

Hélène Delphine Carton

Education:

- June 2001 DEA (~MSc.), Geophysics, Louis Pasteur University of Strasbourg, France, *Mention Bien*. Advisor: Dr Daniel Sauter
- December 2001 Diploma, Ecole de Physique du Globe de Strasbourg, France, *Mention Bien*
- December 2005 Ph.D., Marine Geophysics, Institut de Physique du Globe de Paris, France, *Mention Très honorable avec Félicitations du jury*. Advisor: Dr Satish Singh

Appointments:

- July 2010 - present:* Lamont Assistant Research Professor, Lamont-Doherty Earth Observatory
- June 2010:* Doherty Associate Research Scientist, Lamont-Doherty Earth Observatory
- June 2007 - May 2010:* Post-doctoral Research Scientist, Lamont-Doherty Earth Observatory
- January 2006 - June 2007:* Post-doctoral researcher, IPG Paris, France
- September 2004 - August 2005:* ATER (part-time teaching assistant), IPG Paris, France
- January 2002 - August 2004:* Cambridge/IPG Paris PhD studentship

Field of interest: Mid-ocean ridge processes, structure and evolution of the oceanic crust, subduction zone processes, submarine strike-slip fault systems -- investigated through active source marine seismic studies. Also airgun source modeling and underwater sound propagation.

LDEO community activities & committee service:

Since July 2011, Chief Scientist for the Office of Marine Operation. Activities include modeling for marine mammal mitigation, document preparation and review, advice to PIs for survey planning.

Funded proposals:

Trehu, A., Abers, G., Carton, H.: "Collaborative Research: Imaging the Cascadia subduction zone: a ship-to-shore opportunity", EAR 11-47622, \$333,212, 05/01/2012-04/30/2014.

Carbotte, S., Carton, H., Nedimovic, M., Canales, J.P.: "Collaborative research: Evolution and hydration of the Juan de Fuca crust and uppermost mantle: A plate-scale seismic investigation from ridge to trench", OCE 10-29411, \$823,085, 03/01/2012-02/28/2015.

Cochran, J., Shillington, D., and Carton, H.: "A training course in the processing and interpretation of marine geophysical data for officers of the Geological Survey of India", \$336,460 funded by Wartsila ship design Norway (project duration: 08-12/2011).

Carton, H., and Carbotte, S.M.: "RAPID: Deep investigation of Sumatran subduction zone seismic gap", OCE 09-38221 (ARRA), \$74,527, 06/01/2009-05/31/2011.

Seagoing experience:

- 2012 Co-chief scientist on Cruise OC1206A aboard R/V *Oceanus*, part of the two-ship *Ridge2Trench* experiment across the Juan de Fuca plate and Cascadia subduction zone; OBS deployment/recoveries and CTD work.
- 2011 Chief scientist for JMS inspection onboard R/V *Marcus G. Langseth*, in and out of San Diego

- 2009 *TIDES* survey onboard M/V *Geowave Champion* of CGGVeritas - MCS (multi-streamer and long-offset) study of the Sumatran subduction zone over locked (off Padang) and aseismic segments, also incoming plate and forearc basin
- 2008 January: Shakedown cruise for 3D MCS onboard R/V *Marcus G. Langseth*, Gulf of Mexico; July-August: *MGL0812* cruise onboard R/V *Marcus G. Langseth* - 3D MCS study of the magmatic-hydrothermal system at the 9°50'N Integrated Study Site on the East Pacific Rise
- 2006 "Tsunami Survey" onboard M/V *Geco Searcher* - MCS study of the northern Sumatra subduction and incoming plate in the 2004 earthquake epicentral area
- 2005 *SISMOMAR* cruise onboard R/V *L'Atalante* - 3D MCS reflection box over the Lucky Strike volcano at 37°N on the Mid-Atlantic Ridge
- 2004 *TESTOBS* cruise onboard R/V *Le Suroît* - First deployment of the French INSU pool of ocean bottom seismometers, Mediterranean (Ligurian) Sea
- 2003 *SHALIMAR* cruise onboard R/V *Le Suroît* - Active tectonics offshore Lebanon using high-resolution bathymetry, single-channel and high-resolution seismics

Teaching experience:

- 2011: Co-taught (50%, with D. Shillington) an eight-week training course in marine seismology to a group of 10 scientists of the Geological Survey of India.
- 2004-2005: Taught labs in signal processing and seismic data analysis for first year Master students.

Students advised, PhD examinations, visiting fellowships:

- 2008-present: Provided informal input to Milena Marjanovic (defended February 2013) and Shuoshuo Han for their PhD work on the East Pacific Rise project
- 2012-present: PhD committee of Helen Janiszewski, student working on the Cascadia onshore/offshore project
- Examiner at PhD defenses of IPG Paris PhD candidates Nugroho Hananto (12/2011) and Dibakar Ghosal (03/2013)
- 2012/2013: Visiting Scientist, three months, IPG Paris

Publications by theme: * indicates graduate student first author

Mid-ocean ridges

In preparation:

Marjanovic, M.(*), **Carton, H.**, Carbotte, S.M., Mutter, J.C., Nedimovic, M.R., and Canales, J.P., Distribution of melt along the East Pacific Rise from 9°30' to 10°N from an amplitude variation with angle of incidence (AVA) technique, in prep. for *Geophysical Journal International*

Marjanovic, M.(*), Carbotte, S.M., **Carton, H.**, Mutter, J.C., Nedimovic, M.R., and Canales, J.P., Seismic images of magma sills beneath the axial melt lens along the East Pacific Rise 9°20' to 9°50'N, in prep. for *Science*

Carton, H., Carbotte, S.M., Mutter, J.C., Nedimovic, M.R., Canales, J.P., Marjanovic, M., Aghaei, P., and Xu, M., Architecture of the axial magma lens along an erupting mid-ocean ridge: insight from three-dimensional seismic images on the East Pacific Rise 9°42' to 9°57'N, in prep. for *Geology*

In review:

Aghaei, O.(*), Nedimovic, M., **Carton, H.**, Canales, J.P., Carbotte, S.M., and Mutter, J.C., Crustal thickness and Moho character from post-stack migrated 3D MCS data collected over the fast-spreading East Pacific Rise from 9°42' to 9°57'N, submitted to *Geochem. Geophys. Geosyst.*

Xu, M.(*), Canales, J.P., Carbotte, S.M., **Carton, H.**, Nedimovic, M.R., and Mutter, J.C., Variations in axial magma lens properties along the East Pacific Rise (9°30'-10°00'N) from swath 3D seismic imaging and 1D waveform inversion, submitted to *Journal of Geophysical Research*.

Han, S.(*), Carbotte, S.M., **Carton, H.**, Mutter, J.C., Aghaei, O., Nedimovic, M.R., Canales, J.P., Architecture of off-axis magma bodies at EPR 9°37'-40'N and implications for oceanic crustal accretion, under revision for *Earth. Planet. Sci. Lett.*

Carbotte, S.M., Marjanovic, M., **Carton, H.**, Mutter, J.C., Canales, J.P., Nedimovic, M.R., Han, S., and Perfit, M. (2013) - Fine-scale segmentation of the crustal magma reservoir beneath the East Pacific Rise, *Nature Geoscience*, vol. 6, 866-870, doi:10.1038/ngeo1933.

Canales, J.P., **Carton, H.**, Carbotte, S.M., Mutter, J., Nedimovic, M., Xu, M., Aghaei, O., Marjanovic, M., and Newman, K. (2012) - Network of off-axis melt bodies at the East Pacific Rise, *Nature Geoscience*, vol. 5, 279-283, doi:10.1038/ngeo1377.

Carbotte, S.M., Canales, J.P., Nedimovic, M., **Carton, H.**, and Mutter, J.C. (2012) - Insights into mid-ocean ridge hydrothermal and magmatic processes from recent seismic studies at the EPR 8°20'-10°10'N and Endeavour Segments, *Oceanography* 25-1, 100-112.

Lucazeau, F., Bonneville, A., Escartin, J., Von Herzen, R.P., Gouze, P., **Carton, H.**, Cannat, M., Vidal, V., and Adam, C. (2006) - Heat-flow variations on a slowly accreting ridge: constraints on the hydrothermal and conductive cooling for the Lucky Strike segment (Mid Atlantic Ridge, 37°N), *Geochem. Geophys. Geosyst.*, vol. 7, Q07011, 23 pages, doi:10.1029/2005GC001178.

Singh, S.C.S., Crawford, W., **Carton, H.**, Seher, T., Combier, V., Cannat, M., Canales, J.-P., Dusunur, D., Escartin, J., and Miranda, J.M. (2006) - Discovery of axial magma chamber reflections and faults beneath the Lucky Strike volcano and the hydrothermal field at the Mid-Atlantic Ridge, *Nature*, vol. 442, 1029-1032.

Sauter, D., **Carton, H.**, Mendel, V., Munsch, M., Rommevaux-Jestin, C., Schott, J.-J., Whitechurch, H. (2004) - Ridge segmentation and the magnetic structure of the Southwest Indian Ridge (49°15'-51°15'E and 54°30'-56°30'E): implication for magmatic processes at ultra-slow spreading centers, *Geochem. Geophys. Geosyst.*, 5 (5), Q05K08, 1-25, doi:10.1029/2003GC000581.

Oceanic crust

Carton, H., Singh, S.C., Hananto, N., Martin, J., Djajadihardja, Y., Udrexh, Franke, D., and Gaedicke, C. - Deep seismic reflection images of the Wharton Basin oceanic crust and uppermost mantle offshore northern Sumatra: Relation with active and past deformation, accepted with minor revisions at *Journal of Geophysical Research*.

Mutter, J.C., and **Carton, H.** (2013) - The Mohorovicic discontinuity in ocean basins: Some observations from seismic data, *Tectonophysics*, <http://dx.doi.org/10.1016/j.tecto.2013.02.018>.

Singh, S.C., **Carton, H.**, Chauhan, A.S., Androvandi, S., Davaille, A., Dymant, J., Cannat, M. and Hananto, N. (2011) - Extremely thin crust in the Indian Ocean possibly resulting from plume-ridge interaction, *Geophys. J. Int.*, 184, vol. 1, 29-42, doi: 10.1111/j.1365-246X.2010.04823.x

Sumatra subduction

In preparation:

Carton, H., Singh, S.C., and Hananto, N.D., Bending-related faulting and subduction of oceanic reliefs at the central and southern Sumatra margin, in prep. for *Earth. Planet. Sci. Lett.*

Singh, S.C., Chauhan, A.P.S., Calvert, A.J., Rai, A., Hananto, N.D., Ghosal, D., and **Carton, H.** (2012) - Seismic evidence of bending and unbending of subducting oceanic crust and the presence of mantle megathrust in the 2004 Great Sumatra earthquake rupture zone, *Earth Planet Sci. Lett.* 327-328, 39-49.

Singh, S.C., Hananto, N., Mukti, M., Robinson, D., Das, S., Chauhan, A., **Carton, H.**, Gratacos, B., Midenet, S., Djajadihardja, Y., and Harjono, H. (2011) - Aseismic zone and earthquake segmentation

associated with a deep subducted seamount, *Nature Geoscience*, vol. 4, 308-311, doi:10.1038/ngeo1119.

Chauhan, A.P.S.(*), Singh, S.C., Hananto, N.D., **Carton, H.**, Klingelhoefer, F., Dessa, J.-X., Permana, P., White, N.J., Graindorge, D., and Sumatra OBS Scientific Team (2009) - Seismic imaging of forearc backthrusts at northern Sumatra subduction zone, *Geophys. J. Int.*, vol. 179 no. 3, 1772-1780, doi: 10.1111/j.1365-246X.2009.04378.x.

Singh, S.C., **Carton, H.**, Tapponnier, P., Hananto, N.D., Chauhan, A.P.S., Hartoyo, D., Bayly, M., Moeljopranoto, S., Bunting, T., Christie, P., Lubis, H., and Martin, J. (2008) - Seismic evidence for broken oceanic crust in the 2004 Sumatra earthquake epicentral region, *Nature Geoscience* vol. 11, 777-781, doi:10.1038/ngeo336.

Graindorge, D., Klingelhoefer, F., Sibuet, J.-C., McNeill, L.C., Henstock, T.J., Dean, S., Gutscher, M.-A., Dessa, J.-X., Permana, H., Singh, S.C., Léau, H., White, N.J., **Carton, H.**, Malod, J.-A., Rangin, C., Aryawan, G., Chaubey, A.K., Chauhan, A.P.S., Galih, D.R., Greenroyd, C.J., Laesanpura, A., Prihanto, J., Royle, G., and Shankar, U. (2008) - Impact of lower plate structure on upper plate deformation at the NW Sumatran convergent margin from seafloor morphology, *Earth Planet Sci. Lett.*, vol. 275, 201-210.

Singh, S.C. & Sumatra-Aftershocks working group (Sibuet, J.-C., Malod, J., Rangin, C., Chauhan, A., **Carton, H.**, Apprioual, R., Aryanto, N.C., Begot, J., Cattaneo, A., Creach, R., Crozon, J., Domzig, A., Falleau, N., Graindorge, D., Harmegnies, F., Haryadi, Y., Klingelhoefer, F., Krishna, S.K., Landuré, J.-Y., Le Lann, C., Normand, A., Oggian, G., Restuning Galih, D., Schneider, J.-L., Sultan, N., Taufik, M., UMBER, M., Yamagushi, H.) (2005) - Sumatra earthquake research indicates why rupture propagated northward, *EOS*, vol. 86 no. 48, 3 pages.

Strike-slip fault systems

Kurt, H., Sorlien, C., Seeber, L., Steckler, M., Shillington, D., Cifci, G., Cormier, M.-H., Dessa, J.-X., Atgin, O., Dondur, D., Demirbag, E., Okay, S., Imren, C., Gurcay, S., and **Carton, H.** (2013) - Steady late Quaternary slip rate on the Cinarcik section of the North Anatolian fault near Istanbul, Turkey, *Geophysical Research Letters*, vol. 40, 1-5, doi:10.1002/grl.50882.

Carton, H., Singh, S.C., Tapponnier, P., Elias, A., Briais, A., Sursock, A., Jomaa, R., King, G.C.P., Daëron, M., Jacques, E., and Barrier, L. (2009) - Seismic evidence for Neogene and active shortening offshore Lebanon (SHALIMAR cruise), *J. Geophys. Res.*, vol. 114, B07407, 26 pages, doi:10.1029/2007JB005391

Elias, A., Tapponnier, P., Singh, S.C., King, G., Briais, A., Daëron, M., **Carton, H.**, Sursock, A., Jacques, E., Jomaa, R., and Klinger, Y. (2007) - Thrusting offshore Mt Lebanon: source of the tsunamigenic, 551 AD Beirut-Tripoli earthquake, *Geology*, vol. 35 no. 8, 755-758.

Carton, H., Singh, S.C., Hirn, A., Bazin, S., de Voogd, B., Vigner, A., Ricolleau, A., Cetin, S., Ocakoglu, N., Karakoc, F., and Sevilgen, V. (2007) - Seismic imaging of the three-dimensional architecture of the Cinarcik Basin along the North Anatolian Fault, *J. Geophys. Res.*, vol. 112, B06101, 17 pages, doi:10.1029/2006JB004548.

Non peer-reviewed: **Carton, H.**, 2003 - Structure of the Cinarcik Basin (Marmara Sea) from a densely spaced grid of multi-channel seismic profiles, *Lithos Science Report 5* (June 2003), 69-76, University of Cambridge.

Seismic imaging

Canales, J.P., **Carton, H.**, Mutter, J.C., Harding, A., Carbotte, S.M., and Nedimovic, M. (2012) - Recent advances in multichannel seismic imaging for academic research in deep oceanic environments, *Oceanography* 25-1, 113-115.

Mutter, J.C., Carbotte, S.M., Nedimovic, M., Canales, J.P., and **Carton, H.** (2009) - Seismic imaging in three dimensions on the East Pacific Rise, *EOS*, vol. 90 no. 42, 374-375.