Is the fluid flow in accretionary prisms to fault displacement, or to sigma2 direction?

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Japan as a whole could be considered as a large accretionary wedge, in which horizontal compression prevails. In the recent accretionary prisms, four times of drilling with downhole experiments have been done in the northern Barbados ridge accretionary prism, and 3D fluid flow pattern is thought to be understood (DiLeonardo, Moore et al., 2002, GSAB). However, the exact fluid flow process was not totally verified. In Japan, the active fault patterns are similar both on land and under the sea. In this presentation, 3D fluid flow direction will be examined after some permeability consideration.

In general, in accretionary prisms fluid flows or advects along a decollement zone from the deeper to shallower levels, and warm fluid is actually observed in Barbados. Along a strike-slip fault from the basement subducting slab might be the barrier against the flow (DiLeonardo, Moore et al., 2002, GSAB), but it may be a common sense in 3D triaxial experiment that permeability is much larger along the fault to the sigma 2 direction (Zhang et al., 1999; Takahashi et al., 2000 J. Japan Soc. Eng. Geol.). In outcrops, mineral veins are commonly known in such directions (Takahashi et al., 2003 GS London spec. Pub.; Ogawa & Takahashi, 2003 Tectonphysics). Probably during faulting (co-seismic stage), fluid flows to the displacement direction owing to the increase of permeability and hydraulic gradient, but during inter-seismic stage, it flows to the sigma two direction along the fault zone in which much cavities are connected to that direction as revealed in Barbados accretionary prsim examples (Takizawa & Ogawa, 1999 JSG). Because both conditions are provided in a strike-slip fault system, the strike-slip faults are most dangerous for disposal problems.