



PUBLICATION REPORT OF THE GEODYNAMICS TEAM OF THE GEOLOGICAL SURVEY OF NORWAY - 2009

1. PEER REVIEWED PUBLICATIONS

1. **Buiter, S.J.H.**, O. A. Pfiffner, C. Beaumont, 2009. Inversion of extensional sedimentary basins: A numerical evaluation of the localisation of shortening, *Earth and Planetary Science Letters* 288, 492-504, doi: 10.1016/j.epsl.2009.10.011
2. **Gaina, C.**, Gernigon, L., P. Ball, 2009. Paleocene-Recent Plate Boundaries in the NE Atlantic and the formation of Jan Mayen microcontinent, *Journal of Geological Society*, 166, 601-616, doi: 10.1144/0016-76492008-112
3. Gernigon, L., Olesen, O., Ebbing, J., Wienecke, S, **Gaina, C.**, Mogaard, J.O., Sand, M., Mykeblust, R., 2009. Syn- and post-breakup evolution of the Norwegian-Greenland Sea: intriguing tectono-magmatic processes along the Jan Mayen fracture zone, *Tectonophysics (Magmatism, rifts and rifted margins, Special Issue)*, 468, 185-205.
4. Gong, Z., **van Hinsbergen, D.J.J.**, Dekkers, M.J., 2009. Diachronous pervasive remagnetization in northern Iberian basins during Cretaceous rotation and extension, *Earth and Planetary Science Letters* 284, p. 292-301
5. Gong, Z., **van Hinsbergen, D.J.J.**, Vissers, R.L.M., Dekkers, M.J., 2009. Early Cretaceous syn-rotational extension in the Organyà basin: new constraints on the palinspastic position of Iberia during its rotation, *Tectonophysics* 473, p. 312-323
6. Hüsing, S.K., Zachariasse, W.J., **van Hinsbergen, D.J.J.**, Krijgsman, W., Inceöz, M., Harzhauser, M., Mandic, O., Kroh, A., 2009. Oligo-Miocene foreland basin evolution in SE Anatolia: implications for the closure of the eastern Tethys gateway, in: **van Hinsbergen, D.J.J.**, Edwards, M.A., Govers, R. (editors), *Collision and Collapse at the Africa-Arabia-Eurasia Subduction Zone*, Geological Society of London Special Publication 311, p. 107-132
7. Klingelhoefer, F., **Labails C.**, Cosquer E., Rouzo S., Géli L., Aslanian D., Olivet J.-L., Sahabi M., Nouzé H., Unternehr P., 2009. Crustal structure of the SW-Moroccan margin from wide-angle and reflection seismic data (the DAKHLA experiment) Part A: Wide-angle seismic models. *Tectonophysics*. doi:10.1016/j.tecto.2008.07.022.
8. **Labails C.**, Olivet J.-L., the Dakhla study group, 2009. Crustal structure of the SW Moroccan margin from wide-angle and reflection seismic data (the Dakhla experiment) Part B - the tectonic heritage. *Tectonophysics*. doi: 10.1016/j.tecto.2008.08.028
9. Lei, J., Zhao, D., **Steinberger, B.**, Wu, B., Shen, F., Li, Z., 2009. New seismic constraints on the shallow structure of the Hainan plume. *Phys. Earth Planet. Inter.*, 173, 33-50, doi:10.1016/j.pepi.2008.10.013.
10. Letts, S., **Torsvik, T.H.**, Webb, S.J., Ashwal, L.D., 2009. Palaeomagnetism of the 2054 Ma Bushveld Complex (South Africa): implications for emplacement and cooling. *Geophys. J. Intern.* doi: 10.1111/j.1365-246X.2009.04346.x
11. Maus, S., Barckhausen, U., Berkenbosh, H., Bournas, N., Brozena, J., Childers, V., Dostaler, F., Fairhead, J.D., Finn, C., von Frese, R.R.B., **Gaina, C.**, Golynsky, S., Kucks, R., Luhr, H., Milligan, P., Mogren, S., Muller, R.D., Olesen, O., Pilkington, M., Saltus, R., Schreckenberger,

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12. McEnroe, S.A., Fabian, K., Robinson, P., **Gaina, C.**, and L. Brown, 2009. Crustal Magnetism and Rocks that remember, *Elements*, 5, 241-246, doi: 10.2113/gselements.5.4.241.
 13. Osmundsen, P.T., Henderson, I., Lauknes, T.R., Larsen, Y., **Redfield, T.F.**, Dehls, J. 2009. Tectonic controls on topography and mass-wasting processes in Northern Norway, *Geology*. 37. 135-138. doi:10.1130/G25208A.1
 14. **Redfield, T.F.** Osmundsen, P. T. 2009. The Tjellefonna fault system of Western Norway: Linking late-Caledonian extension, post-Caledonian normal faulting, and Tertiary rock column uplift with the landslide-generated tsunami event of 1756. *Tectonophysics* 474. 106–123.
 15. Seton, M., **Gaina, C.**, Müller, R.D., Heine, C. 2009. Mid-Cretaceous superplume event: Fact or Fiction? *Geology*, 37, 687-690, doi: 10.1130/G25624A.1.
 16. Smith, B., Jordan, M., **Steinberger, B.**, Puskas, C., Farrell, J., Waite, G., Husen, S., O'Connell, R.J., Klingele E., 2009. Geodynamics of the Yellowstone hotspot and mantle plume: Seismic and GPS imaging, kinematics and mantle flow, *J. Volcanol. Geoth. Res.*, 128, 26-56, doi:10.1016/j.jvolgeores.2009.08.020.
 17. Tirel, C., Gautier, P., **van Hinsbergen, D.J.J.**, Wortel, M.J.R., 2009, Sequential development of metamorphic core complexes: numerical scenarios and comparison to the Cyclades, Greece, in: **van Hinsbergen, D.J.J.**, Edwards, M.A., Govers, R. (editors), *Collision and Collapse at the Africa-Arabia-Eurasia Subduction Zone*, Geological Society of London Special Publication 311, p. 257-292
 18. **Torsvik T.H.**, Rousse S., **Labails C. Smethurst, M.**, 2009. A new scheme for the opening of the South Atlantic Ocean and the dissection of an Aptian salt basin. *Geophysical Journal International*, 177, p. 1315-1333.
 19. **Torsvik, T.**, Paulsen, T.S, Hughes, N.C., Myrow, P.M., **Ganerød, M.**, 2009: The Tethyan Himalaya: palaeogeographical and tectonic constraints from Ordovician palaeomagnetic data, *Journal of the Geological Society* 166, 679-687, doi: 10.1144/0016-76492008-123-
 20. **Torsvik, T.H.**, L.R.M. Cocks, 2009. The Lower Palaeozoic palaeogeographical evolution of the northeastern and eastern peri-Gondwanan margin from Turkey to New Zealand. **BASSETT, M. G.** (ed.) *Early Palaeozoic Peri-Gondwana Terranes: New Insights from Tectonics and Biogeography*. Geological Society, London, Special Publications, 325, 3–21.
 21. Van der Meer, D., Spakman, W., **van Hinsbergen, D.**, Amaru, M., **T.H. Torsvik**, 2009, Towards absolute plate motions constrained by lower mantle slab remnants, *Nature Geoscience*, doi:10.1038/NGE0708.
 22. **van Hinsbergen, D.J.J.**, Boekhout, F., 2009. Neogene brittle detachment faulting on Kos (E Greece): implications for a southern break-away fault of the Menderes metamorphic core complex (western Turkey), in: **van Hinsbergen, D.J.J.**, Edwards, M.A., Govers, R. (editors), *Collision and Collapse at the Africa-Arabia-Eurasia Subduction Zone*, Geological Society of London Special Publication 311, p. 311-320
 23. **van Hinsbergen, D.J.J.**, Edwards, M.A. and Govers, R., 2009. Geodynamics of collision and collapse at the Africa-Arabia-Eurasia subduction zone - an introduction, in: **van Hinsbergen, D.J.J.**, Edwards, M.A., Govers, R. (editors), *Collision and Collapse at the Africa-Arabia-Eurasia Subduction Zone*, Geological Society of London Special Publication 311, p. 1-7
 24. **van Hinsbergen, D.J.J.**, Iturralde-Vinent, M.A., van Geffen, P.W.G., García-Casco, A., van Benthem, S., 2009. Structure of the accretionary prism, and the evolution of the Paleogene northern Caribbean subduction zone in the region of Camagüey, Cuba: *Journal of Structural Geology* 31, p. 1130-1144

2. REPORTS

1. **Gaina, C.**, Werner, S.C., the CAMP-GM group, 2009. Circum Arctic Geophysical Maps, NGU Report 2009.010.

2. Henderson, Iain H.C., Osmundsen, P. T., **T. F. Redfield**, 2009. ROS Fjellskred i Troms: Status og planer. NGU Rapport 2009.023
3. **Labails C., Torsvik T.H., Gaina C.**, Cocks R., 2009. Global Plate Polygons 2009. SPlates Model (version 2.0). NGU Report 2009.047, 270 p.
4. **Smethurst, M.**, 2009. Tutorials, SPlates plate reconstruction software version 2.2, NGU Report 2009.039
5. **Smethurst, M., Torsvik, T.H., Redfield, T.**, 2009, Instruction manual, SPlates plate reconstruction software version 2.2, NGU Report 2009.031

3. BOOK

1. **van Hinsbergen, D.J.J.**, Edwards, M.A., Govers, R. (editors), 2009. Collision and Collapse at the Africa-Arabia-Eurasia Subduction Zone, Geological Society of London Special Publication 311, 360 p.

4. CONFERENCE ABSTRACTS

1. **Buiter, S., B. Steinberger**, Could subsidence in the Congo Basin be caused by the interplay of lithosphere deformation and mantle flow? Out of Africa conference, November 2009, Johannesburg, South Africa
2. **Buiter, S.**, The uplift of the Atlas Mountains, Out of Africa conference, November 2009, Johannesburg, South Africa
3. **Buiter, S.**, S. Ellis, Simple subduction models with SULEC, 11th International workshop on modeling of mantle convection and lithosphere dynamics, 28 June - 3 July 2009, Braunwald, Switzerland
4. Chemia, Z., **S. Buiter**, Discussion on resolving sediment subduction, 11th International workshop on modeling of mantle convection and lithosphere dynamics, 28 June - 3 July 2009, Braunwald, Switzerland
5. **Buiter, S.**, Markus Albertz, Michele Cooke, Susan Ellis, Taras Gerya, Luke Hodkinson, Kristin Hughes, Katrin Huhn, Boris Kaus, Walter Landry, Bertrand Maillot, Christophe Pascal, Anton Popov, Guido Schreurs, Christopher Beaumont, Tony Crook, Mario Del Castello and Yves Leroy, Quantitative comparisons of numerical models of brittle deformation (**solicited**), EGU General Assembly, 19-24 April, Vienna, Austria
6. **Buiter, S., B. Steinberger**, Surface topography changes in North Africa derived from combined lithosphere and mantle modelling, Geophys. Res. Abs., 11, 8328. EGU General Assembly, 19-24 April, Vienna, Austria,
7. **Gaina, C., T. Torsvik, D. van Hinsbergen** and the TAP group, The African Plate: an overview of plate tectonic forces since the Jurassic, Lithosphere dynamics and sedimentary basins: The Arabian plate and analogues, ILP Task Force on Sedimentary basins workshop, Abu Dhabi, United Arab Emirates, 6-11 December 2009.
8. **Gaina, C., T. Torsvik, D. van Hinsbergen** and the TAP group, The African Plate: an overview of plate tectonic forces since the Jurassic, Out of Africa conference, Johannesburg, South Africa, 16-19 November 2009.
9. **Gaina, C.**, R. Saltus, CAMP-GM group, and CAMP-geology group, Circum-Arctic Mapping Project: New Magnetic Anomaly map Linked to the Geology of the Arctic, SWARM meeting, GFZ Potsdam, Germany, June 2009.
10. Gernigon, L., Yamasaki, T., **Gaina, C.**, Péron-Pinivic, G., Olesen, O., Ball, P., 2009. Dynamics of the outer Norwegian margin: from rift-to-drift, in 7th Petroleum Geology Conference (PGC VII) - From Mature Basins to New Frontiers, Queen Elisabeth II conference centre, London, UK, 30 March-April 2 p. 84, 2009.

11. Gernigon, L., Olesen, O., **Gaina, C.**, The Norway Basin revisited: New aeromagnetic survey and implications for early spreading development in the Norwegian-Greenland Sea. 3th Faroe Islands Exploration Conference, The Nordic House, Tøshavn, Faroe Islands, 15-16 September, 2009.
12. Müller, D., A. Dutkiewicz, M. Seton, **C. Gaina**, Long-term cycles in ocean chemistry driven by hydrothermal flux at ridge flanks, AGU Fall Meeting, San Francisco, USA, 2009
13. **Ganerød, M., Torsvik, T.H., van Hinsbergen, D.J.J., Corfu, F., Gaina, C., Werner, S., Owen-Smith, T.M., Ashwal, L.D., Webb, S.J., Hendriks, B.W.H.** Paleoposition of the Seychelles continent in relation to the Deccan Traps and the Plume Generation Zone in KT boundary time. Out of Africa, a tribute to Kevin Burke and Lew Ashwal.
14. Olesen, O., Bering, D., Brønner, M., Fredin, O., **Hendriks, B., Magnus, C., Rønning, J.S., Solbakk, T. and Øverland, J.A.**, Tropical weathering in Norway – the NGU-NPD TWIN project, Norwegian Winter conference, Bergen, 13th – 15th January 2009.
15. Solanki, A., Ashwal, L., Pandit, M., Corfu, F., **Hendriks, B.W.H.**, A geochronological, geochemical and petrographic study of granitoids from the Mt. Abu pluton and surrounds, SW Rajasthan, India, Out of Africa Conference, November 2009, Wits University, Johannesburg
16. **Hendriks, B.W.H., Burke, K.C.A., Torsvik, T.H.**, African 30 Ma and younger volcanism and its relationship to the Plume Generation Zone, Out of Africa Conference, November 2009, Wits University, Johannesburg
17. Yuan, K., Van der Voo, R., Bazhenov, M.L., Bakhmutov, V., Alekhin, V., **Hendriks, B.**, Paleolatitudes of the Permo-Triassic Ukrainian Shield with Implications for Pangaea A and B, AGU Fall meeting, San Francisco
18. **Labails C., Roest W.R., Olivet J.-L., Aslanian D.**, An alternative early opening scenario for the Central Atlantic Ocean. AGU, 90(52), Fall Meet. Suppl., Abstract G33B-0629.
19. **Labails C., Gaina C., Skogseid J., Pilskog B., Graue K.**, Insights on the deep structure of the conjugate East African and Madagascan margins. Out Of Africa conference, November 2009, Johannesburg, South Africa
20. **Khabbaz Ghazian, R., S. Buiter**, Numerical modeling of continent-continent collision: A first study of the role of rheology, Fourth seminar on high-pressure metamorphism and subduction zones, June 27 - July 5, 2009, Granada, Spain.
21. **Quinquis, M., S. Buiter**, The influence of surface boundary conditions on subduction zone dynamics, 11th International workshop on modeling of mantle convection and lithosphere dynamics, 28 June - 3 July 2009, Braunwald, Switzerland
22. **Quinquis, M., S. Buiter**, Implementing (de)hydration in a numerical model of subduction, Margins TEI Workshop, Volatiles in a subduction zone, 28 September – 1 October 2009, Timberline Lodge, Mt Hood, Oregon, United-States
23. **Redfield, T.F., M. Perez-Gussinyé, B.W.H. Hendriks, P. T. Osmundsen, G. R. Murrell.** The (c)oldest place on Earth. Geophysical research abstracts, Vol. 11, EGU2009-0, 2009. EGU eneral Assembly 2009, 19th-24th April 2009, Vienna
24. Osmundsen, P.T., **T.F. Redfield.**, Crustal taper and post-rift uplift at passive argins. Geophysical research abstracts, Vol. 11, EGU2009-0, 2009. EGU General Assembly, 19th-24th April 2009, Vienna.
25. Osmundsen, P.T., **T.F. Redfield.**, Geometry of the necking zone offshore Norway and post-rift uplift of the Fennoscandian passive margin. Abstract, Norwegian Winter Conference, Bergen, 13th-15th January 2009.
26. **Steinberger, B.**, Models of large-scale mantle flow and resulting hotspot motion: Implications for absolute plate motion reference frames and plume-ridge interaction, ILP Joint Task Force Meeting, 2009, Clermont-Ferrand, France.
27. **Steinberger, B., S.C. Werner, T.H. Torsvik**, Deep vs. shallow origin of gravity anomalies, topography and volcanism on Earth, Venus and Mars, European Planetary Science Congress, 2009, Potsdam, Germany.
28. **Steinberger, B.**, The quest for dynamic topography: What can we learn from a combined regional and spectral approach? 11th International Workshop on Numerical Modeling of Mantle Convection and Lithospheric Dynamics, 28 June - 3 July 2009, Braunwald, Switzerland.

29. Sobolev, S.V., A. Popov, **B. Steinberger**, Constraining rheology and water content in the upper mantle by modeling plate tectonics, Goldschmidt conference, 2009, Davos, Switzerland, *Geochim. Cosmochim. Ac.* 73 (13), Suppl. 1, A1244.
30. Burke, K., **T.H. Torsvik**, **B. Steinberger**, Implications of long-term stability of large-scale deep mantle structure, Gordon Research Conference - Interior of the Earth, 2009, South Hadley, MA, USA.
31. **Steinberger, B.**, S.C. Werner, **T.H. Torsvik**, Deep vs. shallow origin of gravity anomalies, topography and volcanism on Earth, Venus and Mars, ESLAB09 International Conference on Comparative Planetology: Venus-Earth-Mars, 2009, Noordwijk, Netherlands.
32. **Steinberger, B.**, Location of mid-Atlantic ridge and mantle plumes through time, with implications for their interaction, First SAMPLE SPP Kolloquium, 2009, Benediktbeuren, Germany.
33. Smith, R.B., M. Jordan, **B.M. Steinberger**, J. Farrell, C.M. Puskas, G.P. Waite, S. Husen, W. Chang, R.J. O'Connell, 2009. Geodynamics of the Yellowstone Hotspot and Mantle Plume: Seismic and GPS Imaging, Kinematics, and Mantle Flow. *Eos Trans. AGU*, 90, Fall Meet. Suppl., Abstract V53A-01.
34. Sobolev, S.V., A. Popov, **B. Steinberger**, Constraints on upper mantle rheology from modeling of plate motions with fully 3D visco-elasto-plastic lithosphere, EGU General Assembly, 19-24 April, Vienna, Austria, *Geophys. Res. Abs.*, 11, 12520
35. Sobolev, S.V., A. Popov, **B. Steinberger**, Towards modeling of global mantle convection with rheologically complex and fully 3D lithosphere and asthenosphere, General Assembly IASPEI, Cape Town, South Africa (**invited**).
36. Werner, S.C., **B. Steinberger**, J. Ebbing, and the TAP Team, The isostatic state of the Africa plate: Initial results General Assembly IASPEI, 2009, Cape Town, South Africa.
37. **Tetreault, J.**, **S. Buiter**, Geodynamic modelling of terrane accretion, 11th International workshop on modeling of mantle convection and lithosphere dynamics, 28 June - 3 July 2009, Braunwald, Switzerland
38. **Torsvik, T.H.**, K. Burke, **B. Steinberger**, Linking Africa's surface to its deep interior, General Assembly IASPEI, 2009, Cape Town, South Africa (**invited**).
39. **Torsvik, T.H.**, **B. Steinberger**, L.R.M. Cocks, K. Burke, Longitude: Linking Earth's ancient surface to its deep interior, 11th International Workshop on Numerical Modeling of Mantle Convection and Lithospheric Dynamics, 2009, Braunwald, Switzerland.
40. **Torsvik, T.H.**, **B. Steinberger**, Absolute plate motions and dynamic topography for the European-Mediterranean region, 6th Topo-Europe workshop, 2009, Heidelberg, Germany.
41. **Torsvik, T.H.**, K.C. Burke, S.J. Webb, L.D. Ashwal, **B.M. Steinberger**, Diamonds sampled by plumes from the core-mantle boundary, *Eos Trans. AGU*, 90, Fall Meet. Suppl., Abstract DI32A-06 (**invited**).
42. Domeier, M.M., Van der Voo, R., Tomezzoli, R., **Torsvik, T.H.**, Tohver, E., **Hendriks, B.**, Vizan, H. and Dominguez, A.R., The Pangea problem: Insights from New Permo-Triassic paleomagnetic data from Gondwana, AGU Fall meeting, December 2009, San Francisco
43. Peynircioglu, A., Langereis, C.G., **van Hinsbergen, D.J.J.**, Kaymakci, N., Applying paleomagnetic constraints to evolution of Arabian Plate since Eocene, 62nd Geological Congress of Turkey, Ankara, 2009
44. Meijers, M.J.M., Kaymakci, N., Langereis, C.G., Stephenson, R.A., **van Hinsbergen, D.J.J.**, Timing and formation of the Central Pontides Orocline: Relations with the indentation of the Kirsehir block and the opening of the Black Sea basins, 62nd Geological Congress of Turkey, Ankara, 2009
45. Koç, A., Kaymakci, N., **van Hinsbergen, D.J.J.**, Langereis, C.G., Vissers, R.L.M., Tectonic evolution of South Anatolia in relation to STEP fault scenario, 62nd Geological Congress of Turkey, Ankara, 2009
46. Lefebvre, C., Vissers, R.L.M., **van Hinsbergen, D.J.J.**, Shearing kinematics and Kaman detachment fault in the Kirsehir massif, Central Anatolian Crystalline Complex, Turkey, 62nd Geological Congress of Turkey, Ankara, 2009
47. **van Hinsbergen, D.J.J.**, The evolution of the Aegean - west Anatolian orocline, 62nd Geological Congress of Turkey, Ankara, 2009

48. **van Hinsbergen, D.J.J.**, The evolution of the Aegean orocline, EGU Meeting Vienna 2009

5. PUBLIC OUTREACH

1. Bjoernar Kjensli, Afrika deles i to, (**S. Buiter's** interview)
2. Gudmund Lovo, Himalayas vei til toppen (**D. van Hinsbergen's** field work to Tibet), 18 Jun 2009
3. Deconstructing Plate Tectonics by G. Chandler in Earth Explorer magazine (about **M. Smethurst's** Plate Reconstruction software)