



## Martin Andersen

### Associate Professor & Project Director NCRIS Groundwater Infrastructure Program

Martin has a MSc in Environmental Engineering Science and a PhD in Hydrogeochemistry. He has been with WRL since 2006 and was the previous Director of the UNSW Connected Waters Initiative (CWI) where he worked on large research projects for the Cotton Catchment Communities CRC, investigating surface water groundwater interactions.

Martin's primary research interest is groundwater geochemistry with practical applications for water resources and water quality problems. A significant part of his research is field oriented, giving Martin extensive experience in various field methods. He also has extensive experience in numerical modelling of reactive flow and transport problems, using codes such as PHREEQC and SUTRA. Martin is currently teaching at UNSW in postgraduate courses on: groundwater geochemistry, aquatic chemistry, fate and transformation of contaminants in the environment and groundwater investigations.

### Qualifications and affiliations

MSc (Engineering), Technical University of Denmark, 1997

PhD (Environment and Resources DTU), Technical University of Denmark, 2002

Associate Editor: *Hydrogeology Journal*, 2010-2013

Chief Investigator: National Centre for Groundwater Research and Training (NCGRT), 2010-2014

IAEA Australian Representative: CRP F33030 Isotopes in river and groundwater interaction, 2012-2015

Advisor: Office of Water Science - Coal Seam Gas impacts on water dependent ecology, 2014-2018

Chair: Organising committee for the Australasian Groundwater Conference, Sydney, 2017

Director: UNSW Connected Waters Initiative Research Centre, 2016-2019

Editorial Board Member: *Scientific Reports (Springer Nature)*, 2015-Ongoing

### Awards

2008: **Best presentation**, International Association of Hydrogeologists (IAH), Japan

2010: **Best science poster**, Australian Cotton Conference, Gold Coast

2011: **Best poster**, IAH NSW Groundwater Symposium, Sydney

2011: **Finalist for the 2011 Eureka Prize**, Water and Innovation, UNSW CWI team

### Professional history

2018-Ongoing: Associate Professor, UNSW WRL

2008-2018: Senior Lecturer, UNSW WRL

2006-2008: Postdoctoral Fellow, UNSW WRL

2005-2006: Visiting Postdoctoral Fellow, The Geological Institute, University of Copenhagen

2002-2005: Postdoctoral Fellow, Environment & Resources, Technical University of Denmark

### Expertise

- Groundwater hydrology
- Surface water – groundwater interactions
- Geochemistry
- Groundwater ecology
- Karst processes
- Reactive transport modelling

## Selected grants

- 2013-2022: NCRIS groundwater infrastructure project, Commonwealth Research Infrastructure grant, **\$1,217,000**
- 2015-2016: Research to inform the assessment of ecohydrological responses to coal seam gas (CSG) extraction and coal mining, **\$709,393**
- 2015-2018: Baseline Lower Namoi Groundwater and evaluation Piliga CSG developments, **\$291,824**
- 2016-2019: Groundwater organic matter: source or sink? ARC Discovery grant, **\$473,000**
- 2017-2020: Thirlmere Lakes hydrology program, NSW-OEH, **\$846,891**
- 2017-2021: NSW state groundwater infrastructure grant (RAAP), **\$150,000**
- 2020-2022: Predicting impacts of groundwater abstraction on groundwater ecosystems, NSW Environmental Trust Grant, **\$180,000**

## Selected publications

- McDonough, L.K., Santos, I.R., Andersen, M.S., O'Carroll, D.M., Rutledge, H., Meredith, K., Oudone, P., Bridgeman, J., Goody, D.C., Sorensen, J.P.R., Lapworth, D.J., MacDonald, A.M., Ward, J. & Baker, A. (2020) "Changes in global groundwater organic carbon driven by climate change and urbanization", *Nature Communications* 11, Article number: 1279.
- Bryan, E., Meredith, K.T., Baker, A., Andersen, M.S., Post, V.E. & Treble P.C. (2020) "How water isotopes ( $^{18}\text{O}$ ,  $2\text{H}$ ,  $3\text{H}$ ) within an island freshwater lens respond to changes in rainfall", *Water Research* 170, WR115301.
- Meredith, K., Baker, A., Andersen, M.S., O'Carroll, D., Rutledge, H., McDonough, L., Oudone, P., Bryan, E. & Zainuddin N.S. (2020). "Isotopic and chromatographic fingerprinting of the sources of dissolved organic carbon in a shallow coastal aquifer", *Hydrology & Earth System Sciences*, 24, 2167–2178.
- Acworth R.I., Andersen, M.S. & Dasey, G. (2020) "Investigation of the changing characteristics of the saline interface beneath an ocean beach using time-lapse physical and chemical methods", *Hydrogeology Journal*.
- McDonough, L.K., Rutledge, H., O'Carroll, D.M., Andersen, M.S., Meredith, K., Behnke, M., Spencer, R.G.M., Marjo, C.E., Oudone, P. & Baker, A. (2020) "Characterisation of shallow groundwater dissolved organic matter in aeolian, alluvial and fractured rock aquifers", *Geochimica et Cosmochimica Acta* 273, 163-176.
- McDonough, L.K., O'Carroll, D.M., Meredith, K., Andersen, M.S., Brugger, C., Huang, H., Rutledge, H., Behnke, M., Spencer, R.G.M., McKenna A., Marjo, C.E., Oudone, P. & Baker, A. (2020) "Rainfall recharge drives groundwater dissolved organic matter composition in a coastal sand aquifer", *Water Research* 169, WR115201.
- Pirzada, M.A., Roshan, H., Sun, H., Oh, J., Andersen, M.S., Hedayat, A. & Bahaaddini, M. (2020) "Effect of contact surface area on frictional behaviour of dry and saturated joints", *Journal of Structural Geology*, 135, 104044.
- McMillan, T.C., Rau, G.C., Timms, W.A. & Andersen, M.S. (2019) "Utilising the impact of Earth and atmospheric tides on groundwater systems: A review reveals the future potential", *Reviews of Geophysics* 57, 281–315.
- Castilla-Rho, J.C., Rojas, R., Andersen, M.S., Cameron, C. & Mariethoz, G. (2019) "Sustainable groundwater management: How long and what will it take?" *Global Environmental Change* 58, 101972.
- Markowska, M., Cuthbert, M.O., Baker, A., Treble, P.C., Andersen, M.S., Adler, L., Griffiths, A. & Frisia S. (2019) "Modern speleothem oxygen isotope hydroclimate records in water limited SE Australia", *Geochimica et Cosmochimica Acta* 270, 431-448.
- Markowska, M., Fohlmeister, J., Treble, P.C., Baker, A., Andersen, M.S. & Hua, Q. (2019) "Modelling unsaturated zone  $^{14}\text{C}$  systematics using the bomb-pulse captured in speleothems", *Geochimica et Cosmochimica Acta* 261, 342-367.
- Fang, B., Coleborn, K., Flemons, I., Baker, A., Treble, P.C., Hughes, C., Baker, A., Andersen, M.S., Tozer, M., Duan, W., Fogwill, C. & Fairchild, I.J. (2019) "Hydrological and geochemical responses of fire in a shallow cave system", *Science of the Total Environment* 662, 180-191.
- Rakhimbekova, S., O'Carroll, D., Andersen, M.S., Wu, M. & Robinson, C. (2018) "Effect of transient wave forcing on the behaviour of arsenic in a nearshore aquifer", *Environmental Science & Technology* 52 (21), 12338–12348.

- Burrows, R.M., Rutledge, H., Valdez, D., Vernarsky, M., Bond, N., Andersen, M.S., Fry, B., Eberhard, S. & Kennard, M.J. (2018) "Groundwater supports intermittent stream food webs", *Freshwater Science* 37 (1), 42–53.
- Coleborn, K., Baker, A., Treble, P.C., Andersen, M.S., Baker, A., Tadros, C.V., Tozer, M., Fairchild, I.J., Spate, A. & Meehan, S. (2018) "The impact of fire on the geochemistry of speleothem-forming drip water in a sub-alpine cave", *Science of the Total Environment* 642, 408–420.
- Rau, G.C., Andersen, M.S. & Turner, I.L. (2018) "Experimental observation of increased apparent dispersion and mixing in a beach aquifer due to wave forcing", *Advances in Water Resources* 119, 245–256.
- Nagra, G., Treble, P.C., Andersen, M.S., Bajo, P., Hellstrom, J. & Baker, A. (2017) "Dating stalagmites in Mediterranean climates using annual trace element cycles", *Scientific Reports* 7, article number: 621.
- Halloran, L.J.S., Andersen, M.S. & Rau, G.C. (2017) "Heat transport dynamics in a variably saturated streambed affected by tidal flow", *Hydrological Processes* 31(14), 2541–2555.
- Bryan, E., Meredith, K.T., Baker, A., Andersen, M.S. & Post, V.E. (2017) "Carbon dynamics in a Late Quaternary-age coastal limestone aquifer system undergoing saltwater intrusion", *Science of the Total Environment* 607-608, 771-785.
- Rau, G.C. Halloran, L.J.S., Cuthbert, M.O, Andersen, M.S., Acworth R.I. & Tellam J. (2017) "Characterising the dynamics of surface water-groundwater interactions in intermittent and ephemeral streams using streambed thermal signatures", *Advances in Water Resources* 107, 354-369.
- Castilla-Rho, J.C., Rojas, R., Andersen, M.S., Cameron, C. & Mariethoz, G. (2017) "Social tipping points in groundwater management", *Nature Human Behaviour* 1, 640–649.
- Burrows, R.M. Rutledge, H., Bond, N., Eberhard, S., Auhl, A., Andersen, M.S., Valdez, D. & Kennard, M. (2017) "High rates of organic carbon processing in the hyporheic zone of intermittent streams", *Scientific Reports* 7, article number: 13198.
- Iverach, C.P., Cendón, D.I., Meredith, K.T., Wilcken, K.M., Hankin, S.I., Andersen, M.S. & Kelly, B.F.J. (2017) "A multi-tracer approach to constraining artesian groundwater discharge into an alluvial aquifer", *Hydrology & Earth System Sciences* 21, 5953-5969.
- Cuthbert, M.O., Acworth, R.I., Andersen, M.S., Larsen, J., McCallum, A., Rau, G.C. & Tellam, J.H. (2016) "Understanding and quantifying focused, indirect groundwater recharge from ephemeral streams using water table fluctuations", *Water Resources Research* 52, 827-840.
- Halloran, L.J.S., Roshan, H., Rau, G.C., Andersen, M.S. & Acworth, R.I (2016) "Improved spatial analysis of streambed vertical thermal regime and fluxes using coiled fibre-optic distributed temperature sensing", *Hydrological Processes* 30, 2686–2702.
- Nagra, G., Treble, P.C., Andersen, M.S., Fairchild, I.J., Coleborn, K. & Baker, A. (2016) "A post-wildfire response in cave dripwater chemistry", *Hydrology & Earth System Sciences* 20, 2745-2758.
- Turner, I.L., Rau, G.C., Austin, M.J., & Andersen, M.S. (2016) "Groundwater fluxes and flow paths within coastal barriers: observations from a large-scale laboratory experiment (BARDEX II)", *Coastal Engineering* 113, 104–116.
- Halloran, L.J.S., Rau, G.C. & Andersen, M.S. (2016) "Heat as a tracer to quantify processes and properties in the vadose zone: A review", *Earth-Science Reviews* 159, 358-373.
- Bryan, E., Meredith, K.T., Baker, A., Post, V.E. & Andersen, M.S. (2016) "Island groundwater resources, impacts of abstraction and a drying climate: Rottnest Island, Western Australia", *Journal of Hydrology* 542, 704–718.