Date: **April 2nd**

Time: **4:00 PM**

Location: **Ames 234**

Speaker: **Dr. Gary Parker**
St. Anthony Falls Laboratory, University of Minnesota

Title: **"Water detrainment across settling interfaces: application of a new concept in deep-sea turbidity current dynamics to reservoir sedimentation"**

Abstract

While recent years have been characterized by rapid progress in many areas environmental fluid mechanics, the area of reservoir sedimentation is not one of them. Although increasing rates of reservoir sedimentation are causing major re-evaluations of the usefulness of dams, including considerations of dam removal, the technology for predicting sediment deposition in reservoirs remains stuck in the era of the empirical Brune trap efficiency curve. Sediment is deposited in reservoirs by fluvial deposition on the delta topset, avalanching on the delta foreset and by either plunging turbidity currents or rain from surface plumes in the bottomset. In many reservoirs the bulk of sedimentation is on the bottomset and consists of the finer sizes delivered by the river. It is this process that has proven most difficult to predict. Recent research in deep-sea sedimentation, however, offers a new concept with which to study the process. Plunging turbidity currents in reservoirs readily form muddy ponds below relatively sediment-free water. The interface between the muddy pond and sediment-free water above devolves into a settling interface, across which turbulence is damped by strong flow stratification. This interface is in many ways analogous to the meteorological interface that forms under conditions of atmospheric inversion. It differs from the atmospheric case, however, in that the agent of stratification is sediment, which falls under its own weight. In the absence of supply of sediment-laden water from upstream, the settling interface moves downward with the fall velocity of the sediment, so converting muddy water to clear water. In the presence of supply from upstream, the position of the interface can stabilize, with continuous detrainment of water across it. The position of this interface relative to the level from which water is vented from the reservoir controls the trap efficiency of the finer sediment entering the reservoir.