Large scale modeling of ice flow for the entire Antarctica continent

Eric Larour
Jet Propulsion Laboratory

Understanding the evolution of the mass balance of Antarctica and its interaction with the oceans and atmosphere is of tremendous importance when trying to predict future sea level rises on earth. Current models for Antarctic ice flows lack knowledge of its ice rheology over large extents, making the mass balance prediction impossible. Using inverse control methods, we are now able to use data from satellite observations taken in past decades to constrain the rheology of the largest ice shelves in Antarctica; the resulting improvements in ice flow modeling are considerable and seem to suggest it may be possible to build a realistic large scale model for that continent. In this seminar, we will discuss the scientific and technological challenges of such a large scale model. We will also discuss a realistic approach to those challenges using the massively parallel finite element based computer code called Cielo: this code is being developed at JPL under a three year R&TD strategic initiative to model integrated thermal/mechanical/optical behaviors for large deployable aperture systems. We will show how those capabilities can be used as a framework for large scale modeling of Antarctica's mass balance.