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Session: Ice

Title: Eight years of ERS1/2 observations of the evolution of West Antarctic Glaciers: What have we learned ?

Eric Rignot

Jet Propulsion Laboratory, Mail Stop 300-235

4800 Oak Grove Drive

Pasadena, CA 91109-8099 USA

Ph. (818) 354-1640; Fax (818) 393-3077; Email eric@adelie.jpl.nasa.gov

Since 1992, the ERS SAR series has provided extensive interferometric coverage of West Antarctic glaciers. Spectacular results have been obtained from this long series of data, well beyond our wildest expectations. ERS interferometry has provided highly detailed measurements of the glacier velocities and of their line of grounding (where they detach from the bed and become afloat in the ocean) at an unprecedented level of precision. The results have been employed to estimate their mass budget and their state of mass balance. Pine Island Glacier and Thwaites Glacier stand out as being significantly out of balance at present. Repeated imaging of these glaciers revealed that the grounding line retreated significantly (km) in 1992, 1994, 1996 and 2000, which in turn translates into ice thinning rates of several meters per year. These rates of ice thinning cannot be explained by annual changes in accumulation or ablation and therefore suggests that the two glaciers are flowing too rapidly and are downdrawing their drainage basins. ERS data acquired in 2000 further indicate that their ice velocity increased by 10 percent in the last 4 years, which is a large signal. Taken together, these observations suggest that this sector of West Antarctica, deep inside the continent, is slowly collapsing, thereby confirming an hypothesis formulated by Hughes 20 years ago that this sector is the "weak underbelly of West Antarctica" most likely to trigger its collapse.

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