T1 and T2 measurements across multiple 0.55 T MRI systems using open-source vendor-neutral sequences

SUPPORTING INFORMATION

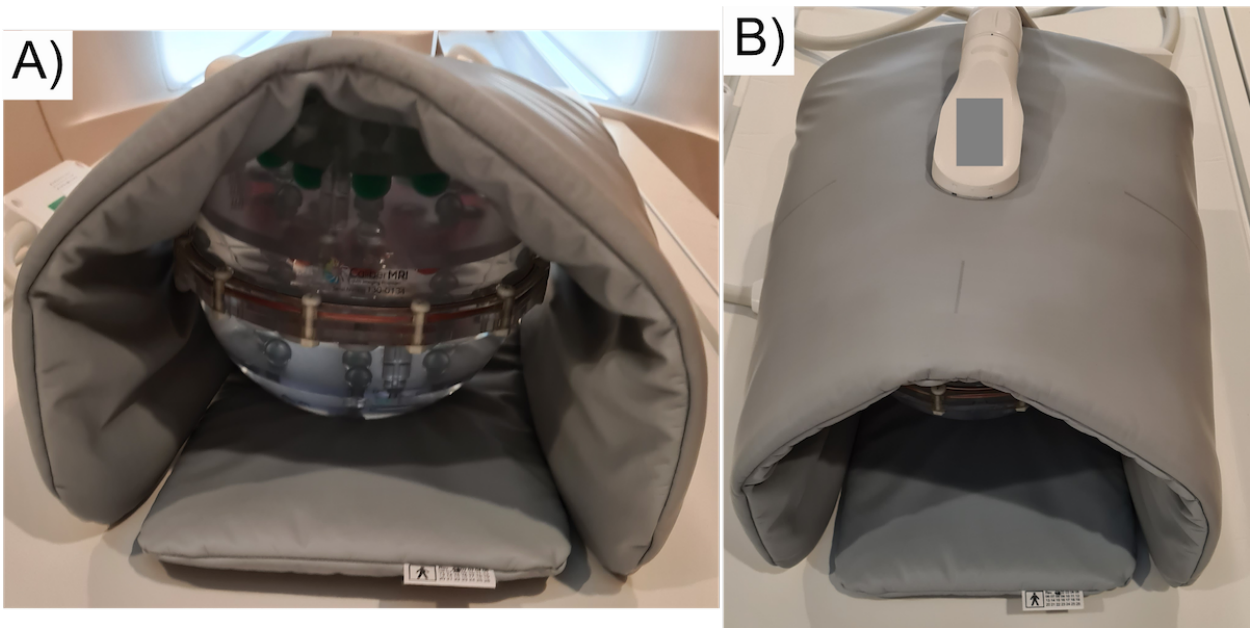


Figure S1:

Photos of the ISMRM/NIST system phantom prepared for imaging on a commercial 0.55 T system.

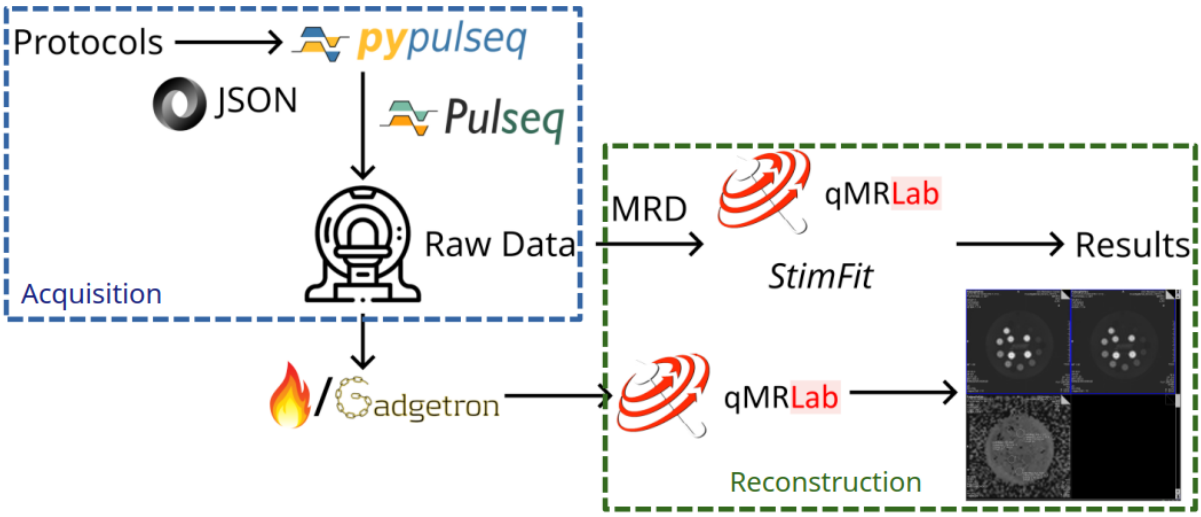


Figure S2:

Illustration of the T1 and T2 acquisition and reconstruction pipeline.

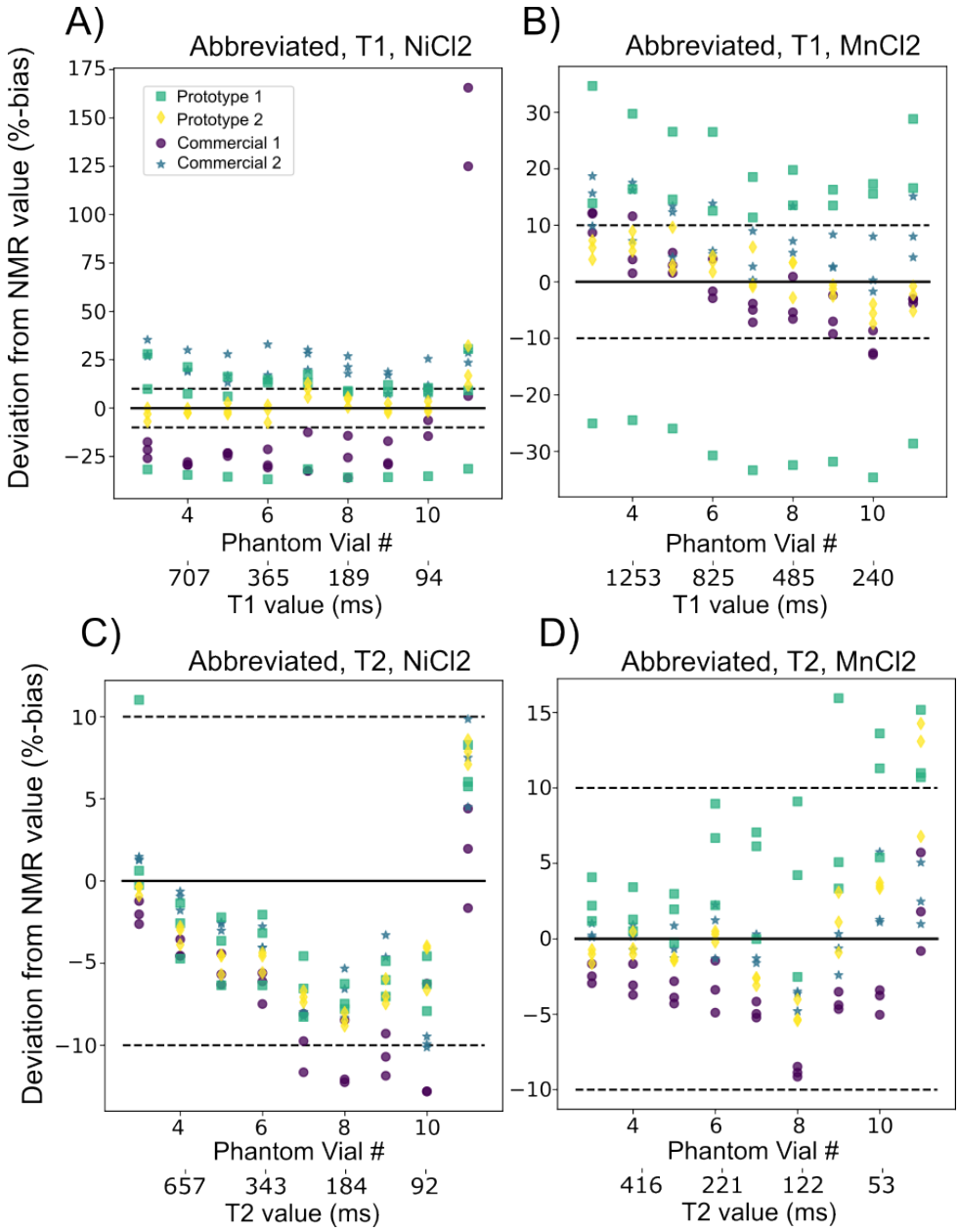


Figure S3:

Plot of the %-bias from the NMR-reference measurement for the T1 and T2 measurements via the 35-minute abbreviated protocols (VFA and MCSE) in the $NiCl_2$ and $MnCl_2$ arrays of the ISMRM/NIST system phantom. This plot shows the two outlier data points from Commercial system 1 on vial 11, which have greater than 100% deviation from the NMR value. These measurements were repeated three times on each system. The black solid line is 0 %-bias, and the dashed lines indicate +/- 10 %-bias.

Table S1 System phantom values at 0.55 T

NMR measured values for the T1 and T2 in ms of the $NiCl_2$ and $MnCl_2$ arrays of the ISMRM/NIST system phantom at 0.55 T. The reported value is the mean and standard deviation (in parentheses) at 20°C.

Vial	$NiCl_2$ - T1 (ms)	$NiCl_2$ - T2 (ms)	$MnCl_2$ - T1 (ms)	$MnCl_2$ - T2 (ms)
3	993.28 (1.22)	916.67 (2.45)	1548.78 (2.30)	593.85 (3.80)
4	707.44 (2.01)	656.66 (0.78)	1253.47 (4.44)	416.01 (0.33)
5	505.12 (2.10)	479.52 (1.24)	972.23 (0.44)	283.87 (0.27)
6	365.42 (1.69)	342.50 (1.04)	824.57 (7.50)	221.27 (0.33)
7	260.91 (0.11)	249.21 (1.50)	665.88 (0.12)	166.76 (0.17)
8	189.48 (0.25)	183.76 (0.22)	484.59 (1.76)	121.51 (0.32)
9	131.76 (0.14)	127.54 (0.25)	350.58 (2.24)	80.43 (0.30)
10	93.99 (0.16)	91.93 (0.13)	240.00 (1.01)	53.23 (0.12)
11	66.05 (0.18)	60.49 (0.08)	184.57 (0.61)	41.08 (0.14)

Table S2 Phantom measured B1

Measured B1 (relative to a desired flip angle of 1.0) of the $NiCl_2$ and $MnCl_2$ arrays of the ISMRM/NIST system phantom at 0.55 T. The mean B1 value and standard deviation are reported over the phantom slices used for the VFA-GRE measurement. Measurements are reported for the three repeated measures of the abbreviated protocol.

System	$NiCl_2$ array			$MnCl_2$ array		
Prototype 1	1.22 (0.26)	0.95 (0.19)	0.93 (0.18)	1.25 (0.21)	1.00 (0.16)	0.94 (0.16)
Prototype 2	0.74 (0.15)	0.73 (0.14)	0.67 (0.13)	1.02 (0.17)	1.02 (0.17)	1.01 (0.17)
Commercial 1	0.67 (0.13)	0.68 (0.13)	0.80 (0.17)	0.97 (0.17)	0.98 (0.17)	0.98 (0.17)
Commercial 2	0.80 (0.17)	0.84 (0.17)	0.79 (0.17)	0.87 (0.16)	0.91 (0.16)	0.91 (0.16)

Table S3 In vivo measured B1

Mean and standard deviation of the measured B1 value (relative to a desired flip angle of 1.0) in participants reported for each system. The participants are not the same across all systems.

Prototype 1	Prototype 2	Commercial 1	Commercial 2
0.97 (0.06)	0.96 (0.06)	0.96 (0.06)	0.97 (0.07)
0.96 (0.05)	0.97 (0.05)	0.95 (0.06)	0.96 (0.06)
0.98 (0.06)	0.97 (0.05)	0.96 (0.06)	0.95 (0.08)
0.97 (0.06)	0.97 (0.05)	0.95 (0.05)	0.94 (0.06)
0.98 (0.06)	0.98 (0.05)	0.97 (0.06)	0.96 (0.09)