



Industrial and Systems Engineering Seminar Series  
in conjunction with the ADVANCE Center

**Humanitarian Logistics: A case study on post-disaster debris operations  
and solving multi-period network capacity expansion problems**

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3024 Emerging Technologies Building

**Abstract:** Debris is the waste generated by hazardous events such as a natural disaster or a terrorist attack. Post-disaster debris collection operations are in general not planned in advance and are done in an ad-hoc way after an event. Issues in tactical and operational planning include clearing quickly, widely, and in ways that is good for the environment and health. Debris impacts the logistics of humanitarian relief and debris generated in some large-scale disasters can be equivalent in volume to years of normal solid waste production in the affected areas. In the context of the Haiti earthquake, six months after the disaster, only 5% of the debris was collected. Hurricane Ike (2008) generated debris enough to fill a football field stacked 2 miles high. The 30-mile debris along the Texas coast that was standing months after Ike's landfall is a testament to the challenges and the inefficiencies that exist in debris clearance operations today. In this research, we consider the decision problems related to the three phases of debris management operations: clearance, collection, and disposal. We develop mathematical models that capture the important characteristics of the debris related operations in each phase along with methodologies for solving these models efficiently. These models include considerations on fairness (given the public impact nature of the application) and robustness (given various types of uncertainty in these settings). We demonstrate the results of some of these models and algorithms on a case study based on the Haitian Earthquake.

**Bio:** Dr. Özlem Ergun is an associate professor in the School of Industrial and Systems Engineering at Georgia Institute of Technology. She is also a co-founder and co-director of the Health and Humanitarian Logistics Research Center at the Supply Chain and Logistics Institute. She received a B.S. in Operations Research and Industrial Engineering from Cornell University in 1996 and a Ph.D. in Operations Research from the Massachusetts Institute of Technology in 2001. Professor Ergun's research focuses on the design and management of large-scale networks. Specifically, she studies logistics and communications networks that are dynamic and partially decentralized. She was awarded the NSF Career Award in 2003. She won the EURO/INFORMS 2007 Management Science Strategic Innovation Prize given on the subject of Logistics in 2007.