

Naiara Fernandez

Professional Summary

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Professional Preparation

Academic Background

Ph.D. Geology, Johannes Gutenberg University of Mainz, Germany, October 2014

M.S., Geology, University of Barcelona, July 2010

B.S. Geology, Euskal Herriko Unibertsitatea - Universidad del Pais Vasco, October 2003

Professional Appointments

Research Associate, Bureau of Economic Geology, The University of Texas at Austin
(November 2016-Present)

Postdoctoral Fellow, Bureau of Economic Geology, The University of Texas at Austin (January
2015-October 2016)

Research Assistant/Teaching Assistant, Johannes Gutenberg University Mainz, Germany
(September 2011-December 2014)

Summer internship in carbonate plays, Statoil Research Centre, Bergen, Norway
(August-September 2014)

Research Assistant, ETH Zurich (January-August 2011)

Technical Research Assistant, Institute of Earth Sciences Jaume Almera - CSIC, Barcelona
(September 2006-December 2010)

Theses

2-D and 3-D numerical modeling of multilayer detachment folding and salt tectonics, Johannes
Gutenberg University Mainz, 2014.

3D Geometry and Evolution of the Eastern Termination of Khorramabad Anticline, Zagros, Iran,
University of Barcelona, 2010.

Awards

Awards and Honorary Societies

2019 Tinker Family BEG Publication Award for Exemplary Publication of Scientific or Economic
Impact: "Structural evolution of salt-influenced fold-and-thrust belts: a synthesis and new
insights from basins containing isolated salt diapirs," Journal of Structural Geology, 2018, v. 11,
p 206-221.

Presentations

Invited Presentations

Renaissance of North Sea Salt Tectonics: Permian and Triassic Salt Tectonics of the Central

North Sea: presented to Norwegian Petroleum Directorate FORCE group (consortium of Norwegian oil companies), presented at Salt Tectonics Webinar, online webinar, December 9, 2020.

The Subsidence and Mobility of Minibasins: Insights from Natural Examples and Physical Modelling: presented to The American Association of Petroleum Geologists, presented at AAPG Salt Basins Technical Interest Group, Online Seminar, July 21, 2020.

The Subsidence and Mobility of Minibasins: A Synthesis of Recent Findings: presented to Tulane University Department of Earth and Environmental Sciences, presented at departmental seminar, New Orleans, September 6, 2019.

Presentations

Renaissance of North Sea Salt Tectonics: Late Permian and Triassic Salt Tectonics of the Central North Sea: presented to AAPG Europe, presented at Stratigraphic and Reservoir Challenges with Triassic Plays in the North Sea - Workshop, Online conference, January 26, 2021.

3D Geometries of Natural and Physically Modelled Salt Walls: Salt Stocks, Salt Sheets, and Perched Minibasins: presented to AGL Consortium, presented at AGL Annual Consortium Meeting, Online, November 11-13, 2020.

Geometry and Evolution of a Salt Wall and Flanking Minibasins in the Central North Sea: Along- and Across-Wall Variability: presented to AGL Consortium, presented at AGL Annual Consortium Meeting, Online, November 11-13, 2020.

Renaissance of North Sea Salt Tectonics: Permian and Triassic Salt Tectonics of the Central North Sea: presented to AGL Consortium, presented at AGL Annual Consortium Meeting, Online, November 11-13, 2020.

The Subsidence and Mobility of Minibasins: A Synthesis of Recent Findings: presented to Basin Research Group Seminar, presented at Imperial College London, Royal School of Mines, January 8, 2020.

Redirection of Submarine Channels by Minibasin Obstruction on a Salt-Detached Slope: an Example from Above the Sigsbee Canopy: presented to GCSSEPM Foundation, presented at 2019 Perkins-Rosen Research Conference, Noble Energy offices, Houston, Tex., December 5, 2019.

Linking the Style and Location of Lower-Slope Erosion to Salt Tectonics: presented to Applied Geodynamics Laboratory (AGL) Consortium, presented at AGL Annual Meeting, Austin, Tex., November 7-8, 2019.

Minibasin Context and Behavior Controls the Expression of Submarine Canyons: An Example from N. Gulf of Mexico: presented to Applied Geodynamics Laboratory (AGL) Consortium, presented at AGL Annual Meeting, Austin, Tex., November 7-8, 2019.

Minibasin Obstruction by Base-Salt Welding on a Salt-Detached Slope: An Example from the Northern Gulf of Mexico: presented at AAPG ACE, San Antonio, Tex., May 19-22, 2019.

Lateral Mobility of Minibasins During Shortening: Insights from the SE Precaspian Basin, Kazakhstan: presented to AAPG Europe Region, presented at AAPG Geoscience Technology Workshop: Euroasian Mature Salt Basins, Krakow, April 16-18, 2019.

Minibasin Obstruction by Base-Salt Welding on a Salt-Detached Slope: An Example from the Northern Gulf of Mexico: presented to European Geosciences Union, presented at EGU General Assembly, Vienna, April 7-12, 2019.

Salt Diapir Influence on Channel Evolution in Deep-Water Minibasins, Gulf of Mexico: presented to Applied Geodynamics Laboratory Annual Meeting, Bureau of Economic Geology, The University of Texas at Austin, November 9, 2018.

Salt Diapir Influence on Channel Evolution in Deep-Water Minibasins, Gulf of Mexico: presented to Quantitative Clastics Laboratory Annual Meeting, Bureau of Economic Geology, The University of Texas at Austin, October 16, 2018.

Shortening of Diapir Provinces: Translation, Tilting and Rotation of Minibasins in Linked-Diapir Systems: presented to GSA Penrose Conference in honor of Martin P. A. Jackson, presented at Advances in Salt Tectonics: Observations, Applications, and Perspectives, Ein Boqueq, Israel, February 11-16, 2018.

Pattern formation in 3D numerical models of down-built diapirs initiated by a Rayleigh-Taylor instability: presented at XIV International Workshop on Modelling of Mantle and Lithosphere Dynamics, Oleron, France, August 31-September 5, 2015.

Pattern formation of down-built salt structures: insights from 3D numerical models: presented at EGU General Assembly, Vienna, Austria, April 12-17, 2015.

Publications

Peer Reviewed Journal Articles

Fernandez, N., Duffy, O. B., Peel, F. J., and Hudec, M. R., 2021, Influence of minibasin obstruction on canopy dynamics in the northern Gulf of Mexico: *Basin Research*, v. 33, no. 1, p. 427-446, <http://doi.org/10.1111/br.12480>.

Duffy, O. B., Fernandez, N., Peel, F. J., Hudec, M. R., Dooley, T. P., and Jackson, C. A.-L., 2020, Obstructed minibasins on a salt-detached slope: an example from above the Sigsbee canopy, northern Gulf of Mexico: *Basin Research*, v. 32, no. 3, p. 505-524, <http://doi.org/10.1111/br.12380>.

Fernandez, N., Hudec, M. R., Jackson, C. A.-L., Dooley, T. P., and Duffy, O. B., 2020, The competition for salt and kinematic interactions between minibasins during density-driven subsidence: observations from numerical models: *Petroleum Geoscience*, v. 26, no. 1, p. 3-15, <http://doi.org/10.1144/petgeo2019-051>.

Jackson, C. A.-L., Duffy, O. B., Fernandez, N., Dooley, T. P., Hudec, M. R., Jackson, M. P. A., and Burg, G., 2020, The stratigraphic record of minibasin subsidence, Precaspian Basin, Kazakhstan: *Basin Research*, v. 32, no. 4, p. 739-763, <http://doi.org/10.1111/br.12393>.

Casini, G., Romaine, I., Casciello, E., Saura, E., Verges, J., Fernandez, N., and Hunt, D. W., 2018, Fracture characterization in sigmoidal folds: insights from the Siah Kuh anticline, Zagros, Iran: *AAPG Bulletin*, v. 102, no. 3, p. 369-399, <http://doi.org/10.1306/0503171615817076>.

Duffy, O. B., Dooley, T. P., Hudec, M. R., Jackson, M. P. A., Fernandez, N., Jackson C. A.-L., and Soto J. I., 2018, Structural evolution of salt-influenced fold-and-thrust belts: a synthesis and new insights from basins containing isolated salt diapirs: *Journal of Structural Geology*, v. 114, p. 206-221, <http://doi.org/10.1016/j.jsg.2018.06.024>.

Duffy, O. B., Fernandez, N., Hudec, M. R., Jackson, M. P. A., Burg, G., Dooley, T. P., and Jackson, C. A.-L., 2017, Lateral mobility of minibasins during shortening: Insights from the SE Precaspian Basin, Kazakhstan: *Journal of Structural Geology*, v. 97, p. 257-276, <http://doi.org/10.1016/j.jsg.2017.02.002>.

Fernandez, N., Duffy, O. B., Hudec, M. R., Jackson, M. P. A., Burg, G., Jackson, C. A.-L., and Dooley, T. P., 2017, The origin of salt-encased sediment packages: observations from the SE Precaspian Basin (Kazakhstan): *Journal of Structural Geology*, v. 97, p. 237-256, <http://doi.org/10.1016/j.jsg.2017.01.008>.

Collignon, M., Fernandez, N., and Kaus, B. J. P., 2015, Influence of surface processes and initial topography on lateral fold growth and fold linkage mode: *Tectonics*, v. 34, no. 8, p. 1622-1645, <http://doi.org/10.1002/2015TC003843>.

Fernandez, N., and Kaus, B. J. P., 2015, Pattern formation in 3D numerical models of down-built

diapirs initiated by a Rayleigh-Taylor instability: *Geophysical Journal International*, v. 202, no. 2, p. 1253-1270, <http://doi.org/10.1093/gji/ggv219>.

Collignon, M., Kaus, B. J. P., May, D. A., and Fernandez, N., 2014, Influences of surface processes on fold growth during 3-D detachment folding: *Geochemistry, Geophysics, Geosystems*, v. 15, no. 8, p. 3281-3303, <http://doi.org/10.1002/2014GC005450>.

Fernandez, N., and Kaus, B. J. P., 2014, Fold interaction and wavelength selection in 3D models of multilayer detachment folding: *Tectonophysics*, v. 632, p. 199-217, <http://doi.org/10.1016/j.tecto.2014.06.013>.

Fernandez, N., and Kaus, B. J. P., 2014, Influence of pre-existing salt diapirs on 3D folding patterns: *Tectonophysics*, v. 637, p. 354-369, <http://doi.org/10.1016/j.tecto.2014.10.021>.

Dewit, J., Huysmans, M., Muchez, Ph., Hunt, D. W., Thurmond, J. B., Verges, J., Saura, E., Fernandez, N., Romaire, I., Esestime, P., and Swennen, R., 2012, Reservoir characteristics of fault-controlled hydrothermal dolomite bodies: Ramales Platform case study: *Geological Society, London, Special Publications*, v. 370, 27 p., <http://doi.org/10.1144/SP370.1>.

Casini, G., Gillespie, P. A., Verges, J., Romaire, I., Fernandez, N., Casciello, E., Saura, E., Mehl, C., Homke, S., Embry, J.-C., Aghajari, L., and Hunt, D. W., 2011, Sub-seismic fractures in foreland fold and thrust belts: insight from the Lurestan Province, Zagros Mountains, Iran: *Petroleum Geoscience*, v. 17, p. 263-282, <http://doi.org/10.1144/1354-079310-043>.

Lapponi, F., Casini, G., Sharp, I. R., Blendinger, W., Fernandez, N., Romaire, I., and Hunt, D. W., 2011, From outcrop to 3D modelling: a case study of a dolomitized carbonate reservoir, Zagros Mountains, Iran: *Petroleum Geoscience*, v. 17, no. 3, p. 283-307, <http://doi.org/10.1144/1354-079310-040>.

Saura, E., Verges, J., Homke, S., Blanc, E., Serra-Kiel, J., Bernaola, G., Casciello, E., Fernandez, N., Romaire, I., Casini, G., Embry, J.-C., Sharp, I. R., and Hunt, D. W., 2011, Basin architecture and growth folding of the NW Zagros early foreland basin during the Late Cretaceous and early Tertiary: *Journal of the Geological Society, London*, v. 168, p. 235-250, <http://doi.org/10.1144/0016-76492010-092>.

Casciello, E., Verges, J., Saura, E., Casini, G., Fernandez, N., Blanc, E., Homke, S., and Hunt, D. W., 2009, Fold patterns and multilayer rheology of the Lurestan Province, Zagros Simply Folded Belt (Iran): *Journal of the Geological Society, London*, v. 166, p. 947-959, <http://doi.org/10.1144/0016-76492008-138>.

Conference Proceedings

Kaus, B.J.P., Popov, A., Baumann, T., Bauville, A., Pusok, A., Fernandez, N., and Collignon, M., 2016, Forward and inverse modeling of lithospheric deformation on geological timescales, NIC Symposium 2016, Publication Series of the John von Neumann Institute for Computing (NIC) NIC Series, v. 48, Jülich, Germany, 417 p.

Fernandez, N., and Kaus, B.J.P., 2014, Analytical and Numerical Investigation of 3D Multilayer Detachment Folding, 15th Annual Conference of the International Association for Mathematical Geosciences, Lecture Notes in Earth System Sciences, v. Mathematics of Planet Earth, Madrid, 757-761 p.

Contract Reports

Dooley, T. P., Peel, F., Nikolinakou, M. A., Duffy, O. B., Fernandez, N., Heidari, M., Hudec, M. R., and Apps, G., 2018, 2017 Applied Geodynamics Laboratory Annual Report to industrial associates (slide set 37): Bureau of Economic Geology, The University of Texas at Austin, prepared for <http://www.beg.utexas.edu/agl/sponsors>.

Dooley, T. P., Peel, F., Nikolinakou, M. A., Duffy, O. B., Fernandez, N., Heidari, M., Hudec, M. R., and Apps, G., 2018, Applied Geodynamics Laboratory Contract Report to Industrial Associates 2018 (slide set 37): Bureau of Economic Geology, The University of Texas at Austin,

prepared for <http://www.beg.utexas.edu/agl/sponsors>.

Peel, F., Dooley, T. P., Hudec, M. R., Nikolinakou, M. A., Moghadam, M. H., Fernandez, N., Duffy, O. B., and Apps, G., 2017, Applied Geodynamics Laboratory annual report to industrial associates 2017, slide set 36: Bureau of Economic Geology, The University of Texas at Austin, Annual Report prepared for Anadarko, Apache, BHP Billiton, BP, CGG, Chevron, Cobalt, Condor, ConocoPhillips, EcoPetrol, ENI, ExxonMobil, Freeport-McMoRan, Fugro, Hess, ION Geophysical, Lukoil, Maersk, Marathon, Murphy, Nexen, Noble, Pemex, Petrobras, PGS, Repsol-YPF, Rockfield, Samson, Saudi Aramco, Shell, Statoil, Stone Energy, TGS-Nopec, Total, and Woodside. CD-ROM.

Dooley, T. P., Peel, F., Curry, M., Duffy, O. B., Fernandez, N., Moghadam, M. H., Nikolinakou, M. A., Apps, G., and Hudec, M. R., 2016, Applied Geodynamics Laboratory annual report to industrial associates 2016, slide set 35: Bureau of Economic Geology, The University of Texas at Austin, Annual Report prepared for Anadarko, Apache, BHP Billiton, BP, CGG, Chevron, Cobalt, Condor, ConocoPhillips, EcoPetrol, ENI, ExxonMobil, Freeport-McMoRan, Fugro, Hess, ION Geophysical, Lukoil, Maersk, Marathon, Murphy, Nexen, Noble, Pemex, Petrobras, PGS, Repsol-YPF, Rockfield, Samson, Saudi Aramco, Shell, Statoil, Stone Energy, TGS-Nopec, Total, and Woodside. CD-ROM.

Fernandez, N., Nikolinakou, M. A., Dooley, T. P., Duffy, O. B., Moghadam, M. H., Ellis, M., Hudec, M. R., and Jackson, M.P.A., 2015, Applied Geodynamics Laboratory annual report to industrial associates 2015, slide set 34: Bureau of Economic Geology, The University of Texas at Austin, Annual Report prepared for Anadarko, Apache, BHP Billiton, BP, CGG, Chevron, Cobalt, Condor, ConocoPhillips, EcoPetrol, ENI, ExxonMobil, Freeport-McMoRan, Fugro, Hess, ION Geophysical, Lukoil, Maersk, Marathon, Murphy, Nexen, Noble, Pemex, Petrobras, PGS, Repsol-YPF, Rockfield, Samson, Saudi Aramco, Shell, Statoil, Stone Energy, TGS-Nopec, Total, and Woodside.

Published Abstracts

Burrell, L., Teixell, A., Fernandez, N., and Hudec, M., 2019, Compressional salt tectonics in the South-Pyrenean fold-and-thrust belt: role of pre-existing diapiric structures and insights from 2D numerical modelling (abs.): Geophysical Research Abstracts, v. 21, no. EGU2019-9959-1, 1 p.

Dooley, T., Hudec, M., Duffy, O., and Fernandez, N., 2019, Shortening of diapir provinces: translation, tilting and rotation of minibasins in isolated minibasin systems (abs.): 2019 AAPG Annual Convention and Exhibition, San Antonio, Tex., May 19-22, 1 p.

Duffy, O. B., Fernandez, N., Peel, F. J., Hudec, M. R., Dooley, T. P., and Jackson, C. A.-L., 2019, Minibasin obstruction by base-salt welding on a salt-detached slope: an example from the northern Gulf of Mexico (abs.): Geophysical Research Abstracts, v. 21, no. EGU2019-18928, 1 p.

Duffy, O., Fernandez, N., Peel, F., Hudec, M., and Dooley, T., 2019, Minibasin obstruction by base-salt welding on a salt-detached slope: an example from the northern Gulf of Mexico (abs.): 2019 AAPG Annual Convention and Exhibition, San Antonio, Tex., May 19-22, 1 p.

Duffy, O., Fernandez, N., Peel, F., Hudec, M., Apps, G., Dunlap, D., and Jackson, C., 2019, Redirection of submarine channels by minibasin obstruction on a salt-detached slope: an example from above the Sigsbee canopy (abs.): 37th Annual GCSSEPM Foundation Perkins-Rosen Research Conference, Houston, Tex., Dec. 3-6, Program and Abstracts, p. 24.

Fernandez, N., Duffy, O., Peel, F., and Hudec, M., 2019, Differential translation of supra-canopy minibasin domains in the northern Gulf of Mexico slope (abs.): 2019 AAPG Annual Convention and Exhibition, San Antonio, Tex., May 19-22, 1 p.

Fernandez, N., Duffy, O., Peel, F., Hudec, M., Apps, G., and Jackson, C., 2019, Mass-transport complexes (MTCs) steered by minibasin obstruction and extensional breakaway on a salt-detached slope: an example from above the Sigsbee canopy (abs.): 37th Annual

GCSSEPM Foundation Perkins-Rosen Research Conference, Houston, Tex., Dec. 3-6, Program and Abstracts, p. 35.

Fernandez, N., and Kaus, B.J.P., 2015, Pattern formation in 3D numerical models of down-built diapirs initiated by a Rayleigh-Taylor instability (abs.): XIV International Workshop of Modelling Mantle Convection and Lithosphere Dynamics, Oleron, France.

Fernandez, N., and Kaus, B.J.P., 2015, Pattern formation of down-built salt structures: insights from 3D numerical models (abs.): EGU General Assembly, Vienna, Austria.

Collignon, M., Fernandez, N., and Kaus, B.J.P., 2014, Do surface processes and/or the presence of an initial surface topography affect the fold linkage? (abs.): EGU General Assembly, Vienna, Austria.

Collignon, M., Fernandez, N., and Kaus, B.J.P., 2014, Do surface processes and/or the presence of an initial surface topography affect(s) the fold linkage? And if yes, how? (abs.) 12th Swiss Geoscience Meeting, Fribourg, Switzerland.

Fernandez, N., Kaus, B.J.P., and Collignon, M., 2014, Influence of pre-existing salt structures in the 3D pattern of multilayer folding (abs.): EGU General Assembly, Vienna, Austria.

Fernandez, N., Kaus, B.J.P., and Epard, J.-L., 2014, Dynamics of thin-skinned fold and thrust belts with a tilted detachment (abs.): EGU General Assembly, Vienna, Austria.

Kaus, B.J.P., Baumann, T., Popov, A., Boutonnet, E., Fernandez, N., Püsök, A., May, A., and Collignon, M., 2014, Numerical modeling of lithospheric and crustal scale deformation in geological time scales (abs.): John von Neumann Institut für Computing NIC Symposium.

Collignon, M., Fernandez, N., May, D.A., and Kaus, B.J.P., 2013, Effect of sediment load on growth folds in thin-skinned fold-and-thrust belts: a numerical approach (abs.): EGU General Assembly, Vienna, Austria.

Collignon, M., May, D.A., Kaus, B.J.P., and Fernandez, N., 2013, Effects of surface processes on multilayer detachment folding: a numerical approach (abs.): 11th Swiss Geoscience Meeting, Lausanne, Switzerland.

Collignon, M., May, D.A., Kaus, B.J.P., and Fernandez, N., 2013, Effects of surface processes on multilayer detachment folding: a numerical approach (abs.): AGU Fall Meeting, San Francisco, Calif.

Fernandez, N., and Kaus, B.J.P., 2013, Reverse modeling of 2D and 3D salt structures (abs.): AGU Fall Meeting, San Francisco, Calif.

Fernandez, N., and Kaus, B.J.P., 2013, Analytical and numerical investigation of 3D multilayer folding (abs.): Annual Meeting of the International Association of Mathematical Geosciences (IAMG), Madrid, Spain.

Fernandez, N., and Kaus, B.J.P., 2013, Fold interaction and linkage in 3D numerical models of multilayer detachment folding (abs.): EGU General Assembly, Vienna, Austria.

Fernandez, N., and Kaus, B.J.P., 2013, Forward and reverse modelling of salt diapirs formed by down-building (abs.): EGU General Assembly, Vienna, Austria.

Fernandez, N., and Kaus, B.J.P., 2013, Interaction and linkage of folds in high-resolution 3D numerical models of multilayer detachment folding (abs.): 73rd Annual Meeting of the German Geophysical Society (DGG), Leipzig, Germany.

Collignon, M., Kaus, B.J.P., Fernandez, N., Castelltort, S., Simpson, G., and Frehner, M., 2012, Modeling interaction between tectonics and surface processes in the Zagros Mountains, Iran (abs.): GeoMod Conference, Lausanne, Switzerland.

Collignon, M., Kaus, B.J.P., Frehner, M., Fernandez, N., Castelltort, S., Simpson, G., and Burg, J.-P., 2012, Modeling interactions between tectonic and surface processes in the Zagros

Mountain, Iran (abs.): 10th Swiss Geoscience Meeting, Bern, Switzerland.

Fernandez, N., and Kaus, B.J.P., 2012, 3D multilayer detachment folding: combined analytical and numerical approach (abs.): GeoMod Conference, Lausanne, Switzerland.

Fernandez, N., and Kaus, B.J.P., 2012, Wavelength selection and evolution in high-resolution 3D numerical models of multilayer detachment folding (abs.): EGU General Assembly, Vienna, Austria.

Fernandez, N., and Kaus, B.J.P., 2012, Wavelength selection in 3D multilayer detachment folding (abs.): TSK 14, Kiel, Germany.

Fernandez, N., Kaus, B.J.P., Yamato, P., Mouthereau, F., and Castelltort, S., 2012, Insights into the physics of crustal scale folding in the Zagros from 2D and 3D numerical models (abs.): Darius Workshop, Mainz, Germany.

Fernandez, N., Kaus, B.J.P., and Castelltort, S., 2011, Dynamics of fold belts: insights from 3D numerical models of multilayer detachment folding (abs.): 12th International Workshop on Modeling of Mantle Convection and Lithospheric Dynamics, Doellnsee, Germany.

Kaus, B.J.P., Keller, T., Cramer, F., Thielmann, M., and Fernandez, N., 2011, Numerical techniques for thermo-mechanical-fluid-flow modelling (abs.): 12th International Workshop on Modelling of Mantle Convection and Lithosphere Dynamics, Doellnsee, Germany.

Kaus, B.J.P., Yamato, P., Mouthereau, F., May, D.A., Castelltort, S., and Fernandez, N., 2011, Insights in the dynamics of fold-and-thrust belts (abs.): Joint Annual Meeting Swiss Physical Society and Austrian Physical Society, Lausanne, Switzerland.