UCI’s Velicogna contributes to study stressing benefits of limiting greenhouse gas emissions

Climate model predictions made more precise through use of NASA GRACE satellite data

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Isabella Velicogna, UCI professor of Earth system science, took part in a recent study suggesting that future sea level rise can be halved if humans limit global warming to a degree and a half this century.

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Nicole Del Castillo / UCI

An aggressive effort to limit greenhouse gas emissions which cause climate change will pay large dividends between now and 2100, according to a new study published today in *Nature*. An international team of researchers, including UCI geophysicist Isabella Velicogna, said that if humans can keep global warming to 1.5° Celsius during the 21st century, the projected amount of sea level rise from melting land ice could be cut in half.

Velicogna, professor of Earth system science, provided the project precise data and analysis from the Gravity Recovery and Climate Experiment, a mission run by NASA and the German Aerospace Center. GRACE satellites have circled the Earth continuously since 2002 – except for a brief offline period to upgrade equipment – collecting data on changes in the planet's gravity fields which render evidence of the shifting of water – from ice on the land to liquid in the ocean, for example. The model projections in this study were constrained by 15 years of GRACE mass balance observations in Antarctica.

"This is the first time that this sort of numerical model simulation was done using such a long modern observational record, and in my opinion, it has made the results much more robust, realistic and reliable," said Velicogna, who is also a senior project scientist at NASA's Jet Propulsion Laboratory.

Planet-scale physical processes are a challenge to replicate in a model because often there is not enough data from direct observations, according to Velicogna. Sometimes modeling these processes require immense computing power and therefore they need to be represented in a simplified fashion.

"The power of constraining these numerical models with GRACE data is that it compensates for these limitations and places the models on a better trajectory to forecast the evolution of the system," she said.

The authors of the Nature paper said the best-case scenario would be to remain with 1.5° Celsius limit, but if emissions could be curbed only enough to reach the Paris Agreement's alternative target of 2° C, Antarctic ice loss rates would remain roughly constant. In the 3° C warming scenario, which is what would happen if humans were to continue emitting greenhouse gases as the present level, the rate of ice loss would increase substantially from 2060 on, triggering sea-level increases of half a centimeter per year by 2100.

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