

Nicholas Culshaw

Current rank: Associate Professor, hired 1986

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Office Location: LSC 2636

Education: Ph.D. Ottawa 1983

Teaching:

ERTH 2110 Field Methods (25 yrs.)

ERTH 4350 Tectonics (15 yrs.)

ERTH 6350 Geology of Nova Scotia (10 yrs.)

Departmental responsibilities:

Graduate Coordinator for the past 12 years.

Other:

External Graduate Faculty, University of Maine, appointed March 2010.

Grants Held / Currently Applied for:

Have been supported continuously by NSERC since hiring

NSERC Discovery Grant 2005-2011 (deferred one year at NSERC request) \$34,000

NSERC Discovery Grant 2011-2016 \$22,000

Research Interests:

As mountains develop, the lower parts of the thickened continental crust may flow, analogous to a very slow moving fluid. My primary project uses field studies and lab analyses to discover how the architecture, and thus the strength, of the lower crust changes during such flow. The work is based in a part of the Canadian Shield, the Grenville Province, that exposes the deep roots of an ancient mountain belt. A second project uses geochronological and geochemical studies to illuminate the history of the rocks were before they were incorporated into the mountain belt.

Publications: (2004-2011 inclusive)

Peer-Reviewed Journal Articles

Marsh, J.H., Gerbi, C., Culshaw, N.G., and Clark, C. *In press*. New in-situ zircon ages from the southern Parry Sound Domain, Grenville Province, Ontario, Canada: Constraints on the timing of metamorphism, dike emplacement, and shearing along the Twelve Mile Bay shear zone. Submitted 13/9/2010 Precambrian Research.

Culshaw, N.G., Mosonyi, E., and Reynolds, P. 2011. New $^{40}\text{Ar}/^{39}\text{Ar}$ laser single grain-ages of muscovites of mylonitic schists from the Rodna Mountains Eastern Carpathians, Romania. Accepted 6/5/2011, International Journal of Earth Sciences; doi: 10.1007/s00531-011-0674-y.

Marsh, J.H., Gerbi, C., Culshaw, N.G., Potter, J., Longstaffe, F., and Johnson, S.E. 2011. Initiation and development of the Twelve Mile Bay Shear Zone: The low viscosity sole of a Grenvillian thrust sheet. *Journal of Metamorphic Geology*, 29: 167-191.

Culshaw, N.G., Gerbi, C., Marsh, J.H., and Plug, L. 2011. Heterogeneous amphibolite facies deformation of a granulite facies layered protolith: Matches Island Shear System, Parry Sound Domain, Grenville Province, Ontario, Canada. *Journal of Structural Geology*, 33: 875-890; doi: 10.1016/j.jsg.2011.03.005.

Culshaw, N.G., Gerbi, C., and Marsh, J. 2010. Softening the Lower Crust: Modes of Syn-Transport Transposition Around and Adjacent to a Deep Crustal Granulite Nappe, Parry Sound Domain, Grenville Province, Ontario, Canada. *Tectonics*, 29; doi: 10.1029/2009TC002537.

Gerbi, C., Culshaw, N.G., and Marsh, J.H., 2010. Magnitude of weakening during crustal-scale shear zone development. *Journal of Structural Geology*, v. 32, p. 107-117.

Culshaw, N.G., and Clarke, D.B. 2009. Structural History and Styles of Granitoid Emplacement in the Rottenstone Domain during Closure of the Trans-Hudson Orogen, Davin Lake, northern Saskatchewan. *Canadian Journal of Earth Sciences* 47: 287-306; doi:10.1139/E09-021.

Slagstad, T., Culshaw, N.G., Daly, J.S., and Jamieson, R.A. 2009. Western Grenville Province holds key to midcontinental Granite-Rhyolite Province enigma. *Terra Nova*, doi: 10.1111/j.1365.3121.2009.00871.x

Jamieson, R. A., Beaumont, C., Nguyen, M. H., and Culshaw, N. G. 2007. Synconvergent ductile flow in variable-strength continental crust; numerical models with application to the western Grenville Orogen, *Tectonics*, 26, TC5005.

Culshaw, N.G., Beaumont, C., Jamieson, R.A. 2006. The orogenic superstructure-infrastructure concept: Revisited, quantified, and revived. *Geology*, 34: 733-736.

Culshaw, N.G., and Lee, S.K.Y. 2006. The Acadian Fold Belt in the Meguma Terrane, Nova Scotia: Cross sections, fold mechanisms and tectonic implications. *Tectonics*, TC3007; doi: 10.1029/2004TC001752.

Culshaw, N.G., Purves, M., Reynolds, P.H., and Stott, G. 2006. Post-collisional upper crustal faulting and deep crustal flow in the eastern Wabigoon subprovince of the Superior Province, Ontario: evidence from structural and ⁴⁰Ar/³⁹Ar data from the Humboldt Bay High Strain Zone. *Precambrian Research*: 145, 272-288.

Culshaw, N.G. 2005. Buckle folding and deep-crustal shearing of high-grade gneisses at the junction of two major high strain zones, Central Gneiss Belt, Grenville Province, Ontario. *Canadian Journal of Earth Sciences*, 42: 1907-1926.

Slagstad, T., Jamieson, R.A., and Culshaw, N.G. 2005. Formation, crystallisation, and migration of melt in the mid-orogenic crust: Muskoka domain migmatites, Grenville Province, Ontario. *Journal of Petrology*, 46: 893-919.

Slagstad, T., Hamilton, M.A., Jamieson, R.A., and Culshaw, N.G. 2004. Timing and duration of melting in the mid orogenic crust: Constraints from U-Pb (SHRIMP) data, Muskoka and Shawanaga domains, Grenville Province, Ontario. *Canadian Journal of Earth Sciences*, 41: 1339-1365.

Other Peer-Reviewed Items:

Rivers, T., Culshaw, N., Hynes, H., Indares, A., Jamieson, R., and Martignole, J. *In press*. The Grenville Orogen. *Accepted* ~May 2010. Book Chapter *in* Variations in Tectonic Styles Revisited: a Lithoprobe Perspective; Cook, F., Clowes, R., and Percival, J. (eds).

Gibling, M.R., Culshaw, N., & Pascucci, V. 2008. The Maritimes Basin of Atlantic Canada: Basin Creation and Destruction in the Collisional Zone of Pangea. *In* "Basins of North America" (Elsevier Basin Atlas series), ed. A.D. Miall.

Slagstad, T., Culshaw, N.G., Jamieson, R.A., and Ketchum, J.W.F. 2004. Early Mesoproterozoic tectonic history of the southwestern Grenville Province, Ontario: Constraints from geochemistry and geochronology of high-grade gneisses. *in* Tollo, R.P., Corriveau, L., McLelland, J., and Bartholemew, M.J., (eds), Proterozoic tectonic evolution of the Grenville orogen in North America: Boulder, Colorado, Geological Society of America, Special Paper, 197, 209-241.

Map output:

Culshaw, N. G., D. Corrigan, J. W. F. Ketchum, P. Wallace, N. Wodicka, and R. M. Easton (2004), Georgian Bay geological synthesis, Grenville Province; explanatory notes for preliminary maps P.3548 to P.3552 28 pp.

Culshaw, N.G., Corrigan, D., Ketchum, J.W.F., Wallace, P., and Wodicka, N. 2004. Precambrian geology, Penetanguishene area; Ontario Geological Survey, Preliminary Map P. 3552, scale 1:50 000.

Culshaw, N.G., Corrigan, D., Ketchum, J.W.F., Wallace, P., and Wodicka, N. 2004. Precambrian geology, Sans Souci area; Ontario Geological Survey, Preliminary Map P. 3551, scale 1:50 000.

Culshaw, N.G., Corrigan, D., Ketchum, J.W.F., Wallace, P., and Wodicka, N. 2004. Precambrian geology, Parry Sound area; Ontario Geological Survey, Preliminary Map P. 3550, scale 1:50 000.

Culshaw, N.G., Corrigan, D., Ketchum, J.W.F., Wallace, P., and Wodicka, N. 2004. Precambrian geology, Naiscoot area; Ontario Geological Survey, Preliminary Map P. 3549 scale 1:50 000.

Culshaw, N.G., Corrigan, D., Ketchum, J.W.F., Wallace, P., and Wodicka, N. 2004. Precambrian geology, Key Harbour area; Ontario Geological Survey, Preliminary Map P. 3548, scale 1:50 000.

HQP Supervision: (2004-2011)

Co-supervision with Chris Gerbi (University of Maine, Orono):

Jeff Marsh (U Maine PhD, graduated 2010); faculty replacement Colby College, 2010-11; post-doc U Texas (Austin), start Aug 2011.

Deborah Schulman (U Maine PhD candidate, started fall 2010).

MSc Dalhousie:

Sharon Lee (graduated 2005); currently with the Manitoba provincial survey.

John Foster (MSc Dalhousie); left 2006 under financial duress, returned 2010.

Each year I serve on graduate student supervisory committees (three on average).

Honours theses:

Duncan McLeish (graduated 2008); currently MSc candidate at U Vic.

Heather Archibald (graduated 2008); currently involved in gold exploration.

Laura Ratcliffe (graduated 2010); recently involved in gold exploration (resigned).

Peter Regan (ongoing)

I have provided several students with field-based research experience in the Grenville Province as field assistants. Training aspects included:

i) field geology in high grade terrains (**McLeish** (2006-7 & 9); **Laura Ratcliffe** (2009-10; honours thesis); **Luke Hilchie** (2007) and **Jared Butler** (2005), respectively MSc and PhD students; **Peter Regan** (2010).

ii) detailed mapping with differential GPS and field logistics in hard-of - access terrains (**McLeish** (2006-7 & 9); **Ratcliffe** (2009-10); **Regan** (2011)).

Public Awareness / Outreach:

Appeared in segment of "Great Lakes" episode of CBC series "Geologic Journey" illustrating and explaining geological processes in the Central Gneiss Belt of the Grenville Province in Georgian Bay. This series has been repeatedly shown on CBC as well as other channels (e.g. Discovery Channel). There has been significant direct feedback and indirectly via clients and staff at Georgian Bay National Park.

Society-sponsored (2004) and informal post-GAC-MAC (2004 and 2009) field trips and other informal field trips for guest non-Dalhousie faculty and students. The informal post-meeting trips were organized when near unsurmountable insurance-related red tape blocked trips involving boat transport.

Professional Activities:

Requests for review of manuscripts and applications from (journals; organisations):

Tectonics, Journal of Structural Geology, Precambrian Research, Canadian Journal of Earth Sciences, Earth and Planetary Scientific Letters;
NSERC, Czech National Science Foundation.