This file provides information about the data set in the directory QIBA_T1_v02_beta1.

Two sets of images are provided. DICOM part 10 format images are in the DICOM directory. XML files are in the XML directory. The XML images allow the values for the DICOM tags to be altered using a text editor, and new DICOM images can then be generated using dcm4che's tool called "xml2dcm," available at http://www.dcm4che.org/confluence/display/d2/dcm4che2+DICOM+Toolkit.

The parameter used to generate this data is:

Repetition Time = 5 msecs

The test data is generated using several combinations of R1 and S0. R1 takes values of 0.0003536 through 0.0452548 ms^{-1} using a $\sqrt{2}$ progression. The values used in the set were: {0.0003536, 0.0005, 0.0007071, 0.001, 0.0014142, 0.002, 0.0028284, 0.004, 0.0056569, 0.008, 0.0113137, 0.016, 0.0226274, 0.032, 0.0452548} ms^{-1}. S0 takes values of {500, 1000, 2000, 5000, 10000, 20000, 50000}. The test data contains 10*10 pixels patches of each R1 and S0 combination. R1 values vary along the x direction. S0 varies along the y direction.

Simulated MR noise with a given noise level Sigma was added to all images. Noise was applied using the formula $A = \sqrt{(R + r1)^2 + (r2)^2}$ where *A* is output "actual" signal intensity with noise, *R* is the input "noiseless" signal intensity, and *r*1 and *r*2 are gaussian noise with mean 0 and SD sigma. Sigma values of 2, 5, 10, 20, 50, and 100 were used.

The signal intensity images were generated for the following different flip angles: 3, 6, 9, 15, 24, 35 degrees. The files in the zip folder have the following names:

filename	flip angle (in degrees)
fa3	3
fa6	6
fa9	9
fa15	15
fa24	24
fa35	35

The peak Signal Intensity for each flip angle is the top-left 75*10 pixels strip of the image. This strip also contains a label with the flip angle and sigma value. No information is in the top-right 75*10 pixels strip, so those pixels would have intensity values of 0 if no noise were added.

The following is a detailed list giving the specific R1, S0 combination used to generate each 10*10 patch. The x,y location specifies the coordinates of the upper-left corner of each patch.

x	y	R1	S0
0	10	0.0003536	500
0	20	0.0003536	1000
0	30	0.0003536	2000
0	40	0.0003536	5000
0	50	0.0003536	10000
0	60	0.0003536	20000
0	70	0.0003536	50000
10	10	0.0005	500
10	20	0.0005	1000
10	30	0.0005	2000
10	40	0.0005	5000
10	50	0.0005	10000
10	60	0.0005	20000
10	70	0.0005	50000
20	10	0.0007071	500

20	20	0.0007071	1000
20	30	0.0007071	2000
20	40	0.0007071	5000
20	50	0.0007071	10000
20	60	0.0007071	20000
20	70	0.0007071	50000
30	10	0.001	500
30	20	0.001	1000
30	30	0.001	2000
30	40	0.001	5000
30	50	0.001	10000
30	60	0.001	20000
30	70	0.001	50000
40	10	0.0014142	500
40	20	0.0014142	1000
40	30	0.0014142	2000
40	40	0.0014142	5000
40	50	0.0014142	10000
40	60	0.0014142	20000
40	70	0.0014142	50000
50	10	0.002	500
50	20	0.002	1000
50	30	0.002	2000
50	40	0.002	5000
50	50	0.002	10000
50	60	0.002	20000
50	70	0.002	50000
60	10	0.0028284	500
60	20	0.0028284	1000
60	30	0.0028284	2000
60	40	0.0028284	5000
60	50	0.0028284	10000
60	60	0.0028284	20000
60	70	0.0028284	50000
70	10	0.004	500
70	20	0.004	1000
70	30	0.004	2000
70	40	0.004	5000
70	50	0.004	10000
70	60	0.004	20000
70	70	0.004	50000
80	10	0.0056569	500
80	20	0.0056569	1000
80	30	0.0056569	2000
80	40	0.0056569	5000
80	50	0.0056569	10000
80	60	0.0056569	20000
80	70	0.0056569	50000
90	10	0.008	500
90	20	0.008	1000
90	30	0.008	2000
90	40	0.008	5000
90	50	0.008	10000
90	60	0.008	20000
90	70	0.008	50000
100	10	0.0113137	500

100	20	0.0113137	1000
100	30	0.0113137	2000
100	40	0.0113137	5000
100	50	0.0113137	10000
100	60	0.0113137	20000
100	70	0.0113137	50000
110	10	0.016	500
110	20	0.016	1000
110	30	0.016	2000
110	40	0.016	5000
110	50	0.016	10000
110	60	0.016	20000
110	70	0.016	50000
120	10	0.0226274	500
120	20	0.0226274	1000
120	30	0.0226274	2000
120	40	0.0226274	5000
120	50	0.0226274	10000
120	60	0.0226274	20000
120	70	0.0226274	50000
130	10	0.032	500
130	20	0.032	1000
130	30	0.032	2000
130	40	0.032	5000
130	50	0.032	10000
130	60	0.032	20000
130	70	0.032	50000
140	10	0.0452548	500
140	20	0.0452548	1000
140	30	0.0452548	2000
140	40	0.0452548	5000
140	50	0.0452548	10000
140	60	0.0452548	20000
140	70	0.0452548	50000

The JSim model R1_S0_model_20111012.proj was used to generate the signal intensity images. This model can be downloaded from a link provided on the QIBA page of our website. A link to download the JSim software is also provided.

The signal intensity for the T1 mapping images was calculated using the standard signal intensity equation, $S = S0 * (1- E0)* \sin(theta) / [1 - (\cos(theta) * E0)]$ where S is the signal intensity, S0 is the equilibrium magnetization, theta is the flip angle, and $E0 = \exp(-TR/T1)$. This equation assumes that T2 effects are negligible.