



# ANNUAL REPORT OF THE GEODYNAMICS TEAM OF THE GEOLOGICAL SURVEY OF NORWAY - 2011

## 1 THE GEODYNAMICS TEAM

The Geodynamics team at the Geological Survey of Norway aims to increase our understanding of geodynamic processes and their effects on local to global scales. In 2011, the team members were:

SUSANNE J.H. BUITER – Senior Researcher  
ZURAB CHEMIA – Post-Doctoral Scientist (until 01.06.11)  
CARMEN GAINA – Team Leader (until 01.10.11)  
MORGAN GANERØD - Post-Doctoral Scientist  
REZA KHABBAZ GHAZIAN – PhD student  
BART W. HENDRIKS – Assistant Team Leader/Team Leader (from 01.10.11)  
CINTHIA LABAILS – Post-Doctoral Scientist (until 04.02.11)  
MATTHIEU QUINQUIS - PhD student (until 01.03.11)  
THOMAS F. REDFIELD – Senior Researcher  
JOYA L. TETREAULT – Post-Doctoral Scientist  
TROND H. TORSVIK – Senior Researcher (20%)  
ROBIN J. WATSON – Researcher

## 2 MAIN PROJECTS

### 2.1 *The African Plate*

*Funded by:* Statoil and NGU

*Duration:* 2008 - 2012

*Project coordinator:* Carmen Gaina

*Participants:* Susanne Buiter, Carmen Gaina, Morgan Ganerød, Bart Hendriks, Cinthia Labails, Trond Torsvik, Giulio Viola, and Robin Watson

*External collaborators:* Sergei Medvedev (University of Oslo)

*Short description:* This project explores the interaction between the African Plate lithosphere and mantle and seeks to better understand possible forces that can shape and modify sedimentary basins and related hydrocarbon accumulation. We focus on the kinematics of the African Plate since the Palaeozoic, the geophysical characterisation of the present-day structure of the African Plate and its underlying mantle, the timing of major volcanic events, the formation of sedimentary basins, and the computation of regional stresses.

### 2.2 *c2c (crust-to-core)*

*Funded by:* European Union through Marie Curie Research Training Network (MRTN-CT-2006-035957) and NGU

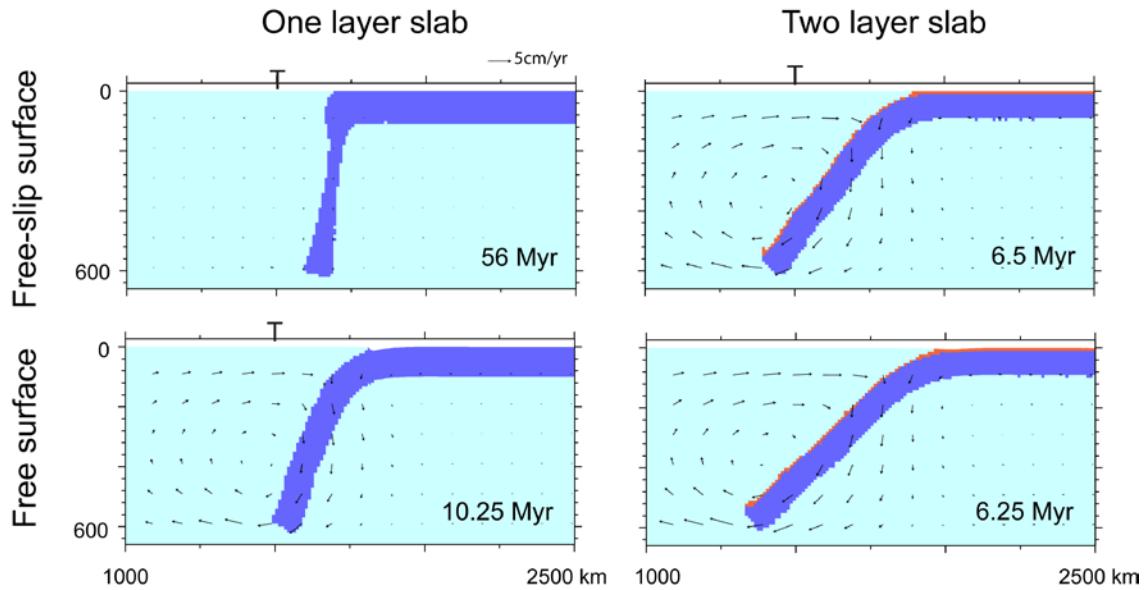
*Duration:* 2007 – 2011

*Project coordinator:* Susanne Buiter

*Participants:* Susanne Buiter, Zurab Chemia, and Matthieu Quinquis

*External collaborators:* Ondrej Čadek and Hana Čížková (Charles University Prague, Czech Republic), Gerd Steinle-Neumann (BGI Bayreuth, Germany), Susan Ellis (GNS Science, New Zealand)

*Short description:* The c2c (crust-to-core) Marie Curie Research Training Network aims to enhance understanding of the changing chemical and physical properties of slab material as it is compressed and heated in response to sinking into Earth's interior, its interaction with the surrounding 'unperturbed' Earth, and the quantification of material fluxes. The network consists of 11 institutes in 9 countries. NGU participates with numerical models of subduction zone dynamics, focussing on slab dehydration and mantle wedge hydration, and sediment subduction.



*Figure:* A snapshot of four models of a free falling slab that illustrate the importance of a true free surface in subduction models. All models are shown when the slab reaches 600 km depth. The 'T' at the surface of the model domain shows the initial position of the trench. Top left) A one layer lithosphere with a free-slip surface; Bottom-left) a one layer lithosphere with a free surface; Top-right) a two layer lithosphere with a free-slip surface, and Bottom-right) a two layer lithosphere with a free surface. The two layer models differ from the one layer models by inclusion of a weak crust. After Quinquis et al. (2011, Tectonophysics 497, 57-70).

### 2.3 The Congo Basin

*Funded by:* Norway-Germany IS-DAAD collaboration grant and NGU

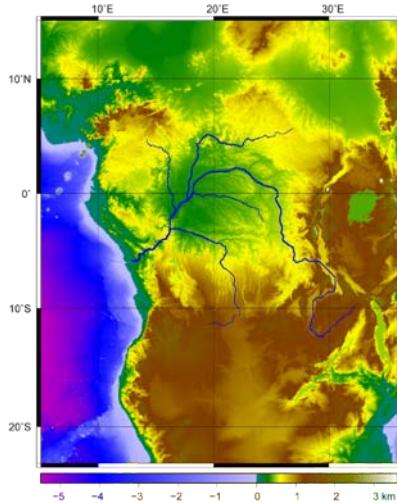
*Duration:* 2010 – 2011

*Project coordinator:* Susanne Buiter

*Participants:* Susanne Buiter and Joya Tetreault

*External collaborators:* Sergei Medvedev (University of Oslo, Norway) and Bernhard Steinberger (GFZ Potsdam, Germany)

*Short description:* The Congo Basin project aims to (1) evaluate if the mantle could play a role in the Mesozoic-Cenozoic subsidence of the Congo Basin, and (2) establish collaborations with GFZ Potsdam (Germany) and the University of Oslo.



*Figure:* The Congo Basin (located in the Democratic Republic of Congo in Central Africa) is an almost circular depression, associated with negative gravity anomalies, which experienced slow subsidence over long periods of time. The topography map in the figure clearly outlines the circular Congo Basin (Amante and Eakins, 2009).

## **2.4 The formation of extensional fault arrays**

*Funded by:* NGU

*Duration:* 2007 - 2012

*Project coordinator:* Susanne Buiter

*Participants:* Susanne Buiter and Per Terje Osmundsen

*External collaborators:* Guido Schreurs (University of Bern, Switzerland) and Susan Ellis (GNS Science, New Zealand)

*Short description:* Parallel-dipping normal faults occur from outcrop scale to large-scale arrays at passive margins. We use numerical models, analogue models and interpretations from seismic observations to investigate processes and factors that favour the development of arrays of parallel-dipping faults over conjugate faults.

## **2.5 GPlates**

*Funded by:* NGU

*Duration:* 2010 - 2012

*Project coordinator:* Robin Watson

*Participants:* Trond Torsvik, Robin Watson, Cinthia Labails, Tim Redfield, and Carmen Gaina

*External collaborators:* University of Sydney, Australia; Caltech, USA

*Short description:* GPlates is a free, open source, multi-platform software tool for modelling the motion of tectonic plates through time. GPlates is developed jointly by researchers and programmers at the Geodynamics Team (NGU), the School of Geosciences (University of Sydney), and the Division of Geological and Planetary Sciences (California Institute of Technology).

## **2.6 Improved plate models for SPPlates/4DLM**

*Funded by:* Statoil and NGU

*Duration:* 2008 - 2011

*Project coordinator:* Carmen Gaina/Bart Hendriks

*Participants:* Carmen Gaina, Bart Hendriks, Cinthia Labails, and Trond Torsvik

*Short description:* This three years research project aims to construct consistent global databases and plate tectonic models to be used with the SPPlates and GPlates reconstructions tools in an ArcGIS environment.

## **2.7 Magnetic remanence properties in Jaspis in Løkken**

*Funded by:* NGU

*Duration:* 2011 – 2012

*Project coordinator:* Morgan Ganerød

*Short description:* Test if a palaeo-latitude can be determined for the early Ordovician Løkken ophiolite. The Ordovician upper allochthon “Trondheimsdekket” was translated into its present position during the Caledonian orogenesis. There are two competing hypotheses to the paleogeography of this unit: it stems 1) from the Baltic margin of Iapetus ocean, or 2) from the margin of Laurentia. Given that Baltica and Laurentia were separated by the Iapetus ocean (3000 – 4000km), a palaeo-latitude can possibly solve this puzzle.

## **2.8 Numerical modelling of the Wilson Cycle**

*Funded by:* Norwegian Research Council and NGU

*Duration:* 2007 – 2012

*Project coordinator:* Susanne Buiter

*Participants:* Susanne Buiter, Reza Khabbaz Ghazian, and Joya Tetreault

*External collaborators:* Torgeir Andersen (University of Oslo) and Susan Ellis (GNS Sciences, New Zealand)

*Short description:* The continuous movement of the tectonic plates, of which Earth’s outer shell is composed, causes regions of plate convergence and divergence. In this project, we investigate the dynamics of plate convergence, the end of convergence by continental collision, and the localisation of subsequent extension. Using dynamic forward models, we examine how the style of convergent margin dynamics is affected by internal (e.g. rheology) and external (e.g. plate velocities) factors, how terranes may be accreted, and how a convergent margin system changes once an ocean is closed and two continents collide.

## **2.9 SPLATES**

*Funded by:* Statoil and NGU

*Duration:* 2008 – 2011

*Project coordinator:* Carmen Gaina/Bart Hendriks

*Participants:* Carmen Gaina, Cinthia Labails, Tim Redfield, Trond Torsvik

*External collaborators:* Mark Smethurst (University of Exeter) and SIMULA (Norway)

*Short description:* This project aims to build new plate tectonics reconstruction software able to link with ArcGIS applications and other open source and proprietary software.

## **2.10 TECTON**

*Funded by:* NGU

*Duration:* 2010-2012

*Project coordinator:* Tim Redfield

*Participants:* Tim Redfield, P.T. Osmundsen

*Short description:* This project uses fieldwork and GIS methodologies to document the impact of post-Caledonian onshore normal faulting (e.g. ‘tectonic topography’) on the Scandinavian landscape. The project’s results place the passive margin into the framework of the new models of extended margin evolution, provide a template for the regional distribution of large volume rockslide hazards in Norway, and offer new models for source-sink relationships within the petroleum exploration sphere.

### 3 PUBLICATIONS

#### 3.1 PEER REVIEWED PUBLICATIONS

1. Antoine, P-O., Marivaux, L., Croft, D., Billet, G., **Ganerød, M.**, Jaramillo, C., Martin, T., Orliac, M., Tejada, J., Altamirano, A., Duranthon, F., Fanjat, G., Rousse, S., Salas-Gismondi, R., 2011. Middle Eocene rodents from Peruvian Amazonia reveal the pattern and timing of caviomorph origins and biogeography. *Proceedings of the Royal Society B*, p. 1-8. doi: 10.1098/rspb.2011.1732
2. Boyden, J. A., R. D. Müller, M. Gurnis, **T.H. Torsvik**, J. A. Clark, M. Turner, H. Ivey-Law, **R. J. Watson**, and J. S. Cannon, 2011. Next-generation plate-tectonic reconstructions using GPlates, in G. R. Keller and C. Baru, eds., *Geoinformatics: Cyberinfrastructure for the Solid Earth Sciences*, Cambridge University Press, 95-113.
3. Calvès, G., Schwab, A. M., Huuse, M., Clift, P. D., **Gaina, C.**, Jolley, D., Tabrez, A. R. and Inam, A., 2011. Seismic volcanostratigraphy of the western Indian rifted margin: The pre-Deccan igneous province. *J. Geophys. Res.*, 116, B01101 doi:10.1029/2010JB000862
4. Cocks, L.R.M. and **Torsvik, T.H.**, 2011. The Palaeozoic geography of Laurentia and western Laurussia: a stable craton with mobile margins. *Earth-Science Reviews* 106, 1–51.
5. Corfu, F., Gerber, M., Andersen, T.B., **Torsvik, T.H.** and Ashwal, L.D. 2011. Age and significance of Grenvillian and Silurian orogenic events in the Finnmarkian Caledonides, northern Norway. *Can. J. Earth Sci.* 48, 419–440.
6. Domeier, M., Van der Voo, R., Tomezzoli, R.N., Tohver, E., **Hendriks, B.W.H.**, **Torsvik, T.**, Vizan, H. and Dominguez, A., 2011, Support for an 'A-type' Pangea reconstruction from high-fidelity Late Permian and Early-Middle Triassic paleomagnetic records from Argentina, *Journal of Geophysical Research*, V116, B12114, <http://dx.doi.org/10.1029/2011JB008495>
7. Domeier, M., Van der Voo, R., Tohver, E., Tomezzoli, R.N., Vizan, V., **Torsvik, T.H.** and Kirshner, J. 2011. New Late Permian paleomagnetic data from Argentina: Refinement of the apparent polar wander path of Gondwana. *Geochem. Geophys. Geosyst.*, 12, Q07002, doi:10.1029/2011GC003616, 2011
8. Dominguez, A.R., Van der Voo, R., **Torsvik, T.H.**, **Hendriks, B.W.H.**, Abrajevitch, A., Domeier, M., Larsen, B.T. and Rousse, S., 2011, The ~270 Ma palaeolatitude of Baltica and its significance for Pangea models, *Geophys. J. Int.* doi: 10.1111/j.1365-246X.2011.05061.x
9. Ellis, S.M., Little, T.A., Wallace, L.M., Hacker, B.R., **Buiter, S.J.H.**, 2011, Feedback between rifting and diapirism can exhume ultrahigh-pressure rocks, *Earth and Planetary Science Letters* 311, 427-438, doi: 10.1016/j.epsl.2011.09.031
10. **Gaina, C.**, Werner, S., Saltus, R., Maus, S. and the CAMP-GM group. Circum-Arctic Mapping Project: New Magnetic and Gravity Anomaly Maps of the Arctic, 2011, in *Arctic Petroleum Geology*, Spencer, A. M., Embry, A. F., Gautier, D. L., Stoupakova, A. V. & Sørensen, K. (eds), Geological Society, London, Memoirs v. 35; p. 39-48, doi:10.1144/M35.4
11. **Gaina, C.**, Werner, S., Saltus, R., Maus, S., Aaro, S., Damaske, D., Forsberg, R., Glebovsky, V., Johnson, K., Jonberger, J., Koren, T., Korhonen, J., Litvinova, T., Oakey, G., Olesen, O., Petrov, O., Pilkington, M., Rasmussen, T., Schreckenberger, B. and Smelror, M. 2011. Circum-Arctic mapping project: new magnetic and gravity anomaly maps of the Arctic. In T. Spencer et al. (Eds.), *Arctic Petroleum Geology*. Geological Society of London, Memoirs, 35, 39-48.
12. **Ganerød, M.**, Chew, D., Smethurst, M.A., Troll, V.R., Corfu, F., Meade, F., Prestvik, T., 2011: Geochronology of the Tardree Rhyolite Complex, Northern Ireland: implications for zircon fission track studies, the North Atlantic Igneous Province and the age of the Fish Canyon sanidine standard. *Chemical Geology*, 286, p. 222-228. doi:10.1016/j.chemgeo.2011.05.007
13. **Ganerød, M.**, **Torsvik, T.H.**, van Hinsbergen, D.J.J., **Gaina, C.**, Corfu, F., Werner, S., Owen-Smith, T.M., Ashwal, L.D., Webb, S.J. and **Hendriks, B.W.H.** 2011. Palaeoposition of the Seychelles microcontinent in relation to the Deccan Traps and the Plume Generation Zone in Late Cretaceous-Early Palaeogene time. In: Van Hinsbergen, D.J.J., **Buiter, S.J.H.**, **Torsvik**,

- T.H., Gaina, C.** and Webb, S. J. (eds.) The Formation and Evolution of Africa: A Synopsis of 3.8 Ga of Earth History. Geological Society, London, Special Publications, 357, 229–252. DOI: 10.1144/SP357.12.
14. Henderson, I.H.C., Lauknes, T.R., Osmundsen, P.T., Dehls, J., Larsen, Y. and **Redfield, T.F.** Structural, geomorphological and InSAR study of an active rockslope failure development. 2011. Geological Society of London Special Publications, 2011, v. 351, p. 185-199. doi: 10.1144/SP351.10.
  15. Letts, S., **Torsvik, T.H.**, Webb, S.J., Ashwal, L.D. 2011. New Paleoproterozoic palaeomagnetic data from the Kaapvaal Craton, South Africa. From: Van Hinsbergen, D.J.J., **Buiter, S.J.H., Torsvik, T.H., Gaina, C.** and Webb, S.J. (eds.) The Formation and Evolution of Africa: A Synopsis of 3.8 Ga of Earth History. Geological Society, London, Special Publications, 357, 9–26. DOI: 10.1144/SP357.2
  16. Mandea, M., **Gaina, C.**, and V. Lesur, 2011. Theory and computational aspects of magnetic modeling and interpretation, in Encyclopedia of Solid Earth Geophysics ed. H. K. Gupta, Encyclopedia of Earth Sciences Series, 2011, Part 11, 781-792, doi:10.1007/978-90-481-8702-7\_232
  17. Nývlt, D., Košler, J., Mlčoch, B., Mixa, P., Lisá, L., Bubík, M. and **Hendriks, B.W.H.**, 2011, The Mendel Formation: implications for Late Miocene climatic cyclicity at the northern tip of the Antarctic Peninsula, Palaeogeography, Palaeoclimatology, Palaeoecology, doi: 10.1016/j.palaeo.2010.11.017
  18. Osmundsen, P.T., and **T.F. Redfield**, 2011, Crustal taper and post-rift uplift at passive margins. *Terra Nova*, 23, 349-361
  19. Palencia-Ortas, A., Ruiz-Martínez, V.C., Villalaín, J.J., Osete, M.L., Vegas, R., Touil, A., Hafid, A., McIntosh, G., van Hinsbergen, D.J.J. and **Torsvik, T.H.** 2011. A new 200 Ma paleomagnetic pole for Africa, and paleo-secular variation scatter from Central Atlantic Magmatic Province (CAMP) intrusives in Morocco (Ighrem and Fourn Zguid dykes). *Geophys. Journal International* 185, 1220–1234.
  20. **Quinquis, M.E.T., Buiter, S.J.H.**, S. Ellis, 2011, The role of boundary conditions in numerical models of subduction zone dynamics, *Tectonophysics* 497, 57-70, doi:10.1016/j.tecto.2010.11.001
  21. **Redfield, T. F.**, Hermanns, R. L., Oppikofer, T., Duhart, P., Mella, M., Derch, P., Bascuñan, I., Fernandez, J., Arenas, M., Sepulveda, S., Rebollo, S., Löw, S., Yugsi Molina, F., Abächerli, A., Henderson, I.H.C., Jaboyedoff, M., and Kveldsvik, V. 2011. Analysis of the 2007 earthquake-induced Punta Cola rockslide and Tsunami, Aysén Fjord, Patagonia, Chile (45.3° S, 73.0° W). 5th ICEGE conference paper, January 2011, Santiago, Chile. 12p.
  22. Saltus, R. W., Miller, E.L., **Gaina, C.**, and P. J. Brown, 2011, Regional Magnetic Domains of the Circum-Arctic – A Framework for Tectonic Interpretation, in Arctic Petroleum Geology, Spencer, A. M., Embry, A. F., Gautier, D. L., Stoupakova, A. V. & Sørensen, K. (eds), Geological Society, London, Memoirs v. 35; p. 49-60, doi:10.1144/M35.4
  23. **Torsvik, T.H.**, Cocks L.R.M. 2011. The Palaeozoic palaeogeography of central Gondwana. In: Van Hinsbergen, D.J.J., **Buiter, S.J.H., Torsvik, T.H., Gaina, C.** and Webb, S.J. (eds.) The Formation and Evolution of Africa: A Synopsis of 3.8 Ga of Earth History. Geological Society, London, Special Publications, 357, 137–166. DOI: 10.1144/SP357.8
  24. van Hinsbergen, D.J.J., **Buiter, S.J.H., Torsvik, T.H., Gaina, C.**, Webb, S.J. 2011. The formation and evolution of Africa from the Archaean to Present: introduction. In: Van Hinsbergen, D.J.J., **Buiter, S.J.H., Torsvik, T.H., Gaina, C.** and Webb, S.J. (eds.) The Formation and Evolution of Africa: A Synopsis of 3.8 Ga of Earth History. Geological Society, London, Special Publications, 357, 1–8. DOI: 10.1144/SP357.1
  25. van Hinsbergen, D. J. J., P. Kapp, G. Dupont-Nivet, P. C. Lippert, P. G. DeCelles, and **T.H. Torsvik**, 2011. Restoration of Cenozoic deformation in Asia and the size of Greater India. *Tectonics*, 30, TC5003, doi:10.1029/2011TC002908.

26. Viola, G., Henderson, I.H.C., Bingen, B. and **Hendriks, B.W.H.**, 2011, The "Mylonite Zone": a key player in the tectonic evolution of the Mesoproterozoic Sveconorwegian belt, *Precambrian Research*, doi:10.1016/j.precamres.2011.06.005

### **3.2 REPORTS**

1. Baranwal, V.C, F. Ofstad, J.S. Rønning, **R.J. Watson**, 2011, Mapping of caesium fallout from the Chernobyl accident in the Jotunheimen area. NGU Report 2011.062
2. Bunkholt, H., Osmundsen, P.T., **Redfield, T.**, Oppikofer, T, Eiken, T., L'Hereaux, J.S., Hermanns, R.L., and Lauknes, T. 2011. ROS Fjellskred I Troms. NGU Rapport 2011.031.
3. **Redfield, T.F.**, P.T. Osmundsen, S. Gradmann, M. Stokke Bauck, J. Ebbing, and A. Nasuti. 2011. Tectonic Topography on Scandinavia's glaciated passive margin NGU Report 2011.033.
4. **Watson, R.J.**, Erichsen, E., Finne, T.E., Ganerød, G. V., Neeb, P.R., Reimeann, C., Rønning, J.S., 2011, Radontrygge byggeråstoff - Fase 1. Etablere målemetoder i felt og laboratorium for å klassifisere tilslagsmateriale i forhold til radonfare. NGU Report 2010.042

### **3.3 BOOKS**

1. van Hinsbergen, D.J.J., **Buiter, S.J.H.**, **Torsvik, T.H.**, **Gaina, C.** and Webb, S. (editors), 2011. The formation and evolution of Africa: a synopsis of 3.8 Ga of Earth history, Geological Society of London Special Publication 357.

### **3.4 CONFERENCE ABSTRACTS**

1. **Buiter, S.**, B. Steinberger, S. Medvedev, and **J. Tetraeault**, Could the mantle cause subsidence of the Congo Basin? EGU General Assembly, 3-8 May, 2011, Vienna, Austria (*Solicited*)
2. **Buiter, S.**, B. Steinberger, S. Medvedev, **J. Tetraeault**, Could the mantle cause subsidence of the Congo Basin? Kongsberg Seminar, 11-13 May 2011
3. **Buiter, S.**, B. Steinberger, S. Medvedev, and **J. Tetraeault**, A Mantle Cause for Congo Basin Subsidence? AGU Fall Meeting, 5-9 December, 2011, San Francisco
4. Bunkholt, H., **Redfield, T.**, Osmundsen, P.T., Oppikofer, T, Hermanns, R.L., and Dehls, J. The role of inherited structures in deep seated slope failures in Lyngen, Troms. 2nd World Landslide Forum conference paper. Rome, 3-7 Oct. 2011. 8 pages
5. Crameri, F., **S. Buiter**, T. Duretz, T. Gerya, G. Golabek, B. Kaus, R. Orendt, H. Schmeling, and P. Tackley, A benchmark comparison of numerical topography: what are suitable sticky-air parameters? EGU General Assembly, 3-8 May 2011, Vienna, Austria.
6. Crameri, F., H. Schmeling, G.J. Golabek, T. Duretz, R. Orendt, **S. Buiter**, D. May, B.J. Kaus, T. Gerya, P.J. Tackley, A benchmark comparison of numerical surface topography calculations in geodynamic modelling. AGU Fall Meeting, 5-9 December, 2011, San Francisco
7. Ellis, S.M., T. Little, L. M. Wallace, B. R. Hacker, **S. Buiter**, Feedback Between Rifting and Diapirism can Exhume Ultrahigh-Pressure Rocks. AGU Fall Meeting, 5-9 December, 2011, San Francisco
8. **Gaina, C.** and **T.H. Torsvik**., Evolution of Oceanic Crust in the North Atlantic and Implications for the Arctic Tectonics, 3P Arctic, AAPG Meeting, 31.08-02.09 Halifax, Canada
9. **Gaina, C.**, R. Saltus, S. Medvedev, S. Werner; N. Kusznir and M. Mandea, Structure and Evolution of the Arctic in the Light of Geophysical Data and Regional Kinematic Models, 3P Arctic, AAPG Meeting, 31.08-02.09 Halifax, Canada

10. **Gaina, C., T.H. Torsvik**, S. Cande, M. Croon, P.V. Dubrovine. Global Plate Circuits at Paleocene-Eocene time. EGU General Assembly, Vienna Austria, 3-9.4.11
11. **Ganerød, M., Torsvik, T.H.**, van Hinsbergen, D., **Gaina, C.**, Corfu, F., Werner, S., Owen-Smith, T.M., Ashwal, L.D., Webb, S.J. and **Hendriks, B.W.H.**, 2011. Palaeoposition of the Seychelles microcontinent in relation to the Deccan Traps and the Plume Generation Zone in Late Cretaceous-Early Palaeogene time. II International Scientific Practical Conference of Young Scientists and Specialists devoted to Academician A.P. Karpinsky's memory, St.Petersburg.
12. **Hendriks, B.W.H.**, Lang, M., Li, W., Kluth, P. and Ewing, R.C., New insights into the formation and annealing behavior of latent fission tracks, OnTrack Newsletter of the Fission Track Community, April 2011
13. Kusznir, N.J., and **C. Gaina**, Is Alpha Ridge Oceanic or Continental Crust? Constraints from Gravity and Magnetic Potential Field Data, 3P Arctic, AAPG Meeting, 31.08-02.09 Halifax, Canada
14. Mandea, M., **Gaina, C.**, Lesur, V. A Gravity and Magnetic View over the Arctic. 25th IUGG General Assembly, Melbourne, Australia
15. Meyer, R., Harbor, D., **Hendriks, B.**, Schultz, L. and Connors, C., Central Appalachian Valley and Ridge Province Middle Eocene igneous activity and their relation in space and time with the Late Jurassic rift to drift related alkalic dikes, AGU Fall Meeting, December 2011
16. Oppikofer, T., Hermanns, R.L., **Redfield. T.**, Sepúlveda, S., Duhart, P. and Bascuñan, I. Morphologic description of the Punta Cola rock avalanche and associated minor rockslides caused by the 21 April 2007 Aysén earthquake (Patagonia, southern Chile). RAGA conference paper, 2011.
17. Peron-Pinvidic, G., L. Gernigon and **C. Gaina**, Insights from the Jan Mayen System in the Norwegian- Greenland Sea: Architecture & Evolution of a Microcontinent, 3P Arctic, AAPG Meeting, 31.08-02.09 Halifax, Canada
18. Peron-Pinvidic, G., L. Gernigon and **C. Gaina**, From Iberia-Newfoundland to the Norwegian-Greenland Sea: A Project on the North Atlantic Evolution, 3P Arctic, AAPG Meeting, 31.08-02.09 Halifax, Canada
19. **Redfield, T. F.**, Hermanns, R. L., Oppikofer, T., Duhart, P., Mella, M., Derch, P., Bascuñan, I., Fernandez, J., Arenas, M., Sepulveda, S., Rebollo, S., Löw, S., Yugsi Molina, F., Abächerli, A., Henderson, I.H.C., Jaboyedoff, M., and Kveldsvik, V. 2011. Analysis of the 2007 earthquake-induced Punta Cola rockslide and Tsunami, Aysén Fjord, Patagonia, Chile (45.3° S, 73.0° W). 5th ICEGE conference paper, 10-14 Jan. 2011, Santiago, Chile. 12p.
20. Saltus, R., E. Miller, **C. Gaina**, Deep Magnetic High Domains of the Circum-Arctic — What are the Structural Implications of These Features? 3P Arctic, AAPG Meeting, 31.08-02.09 Halifax, Canada
21. **Tetreault, J., S. Buitier**, Sinkers and floaters: Modern analogues of allochthonous accreted terranes. EGU General Assembly, 3-8 May, 2011, Vienna, Austria.
22. **Tetreault, J.L., S. Buitier**, Numerical modeling of subduction, accretion, and collision of island arc crust onto continental crust. AGU Fall Meeting, 5-9 December, 2011, San Francisco
23. **Watson, R. J.** GPlates - Plate tectonic modelling and visualisation software: future plans for 3D visualisation. International Workshop on 3D Geological Modeling, December 2011, GEUS, Copenhagen, Denmark.

### **3.5 PUBLIC OUTREACH**

1. <http://www.forskning.no/artikler/2011/oktober/301520>: Fant Sør-Amerikas eldste gnagere
2. <http://www.nature.com/nature/journal/v478/n7370/full/478431d.html>: From Africa to Amazonia

3. <http://www.bbc.co.uk/news/science-environment-15268643>: Tiny fossil teeth re-write rodent record
4. <http://www.sciencedaily.com/releases/2011/10/111011192420.htm>: Oldest Fossil Rodents in South America Discovered; Find Is 10 Million Years Older and Confirms Animals from Africa
5. <http://terra-x.zdf.de/ZDFde/inhalt/22/0,1872,8418390,00.html?dr=1>: Skandinavien – Land der Wikinger (NGU Geodynamics contributed plate reconstructions and **B.W.H. Hendriks** served as a consultant)
6. [http://www.geo365.no/geoaktuelt/sett\\_og\\_hort/sett\\_og\\_ho/europeisk-/](http://www.geo365.no/geoaktuelt/sett_og_hort/sett_og_ho/europeisk-/): Europeisk toppstipend til NGU-forsker
7. <http://www.forskning.no/artikler/2011/desember/308662>: Norske fjell skyldes tynning av jordskorpen
8. Time magazine, October 24th, 2011; Paleontology – Out of Africa

## 4 OTHER ACTIVITIES

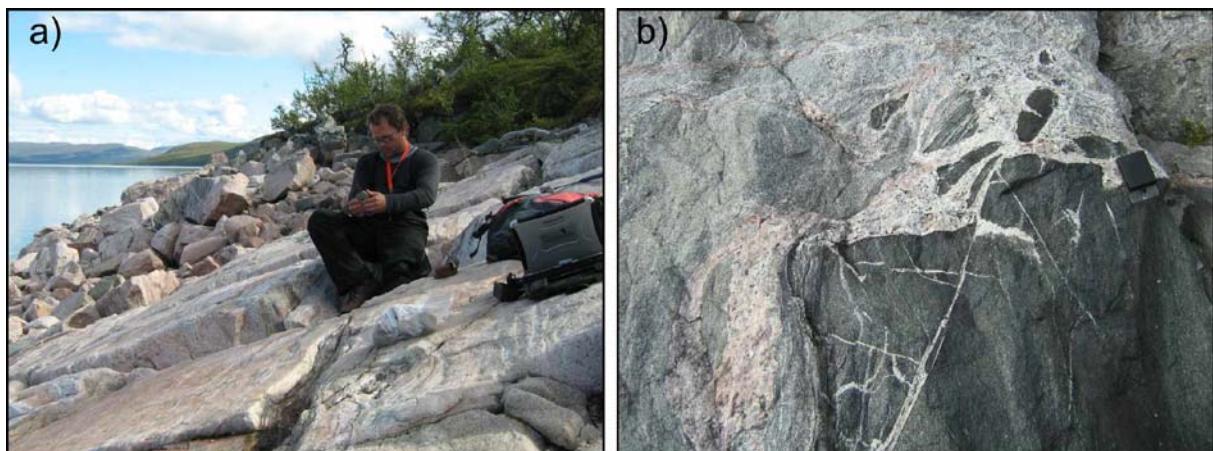
### 4.1 FIELDWORK

1. Bedrock mapping in Vesterålen: **Morgan Ganerød**
2. Bedrock mapping in Altevann, Sør-Troms: **Morgan Ganerød**
3. Excursion for Toposcandia project meeting: **Per Terje Osmundsen** and **Tim Redfield**
4. Fault mapping and characterization in Vesterålen, Minn project, June: **Per Terje Osmundsen**
5. Structural mapping in Møre, Møre Fault and fault products project (Bedrock team), June: **Per Terje Osmundsen** and **Tim Redfield**
6. Devonian metamorphic core complex and supradetachment basin, Northern Spitsbergen, July: **Per Terje Osmundsen**
7. Preparing and conducting 2-day excursion for the NGF in and around the Kvamshesten Basin: **Per Terje Osmundsen**
8. 10-day field course in the Carboniferous half-graben basin in Billefjorden, Svalbard, August: **Per Terje Osmundsen**
9. Rockslide structural mapping in Patagonia (Chile), Aysen Project, February: **Tim Redfield**
10. Rockslide structural mapping in Troms County, August: **Tim Redfield**
11. Fieldwork with the landslide team in June and September: **Tim Redfield**



*Figure: Puente El Gringo. El Gringo for scale*

*Figure:* The Big One.  
Normal- and thrust-fault controlled landslide scar at Punta Cola, Chile.  
Earthquake plus rockslide plus water equals very, very large sploosh. Think Norway! Note small volcanic cones in background.



*Figure:* a) Modern geologist using modern equipment --> Toughbook. b) Mafic enclave in diatexite.

#### 4.2 ORGANISATION OF CONFERENCES AND SESSIONS

1. 'Recent advances in modelling of tectonic processes', **Susanne Buiter**, Marcin Dabrowski, Ernst Willingshofer, Yossi Mart, Guido Schreurs, Dave May, Frederic Gueydan, Dimitrios Sokoutis, session GD1.2/TS9.2 at EGU 2011
2. 'Subduction zone dynamics from the surface to the lower mantle', **Susanne Buiter**, Francesca Funiciello, Jeroen van Hunen, Marina Manea, Yildirim Dilek, Vlad Manea, and Yujiro Ogawa, session GD5.1/GMPV44/SM4.5/TS6.9 at EGU 2011
3. 'Whole mantle dynamics: Linking surface and deep processes', **Trond Torsvik**, Rob van der Voo, Clinton Conrad, and Mike Gurnis, session GD6.1/GMPV55/SM1.12/TS4.6 at EGU 2011

#### 4.3 COMMITTEE WORK

1. Topical editor of Solid Earth ([www.solid-earth.net](http://www.solid-earth.net)), **Susanne Buiter**
2. Vice-president of Tectonics and Structural Geology (TS) Division, EGU, **Susanne Buiter**
3. Programme Committee TS Division EGU, **Susanne Buiter**
4. Programme Committee Geodynamics Division EGU, **Susanne Buiter**