A Bottom Simulating Reflector (BSR) was observed and mapped from prestack migrated 3-D seismic data on the Eastern Nankai Trough. Drilling results show that the BSR corresponds there to the base of the gas hydrate stability zone. The depth-temperature stability curve allows to calculate the temperature at the depth of the BSR, and thereby to compute a heat flow. This heat flow presents kilometric scale discrepancies with the heat flow modeled after the wedge geometry and subduction rate. Seismic images on the accretionary prism slope show several zones where sediment deposition or erosion occur. A large landslide in the study area has a well defined sliding surface 100 m above the BSR. Remarkably, the BSR did not respond to the corresponding change of seafloor geometry, which implies that it is less than a few thousand years old. Geomechanical calculations show that this landslide may slip during large earthquakes, even in the absence of fluid overpressure. Regionally, erosion or sedimentation rates averaged in time can be calculated from the observed heat flow variation, and range from -0.7 to +1.0 mm/year. Zones of erosion and sedimentation computed from this calculated heat flow coincide well with seismic images observations. The strongest erosion occurs on the upper part of the wedge slope, where landslides initiate, but also on the top of a bathymetric relief on the upper wedge flat, the Daitii Tenryu Knoll. Sedimentation occurs on the the upper wedge flat and in a slope basin, where the computed deposition rate is consistent with the mean deposition rate calculated after seismic images. We suggest that slope instability is the main erosional process on the slope above the Tokai Splay Thrust and explains the BSR
depth anomaly as a response to repeated landsliding and redeposition in the basin at the base of the slope.