Development of seafloor morphology and cold seep by active faulting

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Numerous cold seeps have been found at landward slopes of trenches in subduction zones and most of them are interpreted to be associated with fluid expulsion through fault planes. Seep fluids can provide with important information of compaction and dewatering at fluid source regions. Distribution of cold seeps are key to understand ongoing geological process such as sedimentation and deformation because seep sites seem to be controlled by subbottom geological structures. Seep sites observed by seafloor survey are not always continuous along fault traces. No seep site is often characterized by thick talus deposit. This suggests that cover sediments prevent seep activity even if fluid conduits along fault planes reach to seafloor. Diffusive seeps are occasionally estimated from distribution of seep dependent bivalves such as Calyptogena. Linear arrangement of seep in thin sediment cover suggests fluid expulsion through fissures developed in the hanging wall. Seafloor erosion and no sedimentation as well as development of conduits is a controlling factor for active seep. Because sedimentation is dominant in most ocean floor, regions with erosion and no sedimentation are restricted to steep slope areas including deep sea canyon. Existence of steep slope indicates specific geological processes sch as landsliding, active crustal movements by faulting and folding and erosion by sediment gravity flows because seafloor morphology is always smoothed by slope instability and sedimentation. It is inferred that pervasive distribution of cold seeps along active faults is due to escapement from sediment cover by cyclic displacement by active fault in addition to development of fluid conduit. Distribution of cold seeps is one of important issues to understand ongoing geological process.

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