**Supplementary data-15: Discussion of the model shown in Fig.11.**

**Mechanism of reduction in silt-adjacent pores:**

In the clay microstructure, large silt adjacent pores act as a zone of heterogeneous strain localization. Hence, the larger silt pores are more susceptible to exhibit bent clay than the smaller pores in the clay matrix (Fig.11). Further, with increasing vertical effective stress two situations can arise which are demonstrated in the model shown in Fig.11g-(iii) and (iv) respectively. With an increase in effective stress, the bent clay particles can lose frictional resistance from the sidewall (Fig.11a and b). As a result, the bent clay aggregate can slide down to fill the larger silt adjacent pore space (Fig.11g-(iii)). Secondly, with an increase in vertical effective stress bent clay particles can develop fractures (red lines in Fig.11g-(iv)) and can subsequently collapse within the larger silt adjacent pore space to reduce the porosity of samples (Fig.11g-(v)). For example, Fig.10e represents fractured bent clay on the top of the larger silt adjacent pore (shown by white arrow). Similarly, in Fig.11d, it can be observed that two small clay particles are fallen inside the larger silt adjacent pore space, and on top of them there presents another bent clay aggregate (shown by white arrow). Fig.11f represents a bent clay aggregate is wrapping on the top of two euhedral quartz particles, and the inside space between two quartz particles is filled by four small clay platelets. We argue this could be a paleo silt- adjacent larger pore that was filled by fractured clay due to an increase in effective stress. To justify this point, we can think of little bit differently. If one clay particle breaks into two, we will get two small clay particles in the larger silt adjacent pore space (as shown in Fig.11e). Similarly, if two clay particles break into a similar manner, we expect four small clay particles. If we carefully look within the pore space between two equant quartz grains in Fig.11f, four small clay particles are present, which may have developed due to the fracturing of two large bent clay particles. Hence, it can be stated that the collapse of the larger silt adjacent pores in these mud samples is governed by the bending of the clay particles and subsequent fracturing due to an increase in vertical effective stress. Note that, all clay particle/particle-aggregate associated with silt-adjacent larger pore will not show the evidence of the bending at the same point of time. The clay particle/particle-aggregates that are present within the force chain of load during compaction are susceptible to exhibit bent microstructure. Nevertheless, in this study, we polished and analyzed mudstone microstructure only at one plane among two equivalent counterparts. Hence, we are supposed to encounter only 50% of the total bent clay present in the sample.