

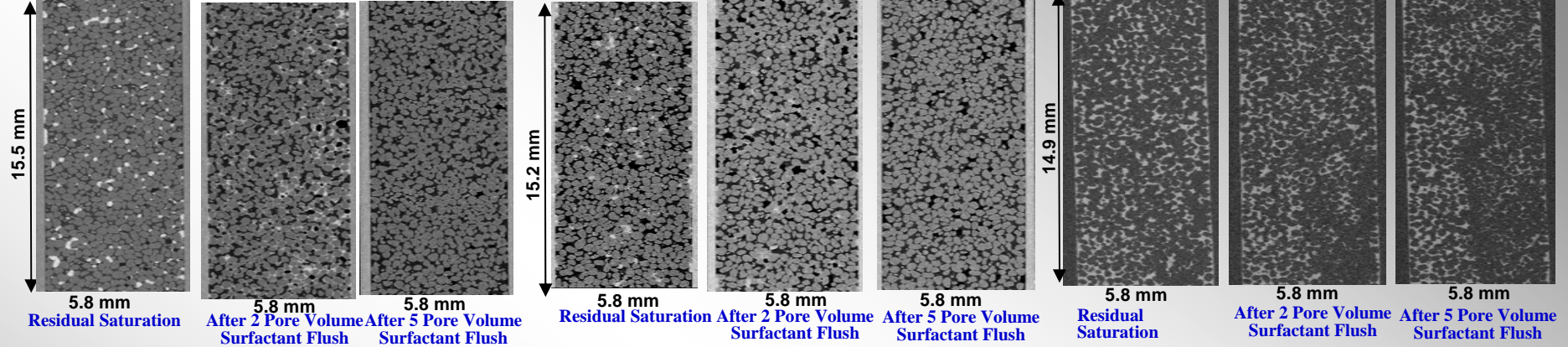
High Resolution Characterization of Crude Oil Distribution at the Pore Scale: Effects on Enhanced Petroleum Recovery

Geoffrey R. Tick, Department of Geological Sciences, University of Alabama, Tuscaloosa, AL 35487-0338

Figure1: Light oil (white colored segregated liquid)

Figure2: Medium oil (white colored segregated liquid)

Figure3: Binary Image of Interconnected Heavy Oil



Figures show oil recovery behavior of three fractions of crude oil, light (41.4°API), medium (29.6°API) and heavy (14.0 °API) after sequential surfactant flushing for 2 pore volumes and 5 pore volumes (PV) respectively (Figures 1, 2, 3). Recovery processes were similar for the light and medium oil fractions whereby approximately 50% of the oil was removed after the first flushing episode. After the second surfactant flush (5 total PV), there was no remaining light or medium oil within the porous-medium filled columns. This indicates that nearly complete oil recovery is likely if the system is flushed long enough, at least for light-fraction and medium-fraction oils distributed within a homogeneous porous medium. Conversely, the heavy-fraction oil showed no significant recovery after the first surfactant flushing episode. However, after the second surfactant flush approximately 13% of the initial oil volume was recovered. These results show that morphology and distribution of the heavy-fraction along may limit oil recovery.

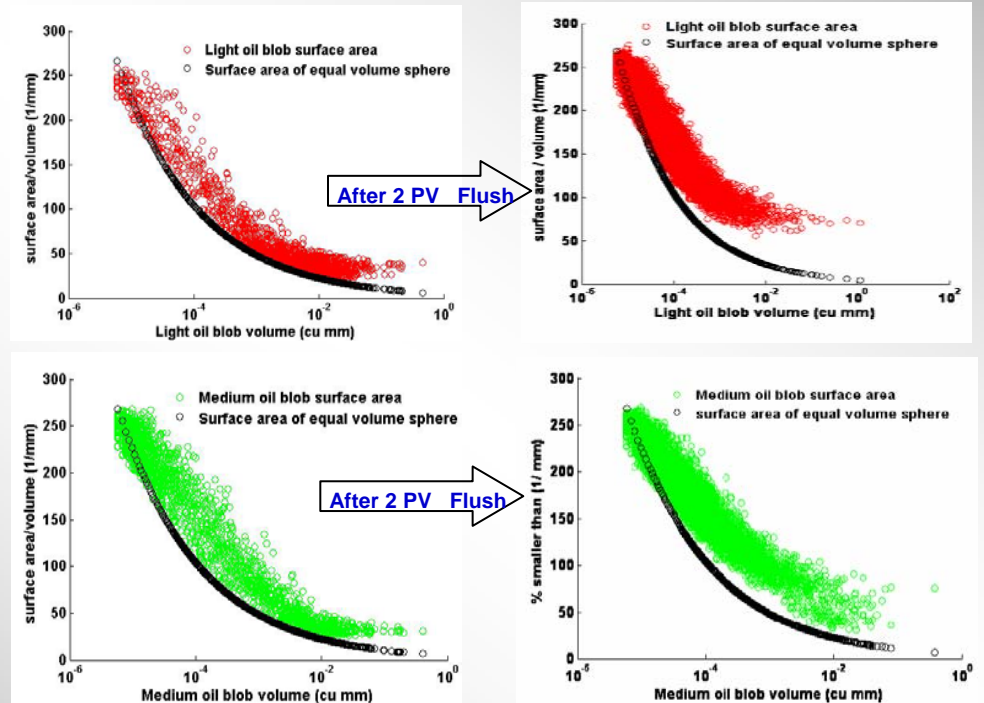


Figure 4. Variation in blob morphology before and after 2-pore volume surfactant flush.