept. de Geodinamica i Geofisica. (Modelling in structural geology) April 2015

Undergraduate Talk, Universitat de Barcelona, Dept. de Geodinamica i Geofisica. (Modelling in structural geology) April 2016

Undergraduate Talk, Universitat de Barcelona, Dept. de Geodinamica i Geofisica. (Modelling in structural geology) April 2017

Undergraduate Talk, Universitat de Barcelona, Dept. de Geodinamica i Geofisica. (Modelling in structural geology) April 2018

Major Departmental/Faculty non-academic activities

Joint (with Joan Bagaria) elected representative of the ICREAS at the University of Barcelona. The commission is formed by 2 representatives of ICREA and 2 of the UB who meet regularly -- at least once a year, and whenever it is considered necessary -- and whose task is to follow up the agreement signed by both institutions, as well as dealing with any questions that concern them both.

Appointed Member of Scientific Committee for Geologica Acta, and appointed as Managing Scientific Editor for this journal. From 26/07/2006.

Publicity/Outreach

El Periodico: Interview published 26/01/06. Major article covering the nature of ICREA and the researchers that it attracts, with myself as focus.
Dossier Economic: Interview/article published 09/05/03 - a short article on scientists attracted to Catalunya with myself as the focus.
Terraflop (Revista del Centre de Supercomputacio de Calalunya): Article on "Modelitzacio d'estructures geologiques" covering the application of supercomputing to modeling of tectonics and sedimentation.