

# Daily Programme of SaltMech X

## Tuesday 5 July 2022

13.00	-		h	Access for sponsors to set up stand for market (Minnaert Building)
15.00	-		h	Registration open (Koningsberger Building), posters can be put up
16.00	-	17.00	h	Lab tours of the <i>High Pressure and Temperature Laboratory</i>
17.00	-	19.00	h	Ice-breaker, Sponsors Market and Posters on display

## Wednesday 6 July 2022

8.30	-	8.50	h	Opening of SaltMech X by the dean of Geosciences Prof. Dr. Wilco Hazeleger and the organisation
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### *Theme 1: Microphysical processes and creep models*

**Chairs: Suzanne Hangx & Kristoff Svensson**

8.50	-	9.10	h	A new rock salt constitutive model with back stress and drag stress hardening <i>B. Reedlunn</i>
9.10	-	9.30	h	Microstructural evolution of glacier salt from the Kuh-e-Namak salt diapir, Iran <i>J. Schmitz, P. Závada &amp; J.L. Urai</i>
9.30	-	9.50	h	Direct tomographic observation of brine percolation into MgO-shotcrete material <i>J.M. Kulenkampf</i>
9.50	-	10.10	h	<b>PICO talks</b> ('4-min-madness') 1. Mechanisms of dilatancy in rock salt at the grain-scale and implications for the dilatancy boundary <i>B.G.A. van Oosterhout, S.J.T. Hangx &amp; C.J. Spiers</i> 2. A review of frictional sliding on brine-penetrated faults in salt <i>A.R. Niemeijer, M. van den Ende, C. Marone, D. Elsworth &amp; C.J. Spiers</i> 3. A threshold stress for pressure solution creep in rock salt: Model predictions vs. observations <i>B.G.A. van Oosterhout, S.J.T. Hangx &amp; C.J. Spiers</i> 4. Effects of grain size distribution on the permeability of compacting aggregates: results from rock-analogue experiments and microphysical models <i>A.R. Niemeijer, D. Elsworth &amp; C. Marone</i>
10.10	-	10.30	h	Coffee Break, Sponsors Market and Poster Session

10.30	-	10.50	h	Microstructure and permeability of vein-bearing upper Permian anhydrite rock (Gorleben-Bank, Germany) <i>M. Mertineit, M. Schramm, H. Shao, B. Paul, J. Hesser, J. Hammer &amp; G. Zulauf</i>
10.50	-	11.10	h	Investigation of fluid transport in rock salt under repository-relevant conditions - the PeTroS project <i>C. Lüdeling, D. Naumann &amp; W. Minkley</i>
11.10	-	11.30	h	Crushed salt compaction – a new approach for lab test analysis, physical modeling and numerical simulation – Part 1: Development and validation <i>U. Düsterloh, S. Lerche &amp; N. Saruulbayar</i>
11.30	-	12.10	h	<b>PICO talks</b> ('4-min madness') 5. 4D microtomography of brine-assisted healing processes in deformation-damaged rock salt: A first look <i>Y. Ji, C.J. Spiers, S.J.T. Hangx, J.H.P. de Bresser &amp; M.R. Drury</i> 6. Interplay between flow and dissolution under stress in rock salt <i>S. Fu, K. Li, A.-C. Dieudonne, D. Bruhn, A. Pluymakers</i> 7. Creep behaviour of bischofite, carnallite and mixed bischofite-carnallite-halite salt rock at in-situ conditions <i>N. Muhammad, J.H.P. de Bresser, C.J. Peach &amp; C.J. Spiers</i> 8. Laboratory and numerical analysis for the simulation of crushed salt compaction behaviour <i>L. Friedenberg, S. Olivella &amp; U. Düsterloh</i> 9. Pilot plant tests to demonstrate the functionality of sealing systems made of salt cut bricks <i>U. Düsterloh, S. Lerche &amp; J. Zhao</i> 10. Modeling of the 3D stress state of typical salt formations <i>T.S. Baumann, B. Kaus, A. Popov, J.L. Urai</i> 11. Mechanism for the formation of sinkholes above deep salt caverns <i>W. Minkley, C. Lüdeling &amp; A. Taghichian</i> 12. Geomechanical analysis of oil storage caverns in salt domes with a low stress creep mechanism added to the M-D model <i>S.R. Sobolik &amp; T.S.A. Ross</i>  Brief introduction to EPOS-NL by R. Pijenburg
12.10	-	13.50	h	<b>Group photo (stairs of the Koningsberger Building) Lunch, Sponsors Market and Poster Session</b>

## Theme 2: Laboratory testing

**Chairs: Till Popp & Chris Spiers**

13.50	-	14.10	h	Insights from an experimental campaign on rock salt and implications at the cavern scale <i>L. Blanco-Martin, M. Azabou, A. Rouabhi, F. Hadj-Hassen &amp; G. Hévin</i>
14.10	-	14.30	h	WEIMOS: Creep of rock salt at low deviatoric stresses

			<i>C. Lüdeling, R.-M Günther, A. Hampel, J. Sun-Kurczinski, R. Wolters, U. Düsterloh, K.-H. Lux, S. Yildirim, D. Zapf, S. Wacker, I. Epkenhans, J. Stahlmann &amp; B. Reedlunn</i>
14.30	-	14.50	h A composite flow law for wet polycrystalline halite to capture the transition from dislocation creep to solution-precipitation creep <i>N. Muhammad, J.H.P. de Bresser, C.J. Peach &amp; C.J. Spiers</i>
14.50	-	15.10	h Flat-bedded rock salt – a mechanically anisotropic material? <i>I. Epkenhans, V. Mintzloff, S. Fachinger, S. Wacker, E. Daumlechner &amp; J. Stahlmann</i>
<b>15.10</b>	-	<b>15.30</b>	<b>h Coffee Break, Sponsors Market and Poster Session</b>
15.30	-	15.50	h WEIMOS: Shear behaviors of bedded salt clay seams and their impact on disposal room porosity <i>S.R Sobolik, C. Vignes, S. Buchholz, E. Keffeler &amp; B. Reedlunn</i>
15.50	-	16.10	h Rate-dependent behaviour of fracture propagation in salt rock <i>A. Escanellas, E. Cámara, J. Liaudat &amp; I. Carol</i>
16.10	-	16.30	h WEIMOS: Laboratory investigation and numerical simulation of damage reduction in rock salt <i>R. Wolters, J.Q. Sun-Kurczinski, U. Düsterloh, K.-H. Lux, R.-M Günther, C. Lüdeling, A. Hampel, S. Yildirim, D. Zapf, S. Wacker, I. Epkenhans, J. Stahlmann &amp; B. Reedlunn</i>
<b>16.30</b>	-	<b>16.50</b>	<b>h Discussion</b>
<b>16.50</b>	-	<b>17.00</b>	<b>h Move to TNO building (Princetonlaan 8)</b>
<b>17.00</b>	-	<b>18.30</b>	<b>h Social event hosted by TNO (Geological Survey and Geosciences Research)</b>

## Thursday 7 July 2022

### Theme 3: Geological isolation systems and geotechnical barriers

**Chairs: Laura Blanco-Martin & Tuanny Cajuhi**

8.30		8.50	h Evaluation of current knowledge for building the Safety Case for salt-based repositories <i>J. Grupa, T. Schröder, K. Browning &amp; A. Poley</i>
8.50	-	9.10	h Disposal of radioactive waste in rock salt: long-term research programme <i>J. Bartol &amp; M. Vuorio</i>
9.10	-	9.30	h Influence of selected model parameters for integrity analysis of disposal of heat-generating waste in bedded salt <i>W. Liu, R. Eickemeier &amp; J. Thiedau</i>
9.30	-	9.50	h Hydromechanical integrity of HAW-repositories in bedded and domal salt - Commonalities and differences as implications for a site selection process in Germany <i>T. Popp, R.-M. Günther &amp; D. Naumann</i>

9.50	-	10.10	h	Derivation of a non-local criterion to assess functionality and robustness of rock salt barrier <i>M. Rahmig, C. Lerch, N. Müller-Hoeppe, M. Polster, T. Schröpfer &amp; B. Stielow</i>
<b>10.10</b>	-	<b>10.30</b>	<b>h</b>	<b>Coffee Break, Sponsors Market and Poster Session</b>
10.30	-	10.50	h	Design and performance assessment of engineered barrier systems in a salt repository for HLW/SNF <i>E. Simo, E.N. Matteo, K.L. Kuhlman, R.S. Jayne, P.L. Vargas, P. Herold, A. Lommerzheim &amp; A. Keller</i>
10.50	-	11.10	h	Compaction of crushed salt for safe containment – Overview of phase 2 of the KOMPASS project <i>L. Friedenberq, J. Bartol, J. Bean, O. Czaikowski, U. Düsterloh, A. Gartzke, S. Hangx, B. Laurich, C. Lerch, S. Lerche, J. Lippmann-Pipke, W. Liu, C. Lüdeling, M. Mills, N. Müller-Hoeppe, T. Popp, O. Rabbel, M. Rahmig, B. Reedlunn, C. Rölke, C. Spiers, K. Svensson, J. Thiedau, B. van Oosterhout, K. Zemke &amp; J. Zhao</i>
11.10	-	11.30	h	Crushed salt compaction – a new approach for lab test analysis, physical modeling and numerical simulation – Part 2: Numerical application <i>U. Düsterloh, S. Lerche &amp; N. Saruulbayar</i>

#### **Theme 4: Analytical and numerical modelling**

**Chairs: Boris Kaus & Karl-Heinz Lux**

11.30	-	11.50	h	Deformation patterns in the mechanically stratified evaporites over an active basement fault <i>M. Adamuszek &amp; M. Dabrowski</i>
11.50	-	12.10	h	Influence of THM process coupling and constitutive models on the simulated evolution of deep salt formations during glaciation <i>F. Zill, W. Wang &amp; T. Nagel</i>
<b>12.10</b>	-	<b>13.50</b>	<b>h</b>	<b>Lunch, Sponsors Market and Poster Session</b>
13.50	-	14.10	h	Unexpected features of salt cavern behaviour <i>E. Gordelij &amp; P. Bérest</i>
14.10	-	14.30	h	Single-cavern convergence for an Ellis 2-branch power-law model <i>P.A. Fokker &amp; J.N. Breunese</i>
14.30	-	14.50	h	Modeling the behavior of underground structures in a rock salt formation: a coupled finite element approach <i>T.A. Bui, G. Cammarata, V.C. Kancharla &amp; S. Brasile</i>
14.50	-	15.10	h	Influence of pressure solution and evaporate heterogeneity on the geo-mechanical behavior of salt caverns <i>K.R. Kumar &amp; H. Hajibeygi</i>
<b>15.10</b>	-	<b>15.30</b>	<b>h</b>	<b>Coffee Break, Sponsor Market and Poster Session</b>

**Chairs: Marta Amaduszek & Ben Reedlunn**

15.30	-	15.50	h	WEIMOS: Simulations of two geomechanical scenarios in rock salt resembling structures at WIPP <i>A. Hampel, C. Lüdeling, R.-M. Günther, J.Q. Sun-Kurczinski, R. Wolters, U. Düsterloh, K.-H Lux, S. Yildirim, D. Zapf, S. Wacker, I. Epkenhans, J. Stahlmann &amp; B. Reedlunn</i>
15.50	-	16.10	h	Investigation of the impact of an additional monitoring level above the disposal level in a radioactive waste repository in rock salt <i>J.A. Othmer, J. Feierabend, K.-H. Lux &amp; R. Wolters</i>
16.10	-	16.30	h	Analyzing field data from the brine availability test in salt (BATS): A high-resolution 3D numerical study <i>R.S.J. Jayne &amp; K.L. Kuhlman</i>
16.30	-	16.50	h	Preliminary study on thermomechanical modeling for correlation with microacoustic measurements in the Morsleben repository <i>T. Cajuhi, R. Eickemeier, S. Fahland, J. Thiedau, D. Kaiser &amp; L. Ceranna</i>
16.50	-	17.10	h	<b>Assembly for touring busses to conference dinner location.</b> Note! The mini-busses will also be picking up dinner companions at Mitland beforehand (~16.30h)
18.00	-		h	<b>Dinner on paddle boat 'Kapitein Kok' boating around the IJ in Amsterdam</b> All attendees will be brought back to Hotel Mitland at the end of the evening

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## Friday 8 July 2022

### Theme 5: Monitoring and site-specific studies

**Chairs: Peter Fokker & Janos Urai**

8.30	-	8.50	h	Progress in the geoscientific exploration of the Asse salt structure as a base for the construction of a new mine for the retrieval of radioactive waste from the Asse II mine <i>L. Pollok, A. Saßnowski, M. Henneberg, M. Pusch, V. Gundelach, T. Thiemeyer, T. Beilecke &amp; R. Holländer</i>
8.50	-	9.10	h	Development of comprehensive 3D-models for geomechanical stability proof of the operation phase and the planned radioactive waste retrieval in the Asse II mine <i>W.-P. Kamlot, J. Kupper, R.-M. Günther, G. Gärtner &amp; F. Manthee</i>
9.10	-	9.30	h	Field evidence of salt fracturing and healing in a MgCl <sub>2</sub> cavern field <i>P. Fokker, A.J. Smit &amp; A. Barth</i>
9.30	-	9.50	h	In-situ analysis of cavern convergence and closure in a complex geological and operational setting <i>M. Wippich, K. Künzel, S. Meyer &amp; D. Zander-Schiebenhöfer</i>
9.50	-	10.10	h	Storage of Production Brine in Potash Mine Rooms: Investigation of Rock Mechanical Feasibility <i>J.-P. Schleinig, M. Nest, R.-M. Günther, M. Günther, H. Zienert &amp; S. Deppe</i>
10.10	-	10.30	h	<b>Coffee Break, Sponsors Market and Poster Session</b>

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## Theme 6: Cavern and borehole abandonment and integrity

**Chairs: Christoph Lüdeling & Steven Sobolik**

10.30	-	10.50	h	Finite element modeling of natural sealing of wellbores in salt using advanced, laboratory-based salt creep laws <i>L. Buijze, J. ter Heege &amp; B. Wassing</i>
10.50	-	11.10	h	Integrity of the geological formation barrier - A comprehensive approach for the assessment of salt caverns <i>A. Raith, S. Wille, B. Horváth &amp; D. Zander-Schiebenhöfer</i>
11.10	-	11.30	h	Development of surface deformations above salt caverns depending on the abandonment scenario <i>R. Buzoqany, D. Zander-Schiebenhöfer, E. Wijermars &amp; M. den Hartogh</i>
11.30	-	11.50	h	CCC - Integrated multiscale study of salt cavern abandonment in the Netherlands <i>T.S. Baumann, P. Bérest, B. Brouard, M. ter Braack, M. den Hartogh, B. Kaus, J. Klaver, P. Oonk, A. Popov, J. Schmatz, J.L. Urai &amp; E. Wijermars</i>
11.50	-	12.10	h	The influence of a threshold stress for pressure solution creep on cavern convergence and subsidence behavior – An FEM study <i>L.B. Hunfeld, J. Breunese &amp; B. Wassing</i>
12.10	-	13.50	h	<b>Lunch, Sponsors Market and Posters Session</b>

## Theme 7: Energy storage in salt caverns

**Chairs: Pierre Bérest & Matteo Gazzani**

13.50	-	14.10	h	Underground hydrogen storage in salt caverns in the Netherlands - Storage performance and implications for geomechanical stability <i>S.F. van Gessel, R.M. Groenenberg, J. Juez-Larré &amp; R.A.F. Dalman</i>
14.10	-	14.30	h	Modelling cyclic injection and withdrawal of gas for subsurface energy storage in salt caverns <i>B. Wassing, R. Groenenberg &amp; J. ter Heege</i>
14.30	-	14.50	h	Long-term operational stability analysis of underground storage in horizontal salt cavern with interlayer <i>J. Jiang, Z. Hou, K. Hou, W. Sun &amp; Y. Fang</i>
14.50	-	15.10	h	Energy storage in salt caverns with supercritical CO <sub>2</sub> <i>W. Minkley, M. Brandt, V. Dorstal &amp; J. Stepanek</i>
15.10	-	15.30	h	Numerical study of hydrogen storage cavern in thinly bedded rock salt, Anning, China <i>Y.F. Fang, Z. Hou, Y. Yue, Q. Chen &amp; J. Liu</i>
15.30	-	15.50	h	<b>Closure discussion of SaltMech X</b>