Weekly CEAFM Seminar: Spring 2016

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Date: **Friday, January 29, 2016**

Time: 11:00 AM

Location: Gilman Hall # 50

Speaker: **Prof. Marcelo H. García** (University of Illinois at Urbana Champaign)

Title: ***"Exploring the World of Density Current Flows: What do Snow Avalanches, Dust Storms, Oceanic Turbidity Currents and Underflows in the Chicago River have in Common?"***

Abstract

Density currents are one of the most beautiful phenomena observed in Nature. They can be broadly defined as flows driven by gravity acting on density differences. As such, they can be encountered in a host of natural and industrial settings. They can manifest themselves as dust storms and snow avalanches in the atmosphere. The scales of atmospheric density flows can be really large: dust storms can reach velocities of tens of meters per second, and heights of hundreds of meters. In water bodies, density currents have been observed as bidirectional underflow during the winter months in the Chicago River or as sediment-laden underflows in reservoirs in China where the sediment load of rivers are large. Density currents may be initiated by diverse mechanisms, such as inflow of turbid water to ponds, sub-aqueous landslides, and the discharge of mining tailings, temperature gradients, or dredging operations. Methane trying to escape from a mine by spreading along the top of a shaft also leads to a density current, which constitutes a health hazard for workers. The relevance of density currents consists in that they are capable of transporting sediments and contaminants for very long distances and they can also cause substantial damage to underwater infrastructure such as pipelines. Typically, tiny density differences can produce relatively swift flows. The heavier constituent of density currents could be dissolved (salinity), or it could be formed by solid particles in suspension resulting in sediment-laden turbidity currents. Geologists believe that turbidity currents are responsible for the scouring of submarine canyons, many of the rivaling in size the Grand Canyon of the Colorado River. Sediment deposits generated by turbidity currents, known as turbidities, in sedimentary basins can be a source of hydrocarbon and have received great attention from the oil industry. This seminar will summarize what has been a bit of a life journey since my grad student days and will include some computational modeling, laboratory experiments and field observations of density current phenomena conducted with my students and collaborators.