Deep submarine groundwater discharge indicated by chloride anomalies in the sediment pore water in the Gulf of Gdańsk, southern Baltic Sea.

Beata Szymczycha, Żaneta Kłostowska, Karol Kuliński, Aleksandra Winogradow, Jaromir Jakacki, Zygmunt Klusek, Aleksandra Brodecka-Goluch, Bożena Graca, Marcin Stokowski, Katarzyna Koziorowska, Daniel Rak

2nd Baltic Earth Conference
The Baltic Sea Region in Transition
Helsingor, Denmark, 11 to 15 June 2018
Submarine groundwater discharge (definition, sources, driving forces)
SGD source of:
1. Freshwater
2. Chemical substances (nutrients, dissolved carbon, metals, isotopes)

Knee i Payton, 2011
Parsons i in. 2008
Moosdorf and Oehler 2017
SGD impact on coastal sites:

The Effect of Submarine Groundwater Discharge on the Ocean

Willard S. Moore

Department of Earth and Ocean Sciences, University of South Carolina, Columbia, South Carolina 29208; email: moore@geol.sc.edu

Chapter 10: Nutrient and other environmental controls of harmful cyanobacterial blooms along the freshwater–marine continuum

Hans Paerl

University of North Carolina at Chapel Hill, Institute of Marine Sciences, Morehead City, NC 28557 (hpaerl@email.unc.edu)

Influence of fresh water, nutrients and DOC in two submarine-groundwater-fed estuaries on the west of Ireland

Aiden M. Smith a, Rachel R. Cove

National University of Ireland, Galway, Ireland

Influence of trace element fluxes from submarine groundwater discharge (SGD) on their inventories in coastal waters off volcanic island, Jeju, Korea

Jaein Jeong a, Seokbom Kim a, Seonghun Han a

a School of Earth and Environmental Sciences, Jeju National University, Jeju Island, Republic of Korea

b Culture of Environment and Engineering, Sunchon National University, Sunchon, Republic of Korea
SGD impact on the Baltic Sea coastal sites:

**Biogeochemical impact of submarine ground water discharge on coastal surface sands of the southern Baltic Sea**

Daphne Donis, Felix Janssen, Bo Liu, Frank Wenzhöfer, Olaf Dellwig, Peter Escher, Alejandro Spitzy, Michael E. Böttcher

**Nutrient fluxes via submarine groundwater discharge to the Bay of Puck, southern Baltic Sea**

Beata Szymczycha, Susanna Vogler, Janusz Pempskiwak

Spatial distribution and budget for submarine groundwater discharge to the Bay (Western Baltic Sea)

Michael Schlüster and Eberhard J. Santer

Alfred-Wegener-Institut, Am Handelskanal, D-27515 Bremenhaven, Germany

Class E. Andersen and Henning Dahlgaard

Riso National Laboratory, Frederiksborgvej 399, PO. Box 49, DK-4000 Roskilde

Paul R. Dando

School of Ocean Sciences, University of Wales–Bangor, Isle of Anglesey LL59 5AB, Great Britain
SGD impact on coastal sites:

Schlüter et al. 2004
Methane occurrence in marine sediments

Egger et al. 2018
Methane occurrence in Baltic Sea Sediments

Brodecka et al. 2013
Characterization of the area

Table 1

<table>
<thead>
<tr>
<th>Station</th>
<th>Region</th>
<th>Coordinates</th>
<th>Depth (m)</th>
<th>Bottom water oxygen (mg dm$^{-3}$)</th>
<th>Sediment moisture (%)</th>
<th>Organic matter (%)</th>
<th>LAR (mm year$^{-1}$)</th>
<th>SAR (gm$^{-2}$year$^{-1}$)</th>
<th>$^{210}$Po$_{aq}$ inventory (Bq m$^{-2}$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Gulf of</td>
<td>54°30'</td>
<td>68</td>
<td>1.09</td>
<td>53.1–86.2</td>
<td>5.2–20.3</td>
<td>3.8 (r$^2 = 0.81$)</td>
<td>1424 (r$^2 = 0.88$)</td>
<td>1.03 (r$^2 = 0.97$)</td>
</tr>
<tr>
<td></td>
<td>Gdańsk</td>
<td>19°03'</td>
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<td></td>
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<tr>
<td>2</td>
<td>Gulf of</td>
<td>54°38'</td>
<td>81</td>
<td>9.15</td>
<td>59.3–93.2</td>
<td>7.4–24.5</td>
<td>5.5 (r$^2 = 0.96$)</td>
<td>1502 (r$^2 = 0.96$)</td>
<td>2.31 (r$^2 = 0.94$)</td>
</tr>
<tr>
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<td>Gdańsk</td>
<td>19°01'</td>
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<tr>
<td>3</td>
<td>Gulf of</td>
<td>54°37'</td>
<td>84</td>
<td>3.20</td>
<td>64.3–89.2</td>
<td>9.5–24.3</td>
<td>3.3 (r$^2 = 0.92$)</td>
<td>883 (r$^2 = 0.94$)</td>
<td>1.41 (r$^2 = 0.96$)</td>
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<td>19°08'</td>
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<tr>
<td>4</td>
<td>Gulf of</td>
<td>54°39'</td>
<td>92</td>
<td>1.36</td>
<td>71.5–89.1</td>
<td>12.2–21.9</td>
<td>3.1 (r$^2 = 0.90$)</td>
<td>536 (r$^2 = 0.97$)</td>
<td>0.64 (r$^2 = 0.96$)</td>
</tr>
<tr>
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<td>Gdańsk</td>
<td>19°13'</td>
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<tr>
<td>5</td>
<td>Gdańsk</td>
<td>54°50'</td>
<td>112</td>
<td>0.58</td>
<td>73.2–90.1</td>
<td>10.2–27.4</td>
<td>1.9 (r$^2 = 0.94$)</td>
<td>272 (r$^2 = 0.96$)</td>
<td>0.69 (r$^2 = 0.96$)</td>
</tr>
<tr>
<td></td>
<td>Basin</td>
<td>19°15'</td>
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<td></td>
<td></td>
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</tr>
<tr>
<td>6</td>
<td>Gdańsk</td>
<td>54°50'</td>
<td>110</td>
<td>0.62</td>
<td>65.1–81.7</td>
<td>10.1–18.1</td>
<td>0.72 ± 0.06 (r$^2 = 0.98$)</td>
<td>153 ± 14 (r$^2 = 0.99$)</td>
<td>0.46 (r$^2 = 0.99$)</td>
</tr>
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<td>Basin</td>
<td>19°07'</td>
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<td></td>
<td></td>
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</tr>
</tbody>
</table>

Zaborska 2014
Why methane
Fresh and saline groundwater discharge to the ocean: A regional perspective

Alicia M. Wilson
Department of Geological Sciences, University of South Carolina, Columbia, South Carolina, USA
Received 7 June 2006; revised 2 November 2006; accepted 13 December 2006; published 16 February 2007.

Studies of groundwater flow in coastal aquifers often focus strongly on freshwater and investigate flow in a narrow (<5 km) zone surrounding the coastline. This work was designed to place coastal flow in a regional context and to compare fresh and saline groundwater discharge (SGD) for regional flow systems. Numerical flow and transport models were developed to estimate SGD associated with topography-driven flow, seawater recirculation, and geothermal convection in a passive margin setting. Simulations were based on two cross sections of North Carolina, and sensitivity studies were used to explore the impact of varying hydraulic and transport parameters. Results suggest that saline flow associated with seawater recirculation and geothermal convection should be considered in studies of SGD. Studies limited to shallow topography-driven flow may be justified in using small study areas, but flow systems contributing to at least 20 km surrounding the coast and continental slope.


Periodical changes of submarine fluid discharge from a deep seafloor, Suiyo Sea Mountain, Japan

Makoto Taniguchi1, Shingo Uchida2, and Masataka Kinoshita3
Received 9 June 2003; revised 21 July 2003; accepted 5 August 2003; published 16 September 2003.

Understanding steady-state Deep Submarine Groundwater Discharge: a case study in Northern Israel

Anner Paldi (1,2), Einat Aharonov (1), and Oded Katz (2)
(1) Hebrew University, Jerusalem, Israel. (2) Geological Survey of Israel.
Sampling
Aarhus Bay, Baltic Sea
Egger et al. 2017
US5B, Bothnian Sea at 214 m
Egger et al. 2014
This study: bottom water 18000 [nM] CH₄

Jakobs et al. 2014
Thank you for your attention 😊