Measuring and Modeling Geosphere – Cryosphere Interaction in Southern Alaska

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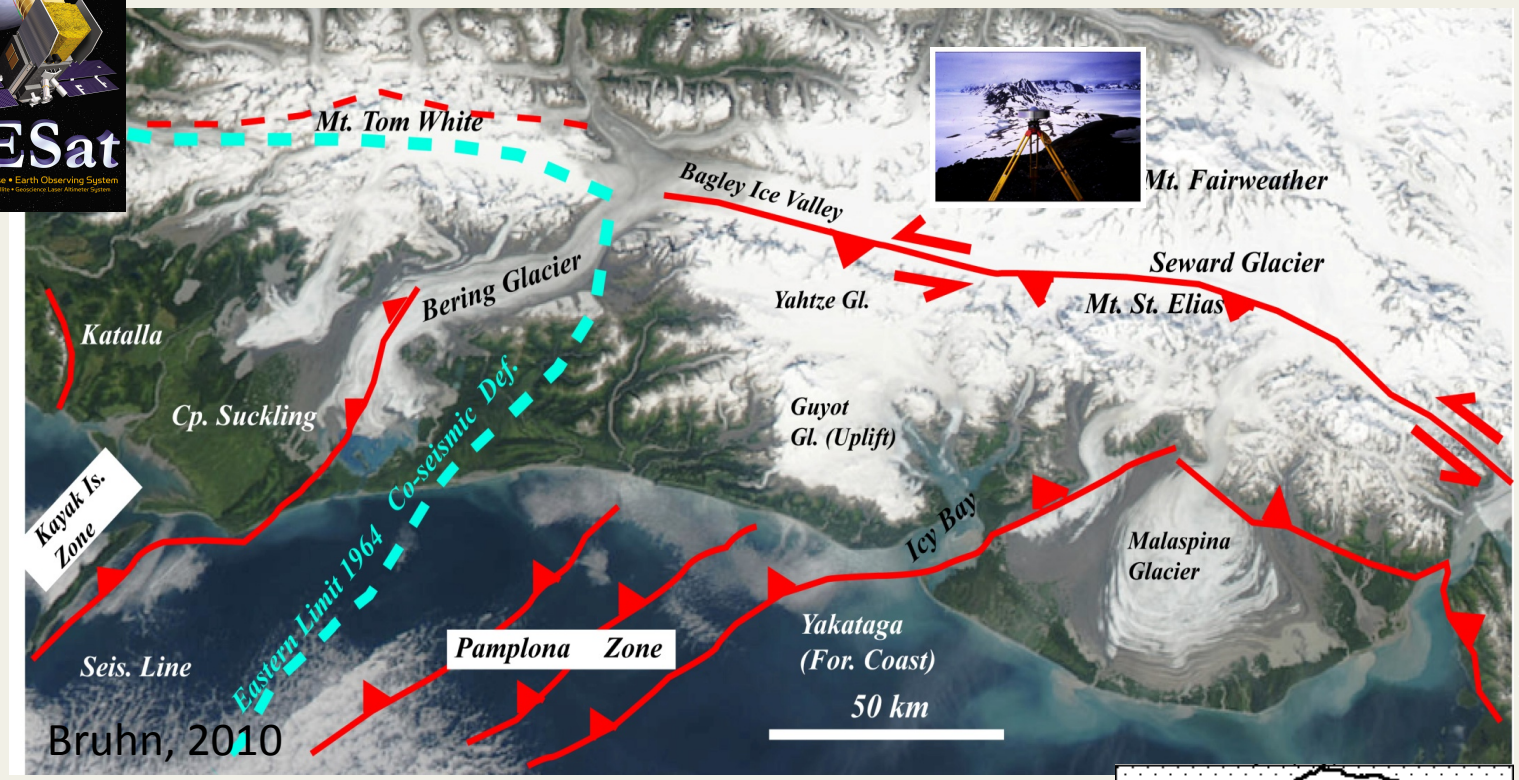
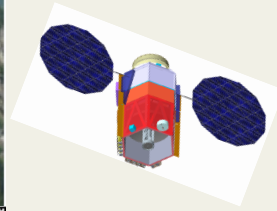
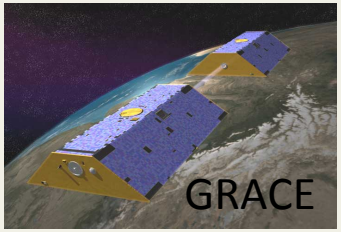
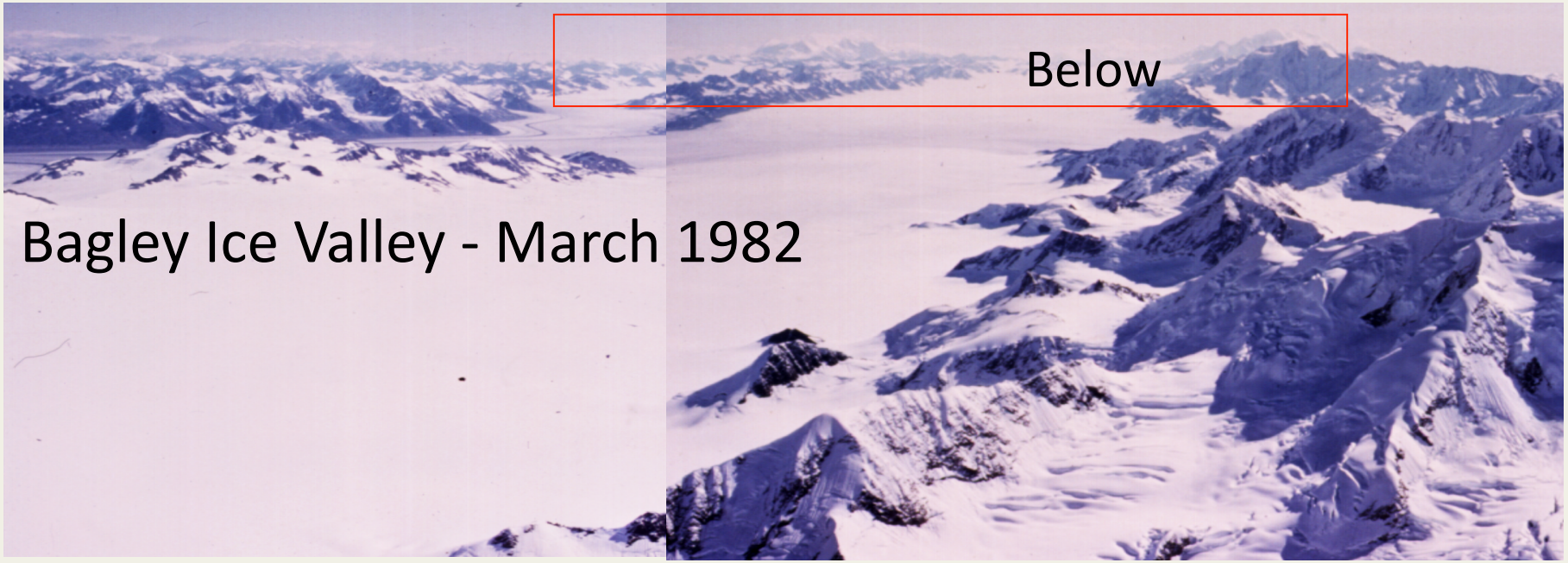


DESDynI






Below
Bagley Ice Valley - March 1982

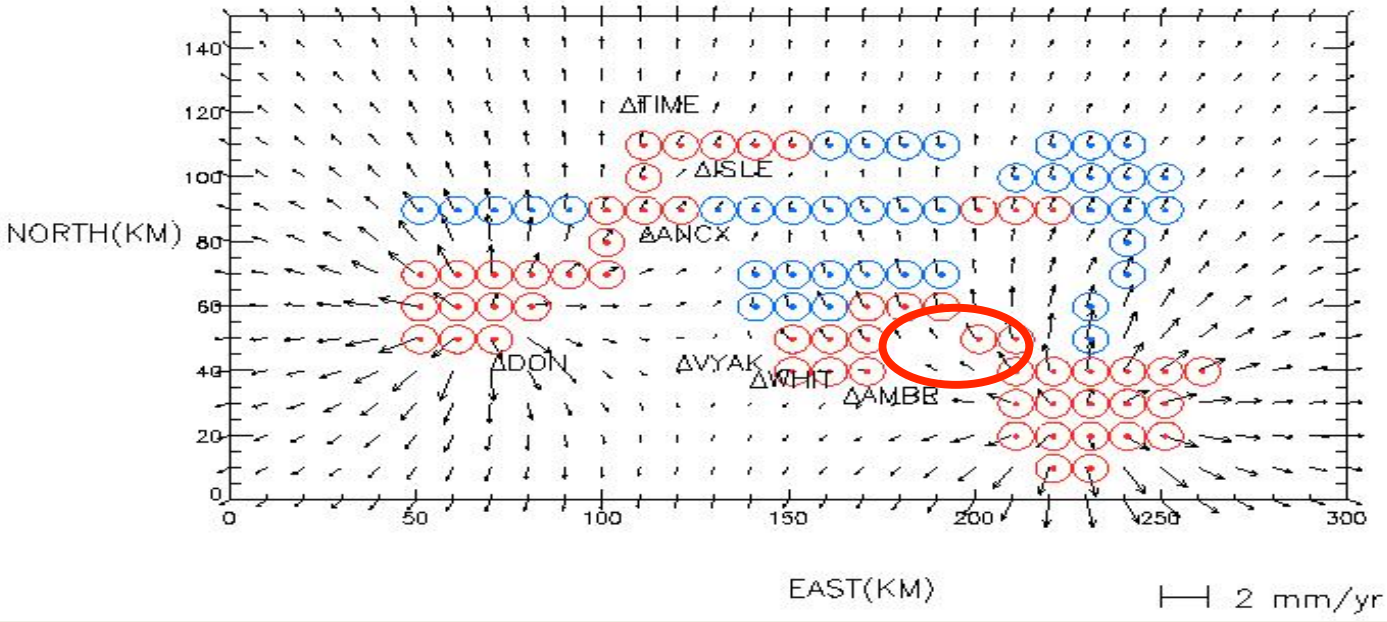

Bagley Ice Valley—
Summer 2001

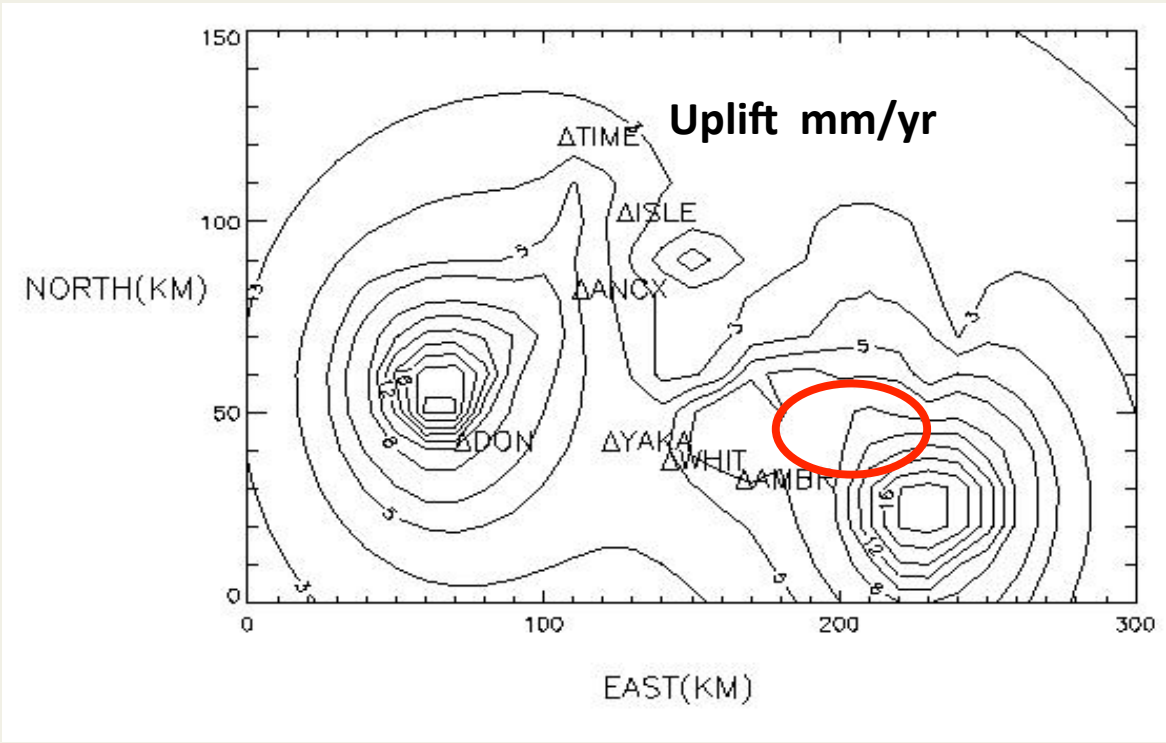
Temporal and Spatial Scales of Ice Mass Changes In Southern Alaska:

✓***Annual*** *variations in snow and ice on glaciers*: 1-8+ meters in ablation region, not well documented in accumulation region**. Observations:** GRACE results (2002-2009) give large scale changes ~10 days; ~10 Gtons annual amplitude for Chugach-St. Elias region plus a general trend of mass decrease**. Modeling:** Need other data with greater spatial sampling to characterize seasonal ice mass changes of these mountain glaciers (DESDynI, ICESat-II). **C-G: Seasonal** modulation of background seismicity during warm years.

✓***Years***: Terminus *retreat and glacier thinning* (meters/yr of thinning in ablation region). Also more frequent glacier surges with *ice unloading* in surge reservoir region and *ice loading* in surge receiving area. **Observations:** Aircraft and satellite laser altimeter (ICESat) and InSAR derived DEMs have been used to estimate average elevation changes. **Modeling**: 3-D elastic **C-G:** mm – cm surface displacements, hard to interpret campaign GPS.

✓***End of Little Ice Age (LIA) Wastage:*** Most glaciers in southern Alaska have undergone km's of terminus retreat with up to 100-1000 meters of ice thickness change. **Modeling:** Finite Element Modeling, we estimated the stress changes associated with this retreat between ~1900-1979. **C-G**: Promotion in time of upper crustal earthquakes.
--Late Pleistocene deglaciation is **not** modeled due to low asthenosphere viscosities and frequent large events in southern Alaska that alter stress.


ΔTIME
ΔISLE
ΔANCX
ΔDON
ΔVYAK
ΔWHIT
ΔAMBE
NORTH(KM)
EAST(KM)
2 mm/yr


Uplift mm/yr
ΔTIME
ΔISLE
ΔANCX
ΔDON
ΔYAKA
ΔWHIT
ΔAMBR
NORTH(KM)
EAST(KM)