Supporting Information for

Multi-scale approach to (micro)porosity quantification in continental spring carbonate facies - Case study from the Cakmak quarry (Denizli, Turkey)

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Introduction

The Supplementary Information provides background on NMR methodology and more specifically on the comparison and integration of NMR measurements with two different types of devices, namely the Halbach instrument and the MOUSE® instrument, conducted ath the Institut für Technische und Makromelkulare Chemie (RWTH Aachen, Germany). To evaluate whether the two instruments recorded the same or different pore compartments, the shapes of the T_2 distribution curves for the same samples with the two instruments were quantified and compared. This is necessary for any further evaluation and integration of the results.

Text S1. Comparison Halbach and Mouse® NMR measurements

The T_2 distribution curves for the same samples with the two show the same structure of one or two modes, that were obtained from inverse laplace transforming the echo train. Though, the pattern is shifted with respect to each other for the two instruments (Fig.

S1). The shift of the principle (highest) mode 1 is systematic between the two instruments, supporting the dependence of T_{2eff} on the gradient as mentioned before (Table S1). The shift in position for the secondary (lower) mode 2 is more variable and this smaller mode 2 is often less pronounced in the Halbach measurements. The distance between mode 1 and 2 is smaller in the Halbach measurements, but the difference between the Halbach and MOUSE® measurements is rather consistent. The ratio of the amplitudes of mode 1 over mode 2 is slightly lower for the Halbach measurements and shows more variability.

The curve shape comparison for measurements with the two different instruments allows concluding that both instruments recorded the same pore compartments. The shift is attributed to the strong static gradient present in the NMR-MOUSE®; reducing the absolute values of the effective relaxation time T_{2eff} (Equation 3). In the following, the Halbach measurements will be combined with BET measurements for pore shape approximations. The echo decays of the MOUSE® measurements reflect better signal quality due to a better filling factor of the sensitive volume. They will be used for discussing the T_2 distribution results.

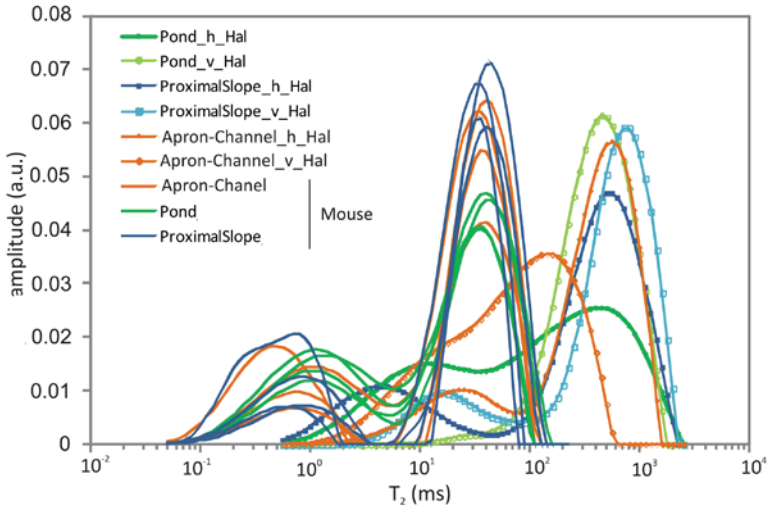

Figure S1: Comparison of NMR T_2 modal distributions from measurements with a Halbach (Hal) magnet and the NMR-MOUSE® instrument. For explanation on sample names Pond, Proximal Slop and Apron-Channel, please refer to the article text. v=vertical, h=horizontal plug orientation.

		Shape of Mode 1 (M1)			Shape of Mode 2 (M2)			Shape of the total curve		
sample	measurement	$\Delta\log_{(\text{mode max})}$	amplitude $M_{(H)}/M_{(Mo)}$	$\log_{(HWPM\,H)}/\log_{(HWPM\,Mo)}$	$\Delta\log_{(\text{mode max})}$	amplitude $M_{(H)}/M_{(Mo)}$	$\log_{(HWPM\,H)}/\log_{(HWPM\,Mo)}$	$\Delta max_{(H)}/\Delta max_{(Mo)}$	$(M1/M2)_H$ / $(M1/M2)_{Mo}$	$HWPM(M1/M2)_H/HWPM(M1/M2)_{Mo}$
Pond_h	l	1.10	1.30	0.63	1.40	0.14		0.81	(9,32)	
	s	1.05	1.34	0.64	1.45	0.12		0.76	(11,14)	
Pond_v	profile 1	1.15	1.52	0.61	1.40	0.09		0.83	(16,19)	
	profile 2	1.20	1.51	0.59	1.30	0.10		0.93	(15,13)	
Proximal	l	1.15	0.79	1.68	0.75	0.86	4.18	1.24	0.92	2.35
Slope_h	s	1.10	0.66	1.63	0.85	1.55	56.52	1.14	0.43	1.17
Proximal	profile 1	1.30	0.97	1.96	1.55	0.49	16.66	0.85	1.98	0.95
Slope_v	profile 2	1.30	0.88	1.85	1.45	1.40	6.89	0.91	0.63	1.07
Apron-Channel_h	l	1.15	0.88	1.62	1.50	1.04		0.79	0.84	
	s	1.20	1.03	1.65	1.75	0.55		0.71	1.87	
Apron-Channel_v	l	0.60	0.86		1.05	1.21		0.71	0.71	
	s	0.65	0.57		1.20	2.63		0.67	0.22	
	average	**1.08**	**1.02**	**1.29**	**1.30**	**0.85**		**0.86**	**0.95**	
	min	**0.60**	**0.57**	**0.59**	**0.75**	**0.09**		**0.67**	**0.22**	
	max	**1.30**	**1.52**	**1.96**	**1.75**	**2.63**		**1.24**	**1.98**	
	stdev	**0.23**	**0.32**	**0.58**	**0.29**	**0.77**		**0.17**	**0.64**	

Table S1: Comparison of the shape of the Halbach (H) and MOUSE® (Mo) T_2 distribution curves. h/v=horizontal /vertical miniplug, l/v=lying/standing position of the miniplugs. Mode 1 refers to the mode at longest T_2 times, mode 2 refers to the mode at shorter T_2 times. HWPM = Half-way peak maximum. Blank areas: value can not be determined.