POLENET: Polar Earth Observing Network

www.polenet.org

G-NET: Greenland
USA-Denmark-Luxembourg
Mike Bevis – U.S. Lead PI

A-NET: Antarctica
USA + 28 nations (IPY)
Terry Wilson – U.S. Lead PI
What is POLENET?
A bipolar, multinational investigation of geodynamic interactions between the lithosphere and ice sheets

Continuous, autonomous GPS and seismic instruments operating at remote sites on continent margins and interior bedrock nunataks of Greenland and Antarctica
Measuring crustal uplift due to glacial isostatic adjustment (‘rebound’)

ice mass change
- ancient ice loss: viscoelastic response
- modern ice loss: elastic response
GNET has installed 52 new CGPS sites in Greenland

Deployed 2007 - 2009
Antarctica: Pre-IPY

Continuous stations

- Seismic
- GPS

500 km
Challenges:
• autonomous operation
• harsh environment

Green = 100% data return - reliability much improved..
Rebound: raised beaches

Antarctic stations with robust velocities – LGM ice mass loss

Vu = 2.29 ± 0.22  wrms  4.89

Rebound: GPS vertical velocity

Wilson et al., 2011
A-NET horizontal velocities lower than GIA model predictions

Wilson et al., 2011
West Antarctica:
- variable, but relatively thin elastic lithosphere
- warm & relatively low viscosity upper mantle

Rebound has slowed – near-complete?
100 m/year

100’s m/year

Ice Velocity

Ice mass balance

-250 gigatons / year
Loss accelerating....

-14.5±2 Gt/yr²

-13.2±10 Gt/yr²

Rignot et al 2011
G-NET vertical velocities

Signal dominated by elastic response to modern ice mass change

Bevis et al. 2011
Accelerations in GPS-derived uplift rates

Khan et al., 2010