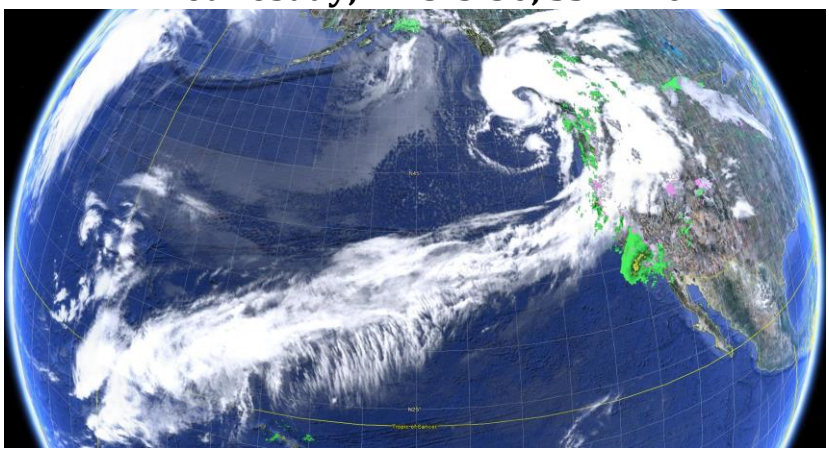
Environmental Systems Seminar, October 21, 2015
Wednesday, 4:15-5:50, SSB 170



Atmospheric Rivers, Storms and Droughts in the Sierra Nevada

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Atmospheric rivers (ARs) are long streams of water vapor that form about one mile up in the atmosphere. When one reaches the U.S. West Coast and hits mountain ranges, such as the Sierra Nevada, it is forced up, cools off and condenses into vast quantities of precipitation. ARs stitch together the extratropical water cycle in ways that we have only come to understand since about 1998 when they were first recognized in weather models, in new microwave-based vapor imagery, and in offshore reconnaissance flights through major winter storms. Historically, landfalling ARs comprise most of the largest storms in California, are the causes of about 80% of major storms in rivers across California, and are the sources of 30-50% of our precipitation. The extent to which California's wettest days--which routinely correspond to ARs--contribute to its overall precipitation and dictate multiyear periods of droughts and plenty is analyzed, historically and in projected future climates. Year-to-year fluctuations in California's precipitation reflect year-to-year fluctuations of contributions from these largest storms, with the large-storm contributions explaining about twice as much precipitation fluctuation as do contributions from all remaining storms combined. This extreme dominance of large storms is largely unique to California within the US. In climate-change projections, eight of 10 climate models considered here yield increases in precipitation from the largest storms, and when the increases are large, total precipitation follows suit. All the models project declines in contributions from the smaller storms, and models that project less precipitation overall reflect this decline.