



**Fig. S1**

Fig. S1. Graphs of z spectra obtained in phantoms as a function of frequency offset showing the effect of MT saturation. A. the direct saturation effect of the MT saturation pulse on the oil phantom at various offset frequencies with different MT saturation powers; direct saturation effect decreased with the increase of MT pulse offset frequency. B. MT saturation of the phantoms with MT saturation power of  $800^\circ$ , providing an overall picture for visual comparison of MT effects upon all the phantoms used in this study at the different offset frequencies.  $M_s$  and  $M$  are the observed image intensities with and without MT saturation respectively.