

Curriculum Vitae

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Date of birth: 13.07.1964
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Academic qualifications

Dr. ing. (PhD) 2002 in engineering geology, Dept. of Geology and Mineral Resources Engineering, Norwegian University of Science and Technology (NTNU), Trondheim, Norway.

Siv.ing. (MSc) 1990 from Univ. of Trondheim, the Norwegian Institute of Technology, NTH.

Education

Norwegian University of Science and Technology, Faculty of Applied Earth Sciences 1997-2001. Dr.ing. thesis "Groundwater quality of crystalline bedrock aquifers in Norway".

University of Trondheim, the Norwegian Institute of Technology, NTH. Department of Geology and Mineral Resources Engineering, 1985-90. Diploma thesis "Hydrogeological investigations at Gåsbakken, Melhus kommune" [in Norwegian].

Officer school for Army Medical Corps with one year of practical work as a sergeant 1983-85.

Chr. August High School, Natural science, 1981-83.

Employment

2017-ongoing	Professor in engineering geology, Dept. of Geosciences and Petroleum, Norwegian University of Science and Technology (NTNU)
2015-2017	Manager owner, SERES AS
2012-2014	Senior hydrogeologist at Geological Survey of Norway (NGU) Groundwater and Urban Geology Team.
2007-2012	Team leader. Groundwater Team at NGU
2002-2007:	Senior hydrogeologist at NGU Geochemistry and Hydrogeology Section.
1997-2001:	Dr.ing. candidate at the Norwegian University of Science and Technology (NTNU) with a University scholarship.
May 1996-Sept 1997:	Hydrogeologist at NGU , Geochemistry and Hydrogeology Section.
Spring 1996:	Consultant at O.T. Blindheim AS .
Autumn 1995:	Consultant at NGU .
1991-1995	Research assistant and assistant professor at the Norwegian Institute of Technology (NTH) , Department of Geology and Mineral Resources
Summer 1993-1995:	Consultant for University Courses on Svalbard, UNIS .

Academic experience

Currently main supervisor for three PhD students and five master students: Has been co-supervisor for two fulfilled PhD-student and supervisor or co-supervisor for 22 Master students at NTNU and UiB. Has been opponent for one PhD student at UiO and external examiner for several master students at NTNU, UiB, UiO and USN. Author or co-author of 36 scientific papers in international journals, four book chapters, 12 conference proceedings, five popular science papers and more than 40 professional reports. Has given more than 100 talks and lectures and has been main organiser or co-organiser for seven national and international seminars and conferences. In addition, has carried out peer reviews for a range of scientific journals, for conferences and for the Slovenian Research Council.

Membership of Professional Organisations

International Association of Hydrogeologists (Secretary and treasurer Norw. Chapter 2003-06)
 International Association of Hydrological Sciences (Norwegian contact point ICGW 2011-14)
 Tekna (The Norwegian Society of Graduate Technical and Scientific Professionals)
 Norsk hydrologiråd (Board member 2009-13)
 Norwegian Geotechnical Society

Languages

Norwegian; mother tongue
 English; very good spoken and written

Expertise and experience in the following fields:

Engineering geology of soils
 Hydrogeology of bedrock- and unconsolidated Quaternary aquifers
 Assessment of groundwater resources for exploitation and energy extraction
 Ground source energy
 Groundwater quality assessment including trace elements and radioactive elements
 Geochemical modelling and statistical analysis
 Baseline studies and long-term monitoring
 Regional and local-scale environmental geochemistry of surface media and groundwater,
 Low-temperature geochemical processes
 Onshore and offshore Quaternary geology

Selected reviewed scientific papers and conference proceedings

Stenvik, L.A., Gjengedal, S., Ramstad, R.K. & Frengstad, B.S. (in press) How to avoid gas clogging in groundwater heat pump systems: A case study from the Lena terrasse system in Melhus, Norway. Bulletin of Engineering Geology and the Environment
 Stenvik, L.A., Gjengedal, S., Ramstad, R.K. & Frengstad, B.S. (2022) Hydrochemical and biotic control on iron incrustations in groundwater heat pump systems: Case study from a saline, anoxic aquifer in Melhus, Norway. Geothermics 100, <https://doi.org/10.1016/j.geothermics.2022.102349>, 10 pp.

- Pajak, L., Sowizdzal, A., Gładysz, P., Tomaszewska, B., Miecznik, M., Andresen, T., Frengstad, B.S., Chmielowska, A. (2021) Multi-Criteria Studies and Assessment Supporting the Selection of Locations and Technologies Used in CO₂-EGS Systems. *Energies* 2021, 14, 7683. <https://doi.org/10.3390/en14227683>.
- Gjengedal, S., Stenvik, L.A., Ramstad, R.K., Ulfnes, J.I., Hilmo, B.O., Frengstad, B.S. (2020) Online remote-controlled and cost-effective fouling and clogging surveillance of a groundwater heat pump system A case study from Lena Terrace in Melhus, Norway. *Bulletin of Engineering Geology and the Environment* <https://doi.org/10.1007/s10064-020-01963-z>, 10 pp.
- Gjengedal, S., Brøtan, V., Buset, O.T., Larsen, E., Berg, O.Å., Torsæter, O., Ramstad, R.K., Hilmo, B.O., Frengstad, B.S. (2020) Fluid flow through 3D-printed particle beds: a new technique for understanding, validating, and improving predictability of permeability from empirical equations. *Transport in Porous Media* 134, 1–40. <https://doi.org/10.1007/s11242-020-01432-x>
- Gjengedal, S., Stenvik, L.A., Storli, P.T.S., Ramstad, R.K., Hilmo, B.O., Frengstad, B.S. (2019) Design of Groundwater Heat Pump Systems. Principles, Tools, and Strategies for Controlling Gas and Precipitation Problems. *Energies* 12, 3657; doi:10.3390/en12193657, 20 pp.
- Gjengedal, S., Ramstad, R.K., Hilmo, B.O., Frengstad, B.S. (2019) Fouling and clogging surveillance in open loop GSHP systems. A systematic procedure for fouling and clogging detection in the whole groundwater circuit. *Bulletin of Engineering Geology and the Environment* <https://doi.org/10.1007/s10064-019-01556-5>, 14 pp.
- Skarphagen, H., Banks, D., Frengstad, B.S. and Gether, H. (2019) Design Considerations for Borehole Thermal Energy Storage (BTES) – A review with Emphasis on Convective Heat Transfer. *Geofluids special issue: Thermal Uses of Ground and Groundwaters: Ground and Aquifers for Thermal Energy Uses and Heat Storage Purposes*. Article ID 4961781, <https://doi.org/10.1155/2019/4961781>, 26 pp.
- Bottrell, S., Hipkins, E.V., Lane, J., Zegosa, R.A., Banks, D., Frengstad, B.S.: Carbon-13 in groundwater from English and Norwegian crystalline rock aquifers: a tool for deducing the origin of alkalinity? *Sustainable Water Resources Management*.
- Dutova, E.M., Nikitenkov, A.N., Pokrovskiy, V.D., Banks, D., Frengstad, B.S., Parnachev, V.P.: Modelling of the dissolution and reprecipitation of uranium under oxidising conditions in the zone of shallow groundwater circulation. *Journal of Environmental Radioactivity* 178-179, 2017.
- Flem, B., Reimann, C., Birke, M., Banks, D., Filzmoser, P. & Frengstad, B.: Inorganic chemical quality of European tap-water: 2. Geographical distribution. *Applied Geochemistry* 59, 211-224, 2015.
- Ramstad, R.K., Midttømme, K., Liebel, H.T., Frengstad, B.S. Willemoes-Wissing, B.: Thermal conductivity map of the Oslo region based on thermal diffusivity measurements of rock core samples. *Bulletin of Engineering Geology and the Environment* 74/4, 275-1286, 2015.
- Frengstad, B.S. & Banks, D.: Uranium distribution in groundwater from fractured crystalline aquifers in Norway. In: Sharp, J.M. Jr. (Ed.) *Fractured Rock Hydrogeology*. International Association of Hydrogeologists Selected Papers 20. CRC Press/Balkema, 383 pp, 2014.
- Liebel H. T., de Beer, J., Frengstad, B.S, Ramstad, K.R. & Brattli, B. (2012) Effect of water yield and rock core thermal conductivities on TRT results. *Comunicações Geológicas* 99/1.
- Liebel H. T., Huber, K., Frengstad, B.S, Ramstad, K.R. & Brattli, B. (2012) Thermal response testing of a fractured hard rock aquifer with and without induced groundwater flow. *Bulletin of Engineering Geology and the Environment*. 71/3, 435-445.
- Liebel H. T., Stølen, M.S., Frengstad, B.S, Ramstad, K.R. & Brattli, B. (2012) Insights into the reliability of different thermal conductivity measurement techniques: a thermo-geological study in Mære (Norway). *Bulletin of Engineering Geology and Environment* 71/2, 235-243.
- Liebel H. T., Huber, K., Frengstad, B.S, Ramstad, K.R. & Brattli, B. (2011) Temperature footprints of a thermal response test can help to reveal important thermogeological information. *Norges geologiske undersøkelse Bulletin* 451, 20-31.
- Frengstad, B.S., Lax, K., Tarvainen, T., Jæger, Ø. & Wigum, B. (2010) The chemistry of bottled mineral and spring waters from Norway, Sweden, Finland, and Iceland. *Journal of Geochemical Exploration* 107, 350-361.
- Karnachuk, O.V., Gerasimchuk, A.L., Banks, D., Frengstad, B., Stykon, G.A., Tikhonova, Z.L., Kaksonen, A., Puhakka, J., Yanenko, A.S. & Pimenov, N.V. (2009) Bacteria of the sulphur cycle in the sediments of gold mine tailings, Kuznetsk Basin, Russia. *Microbiology*, 78 (4), 483–491.
- Frengstad, B. & Banks, D. (2008). The Natural Inorganic Chemical Quality of Crystalline Bedrock Groundwaters of Norway. In: Edmunds, W.M. & Shand, P. (Ed.) *The Natural Baseline Quality of Groundwater in Europe*, s.421-440. Blackwell Publishing.
- Reimann, C., Grimstvedt, A., Frengstad, B. & Finne, T.E. (2007) White HDPE bottles as source of contamination of water samples with Ba and Zn. *Science of the Total Environment* 374, 292-296.
- Frengstad, B. & Banks, D. (2007) Universal controls on the evolution of groundwater chemistry in crystalline bedrock: the evidence from empirical and theoretical studies. In: Krasny, J. & Sharp, J.M. *Groundwater in fractured rocks*. IAH Special Publication.

- Jæger, Ø., Grimstvedt, A., Frengstad, B. & Reimann, C. (2006) Groundwater contamination from well points – An experience from the Norwegian groundwater monitoring network. *Science of the Total Environment* 367, 437-440.
- Banks, D. & Frengstad, B. (2006) Evolution of groundwater chemical composition by plagioclase hydrolysis in Norwegian anorthosites. *Geochimica et Cosmochimica Acta* 70, 1337-1355.
- Banks, D., Morland, G. & Frengstad, B. (2005) Use of non-parametric statistics as a tool for the hydraulic and hydrochemical characterization of hard rock aquifers. *Scottish Journal of Geology* 41, 69-79.
- Banks, D., Parnachev, V.P., Frengstad, B., Holden, W., Karnachuk, O.V. & Vedernikov, A.A. (2004) The evolution of alkaline, saline ground- and surface waters in the southern Siberian steppes. *Applied Geochemistry* 19, 1905-1926.
- Frengstad, B. & Banks, D. (2003) Groundwater chemistry related to depth of shallow crystalline bedrock boreholes in Norway. In: Krásný et al. (Eds.) *Proceedings of the International Conference on Groundwater in Fractured Rocks. Extended abstracts.*, Prague, Czech Republic. IHP-VI, Series on groundwater 7, 203-204.
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- Reimann, C., Bjorvatn, K., Frengstad, B., Melaku, Z., Tekle-Haimanot, R. & Siewers, U. (2003) Drinking water quality in the Ethiopian section of the East African Rift Valley I – data and health aspects. *The Science of the Total Environment* 311, 65-80.
- Frengstad, B., Skrede, A.K., Krog, J.R., Strand, T., Lind, B., & Banks, D. (2002) Radon in Potable Groundwater: Examples from Norway. In: Bølviken, B (Ed) *Natural Ionizing Radiation and Health. Proceedings from a symposium held at the Norwegian Academy of Science and Letters, Oslo 6-7 June 2001.* Det Norske Videnskaps-Akademi, 27-38.
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