Cyclical water injection is actually an almost 60-year-old technic but it has recently received renewed attention because it now appears to be a very appealing option to conventional waterflood in mature fields leading to additional oil recovery at virtually zero additional cost.

Particularly, reservoirs with high area-thickness ratio, long history of secondary recovery and high water cut are the preferable scenarios for this kind of injection scheme. Indeed, fluvial mature reservoirs in San Jorge Gulf Basin are often this case being their many isolated thin sands filled with viscous heavy oil the chosen candidates for this study.

In this paper, conceptual models are simulated according to the geological characteristics of San Jorge Gulf Basin to show the achievable oil production improvement (up to 30% increment) and water cut reduction (up to 70% reduction). Furthermore, it is proved here by numerical simulation how the sweeping efficiency is improved by means of oil migration from lower to higher permeability regions during cyclic injection.

Capillary pressures are commonly thought to be responsible for this effect, although there does not seem to be a clear agreement on the causes of this phenomenon in the literature. Nevertheless, low permeability and naturally fractured reservoirs have commonly been the main objective for systematic studies in this respect. Contrarily, the role of saturation gradients in the resulting cyclical pressure field is here analyzed and thus an alternative thesis for higher permeability reservoirs is developed. This new proposal explains the observed phenomenon being also coherent with analytical calculations and laboratory experiments.

Finally, in order to test above concept a cyclical water injection pilot was implemented in Las Mesetas field, San Jorge Gulf Basin Western Flank. Maximum usage of all available injection water from the water plant and keeping existing well equipment without any work-over were the premises considered for the pilot design. Here, the results of the firsts 18 months are presented achieving 14% incremental oil cumulative.

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