

# ARCTIC CHALLENGES

HSRP – Baltimore

April 14, 2009

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JOA Surveys LLC – Anchorage, Alaska



- ✓ Alaska is 570,000 sq miles (> twice Texas)
- ✓ 34,000 miles of tidal coast line, arctic coast about 1000 miles (like Miami to DC)
- ✓ 9,500 sq nm critical hydro surveys (37% of US)
- ✓ 310,000 sq nm nav significant areas (64% of US)
- ✓ Sea ice melting at rapid rate; and erosion increasing
- ✓ Sea lanes WILL open up.....when????
- ✓ UNH, CO-OPS, OCS, NGS, UNH recent work
- ✓ Large storm surges in western and northern Alaska

Governors letter to NOS

- ✓ Many studies, recon, commissions, reports
- ✓ Coordinated action time - NOW!

- ✓ Alaska from Russian, treaty 3/30/1867, \$7.2M
  - **Ratified** 9 days later by Senate 32-2
  - House held up the \$\$\$\$. Resolved July 1868 with help of Davidson and C&GS
- ✓ Exploration, telegraphs, gold rush, fishing, fur seals and the C&GS
- ✓ NPRA 1923 in Arctic, President Harding, 23M acres
- ✓ WWII boom, yea we have a road to the US!
- ✓ Cold war and the Arctic, DEW Line
- ✓ 1947-1953 last major arctic hydro effort by C&GS
- ✓ Statehood 1959 and “the owner state”
- ✓ Oil exploration & production (1957-present)
- ✓ Native Claims 1972, ANILCA 1980
- ✓ One road to Arctic, dependent on marine and air
- ✓ Tourism, mining, government, and preservation....

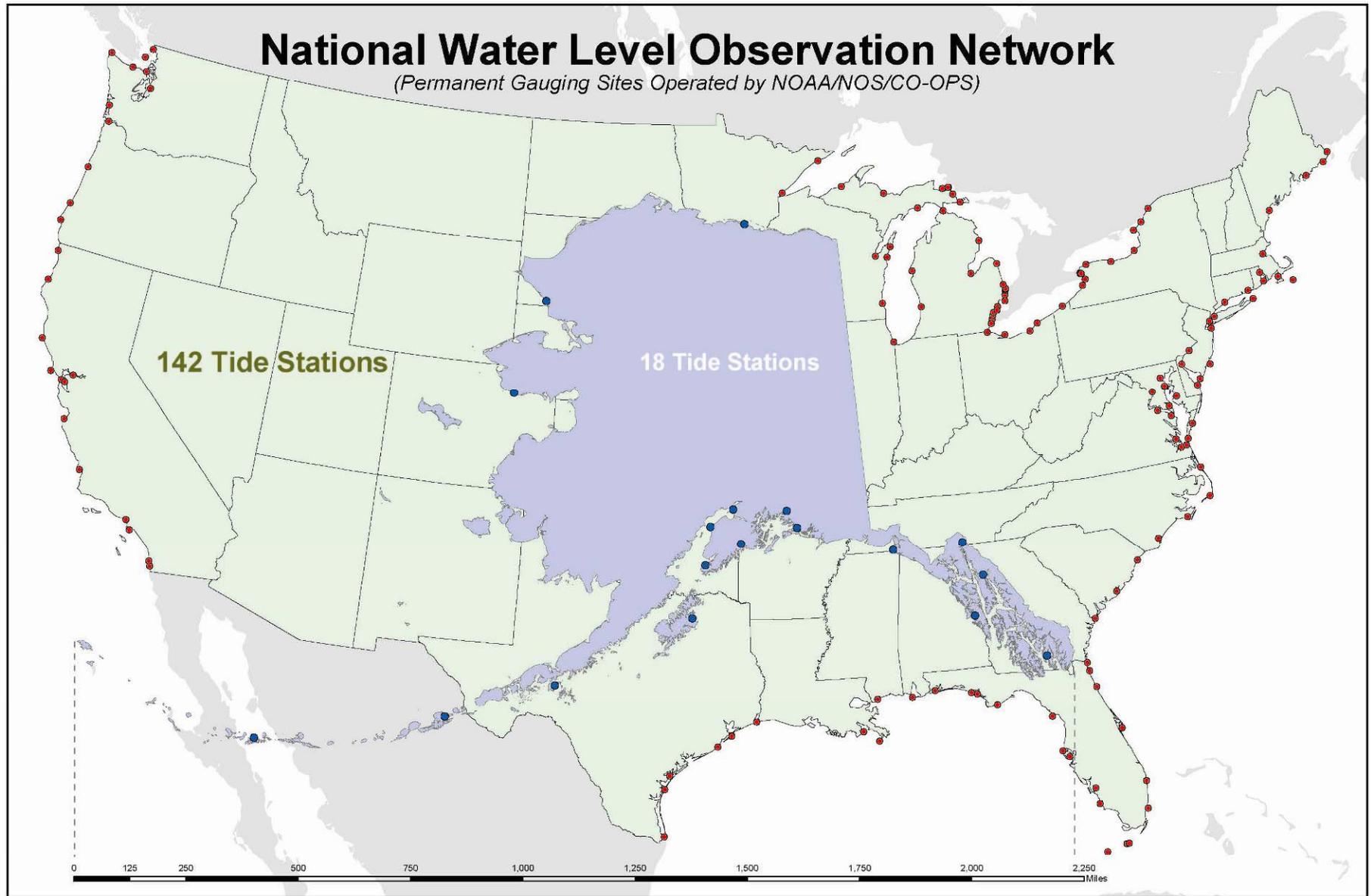
# Recent HSRP briefings

- Stakeholder panel, chaired by Molly McCammon, AOOS, Anchorage, August 2006
- Amy Holman, NOAA Regional Coordinator, San Francisco July 2008
- David Seris, USCG, Tampa, November 2008

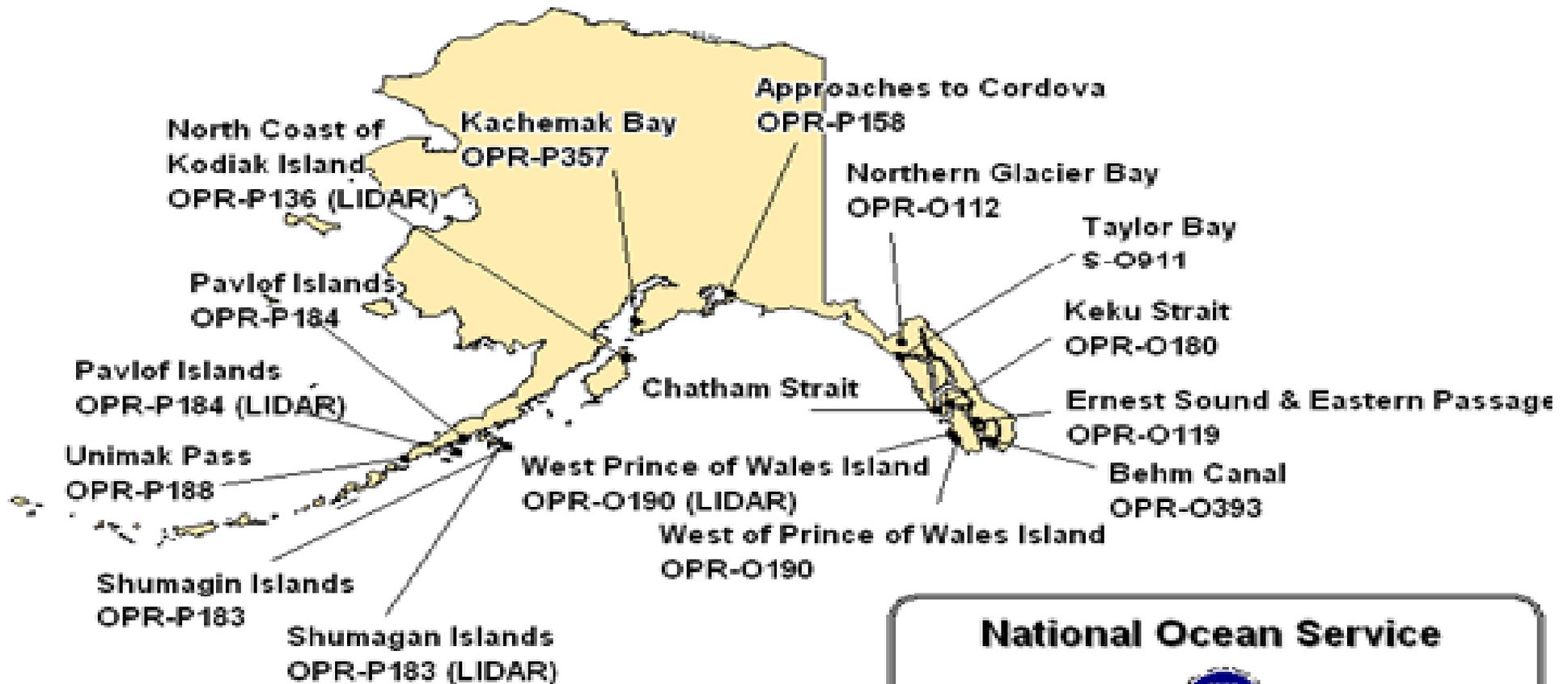


# National Water Level Observation Network

*(Permanent Gauging Sites Operated by NOAA/NOS/CO-OPS)*



# 2009 Alaska Hydro Season Southern Alaska

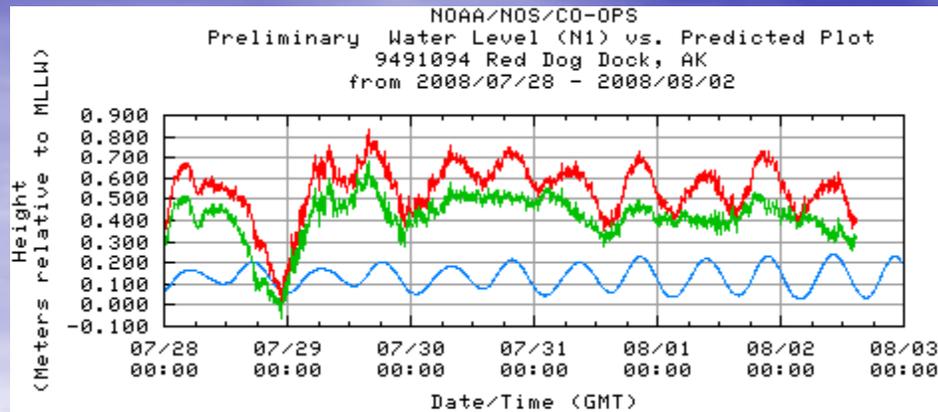


**National Ocean Service**

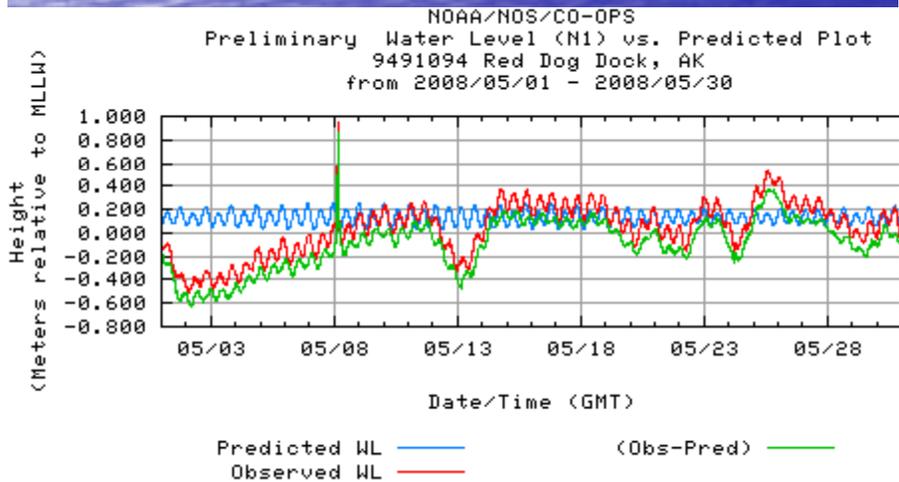
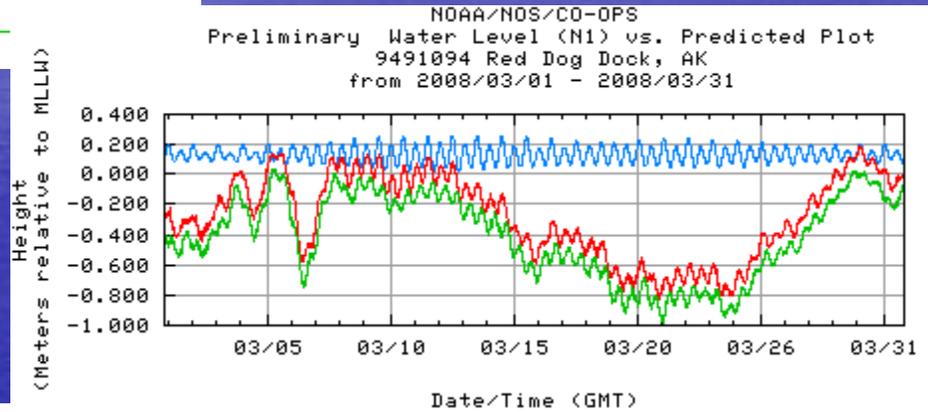


**Hydrographic Survey Projects  
2009**

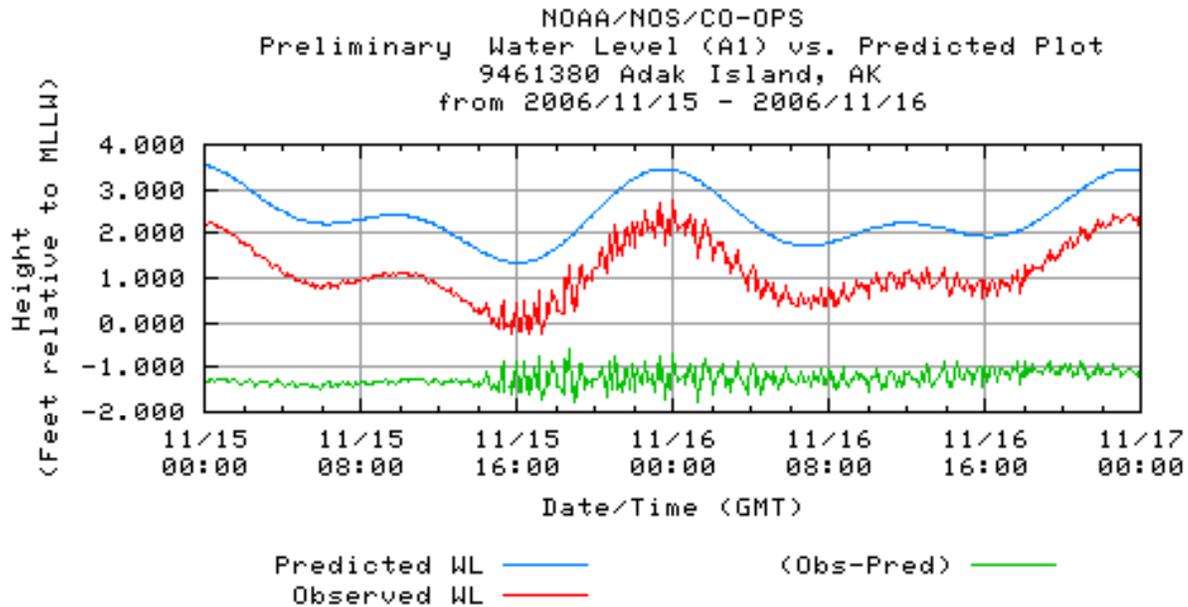
Office of Coast Survey, Hydrographic Survey Division, July 2009



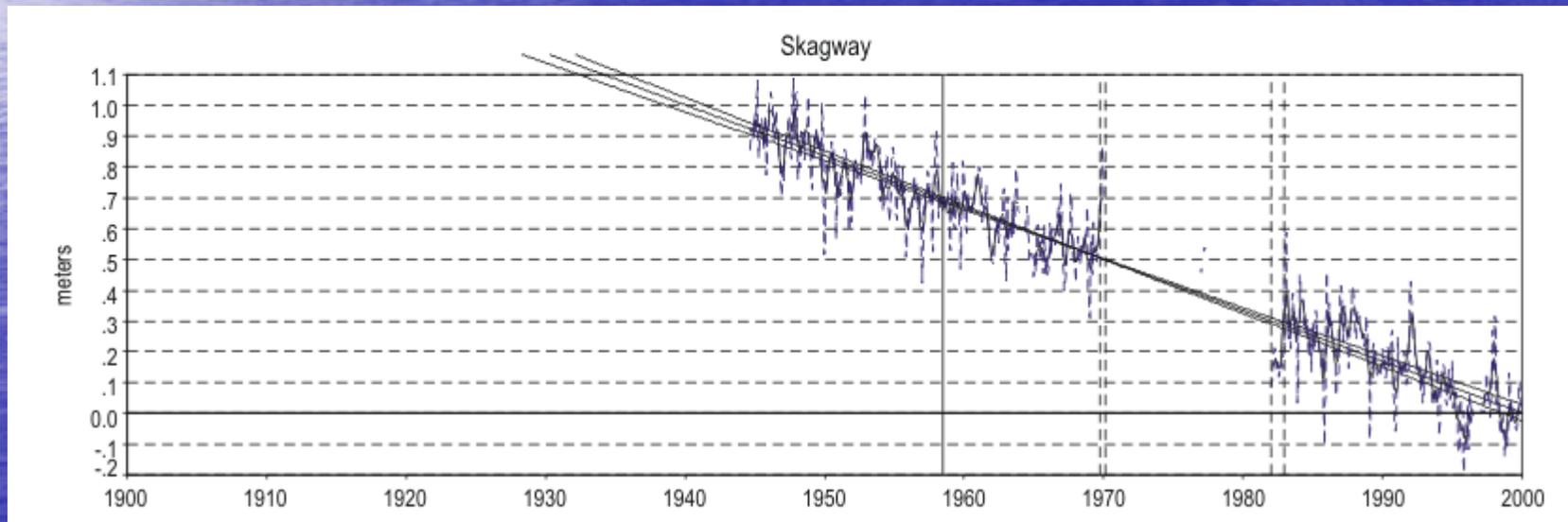
Red = observed  
 Blue = predicted  
 Green = Obs-pred  
 (in meters)



RED DOG NWLON  
 Built 2005

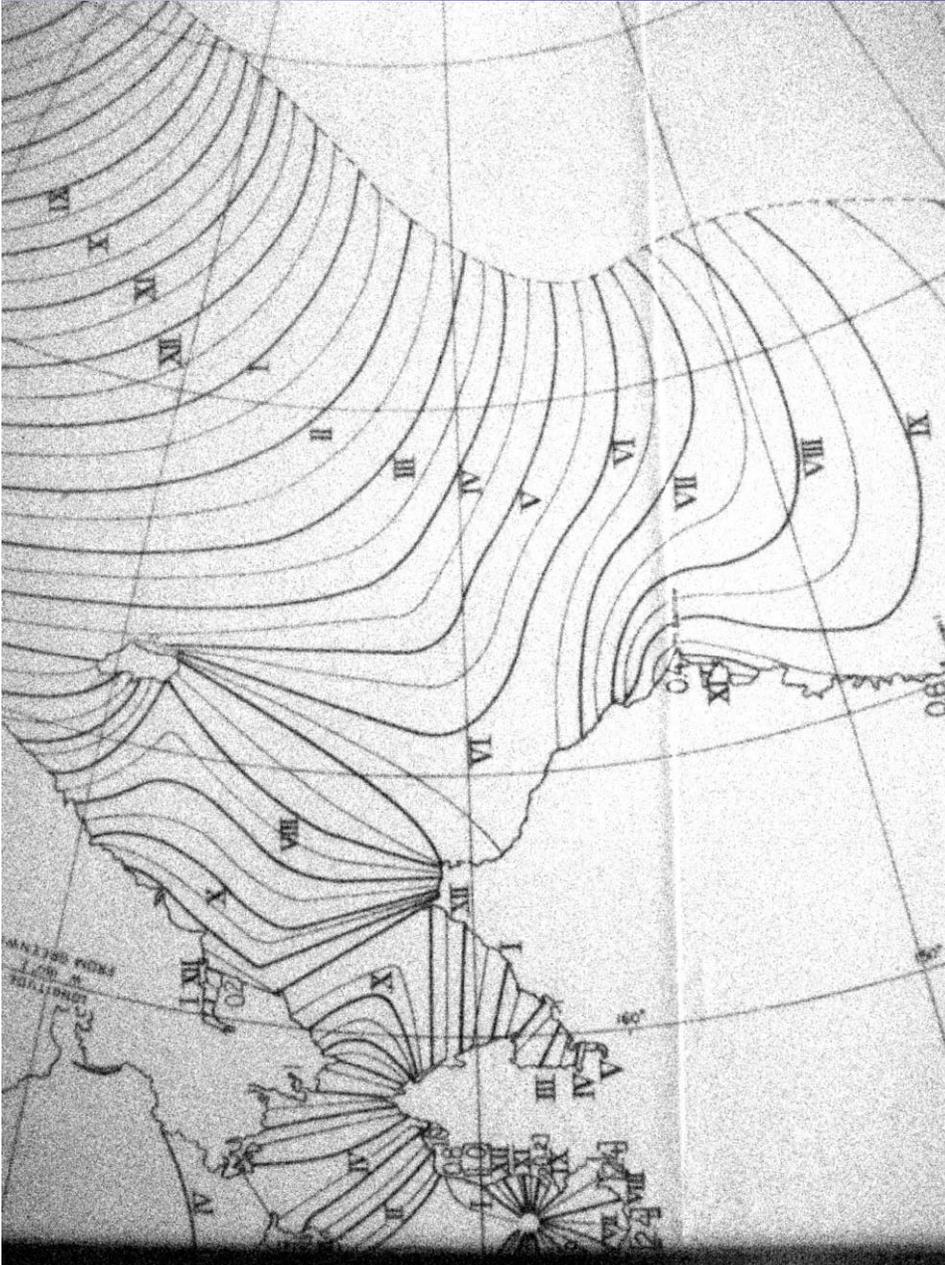


Small Tsunami from  
 Kamchatka logged at  
 Adak NWLON



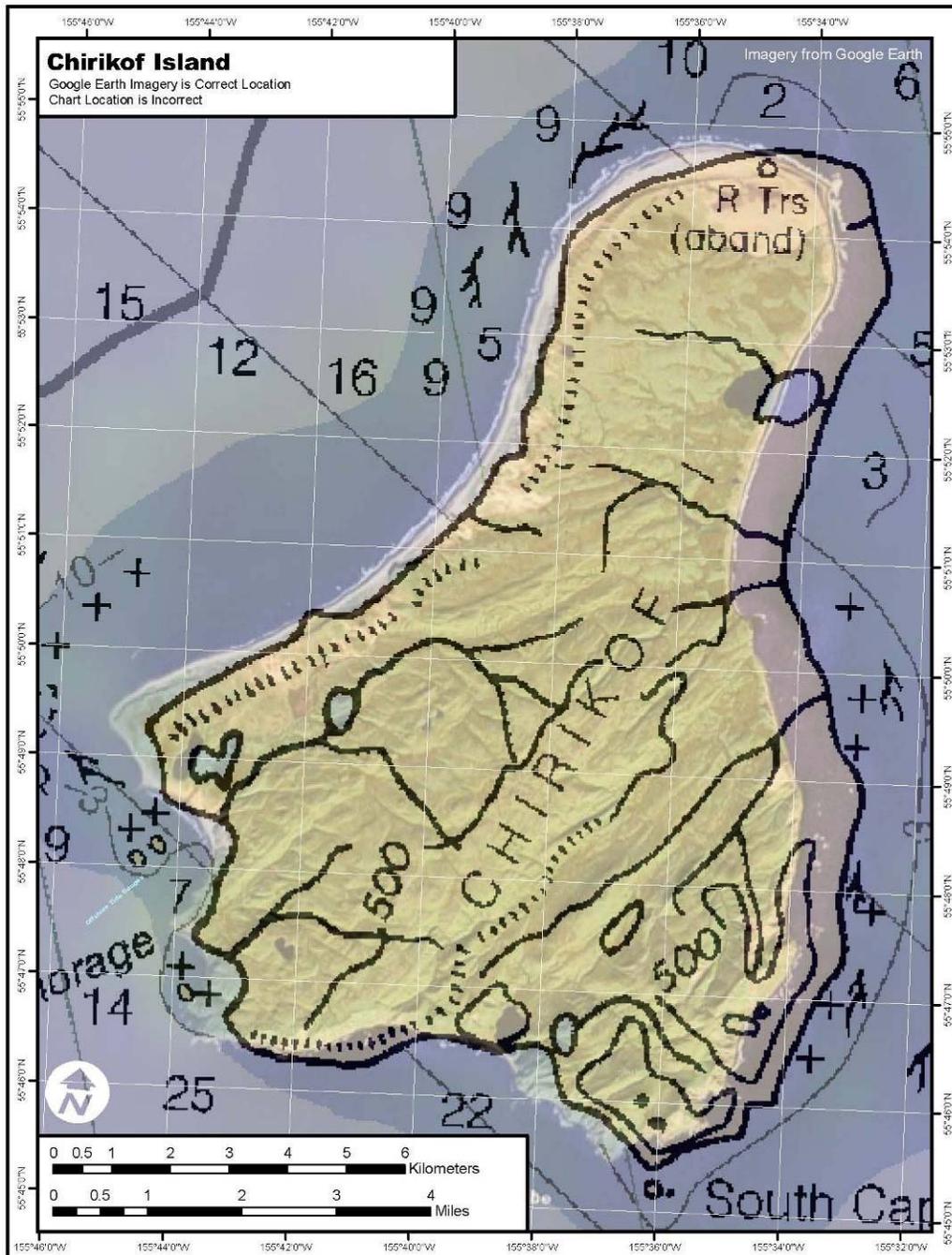
Sea level “change” at Skagway. Isostatic rebound over rides sea level rise!

# 1911 CO-TIDAL MAP FROM C&GS



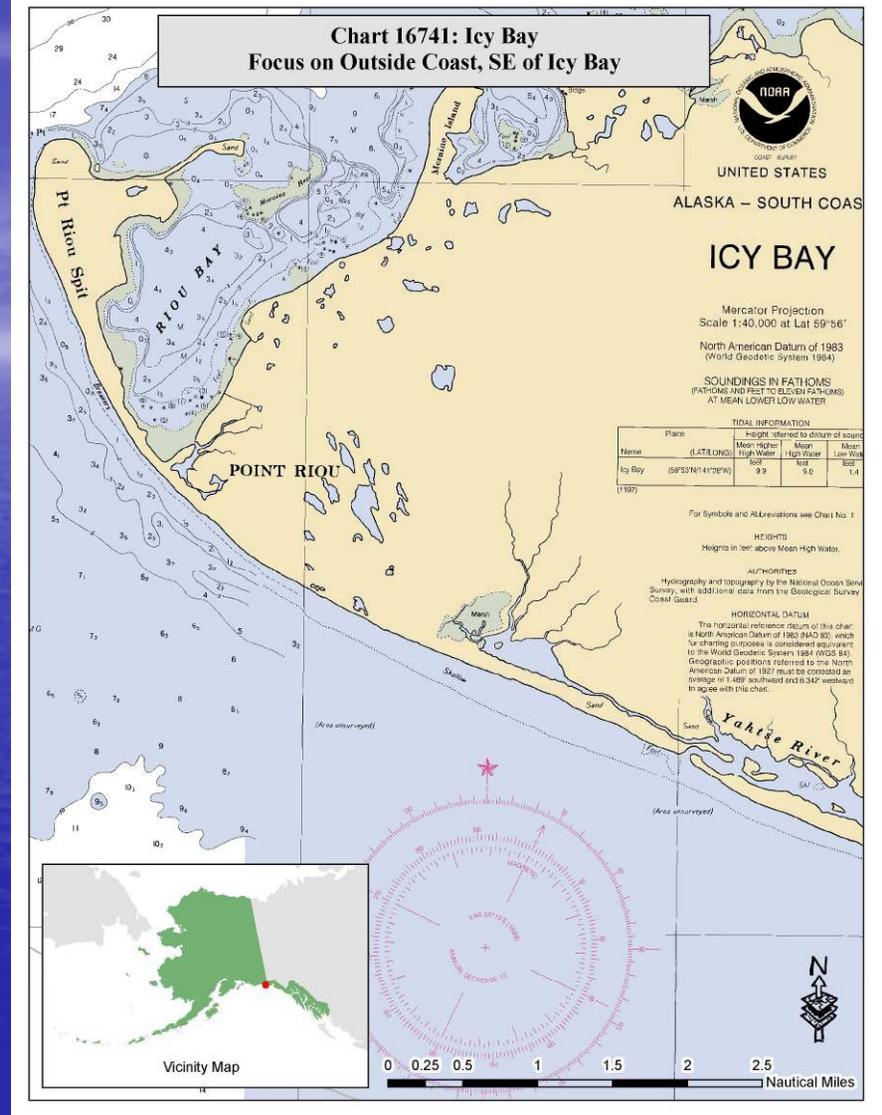
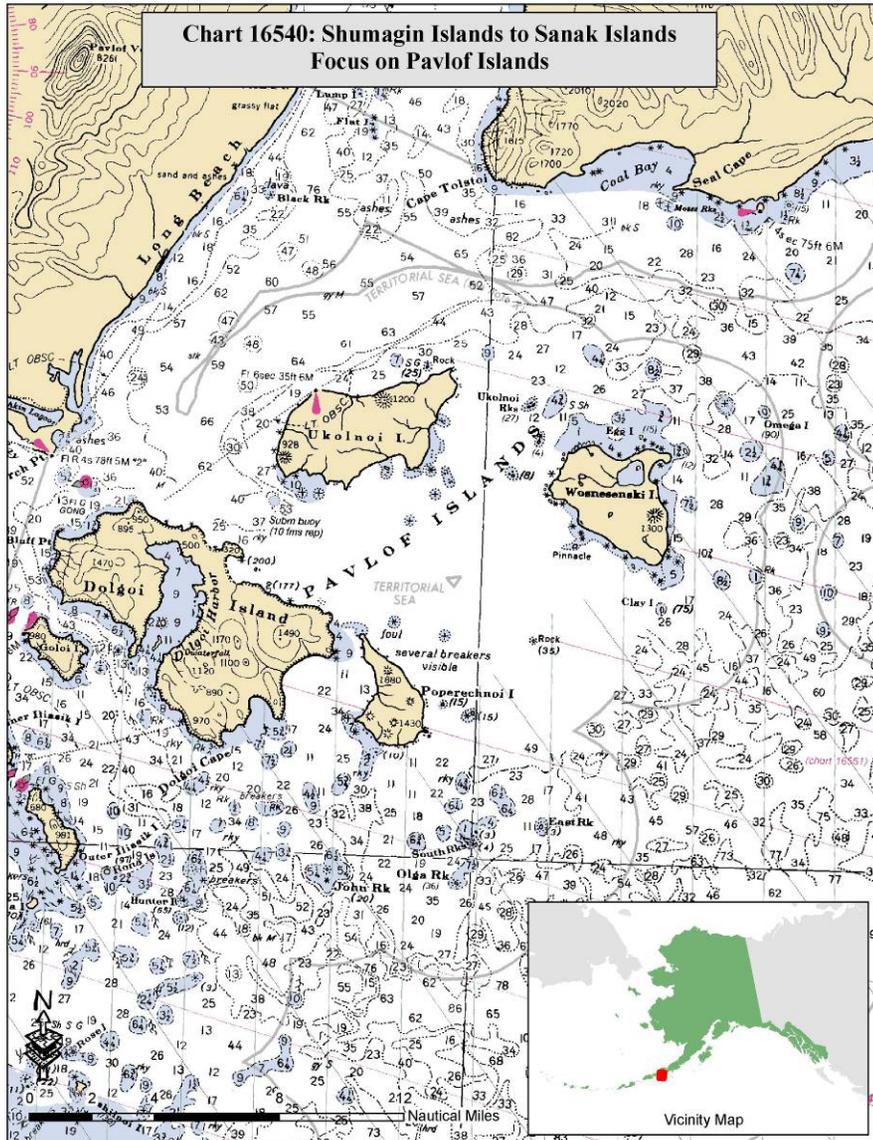
SCIENTISTS BELIEVE IN ARCTIC CONTINENT; Dr Harris convinced there is new land for Stefansson to Discover, maybe 500,000 sq miles  
New York Times 1912

R.Harris – ARCTIC TIDES, 1911  
USC&GS Publication

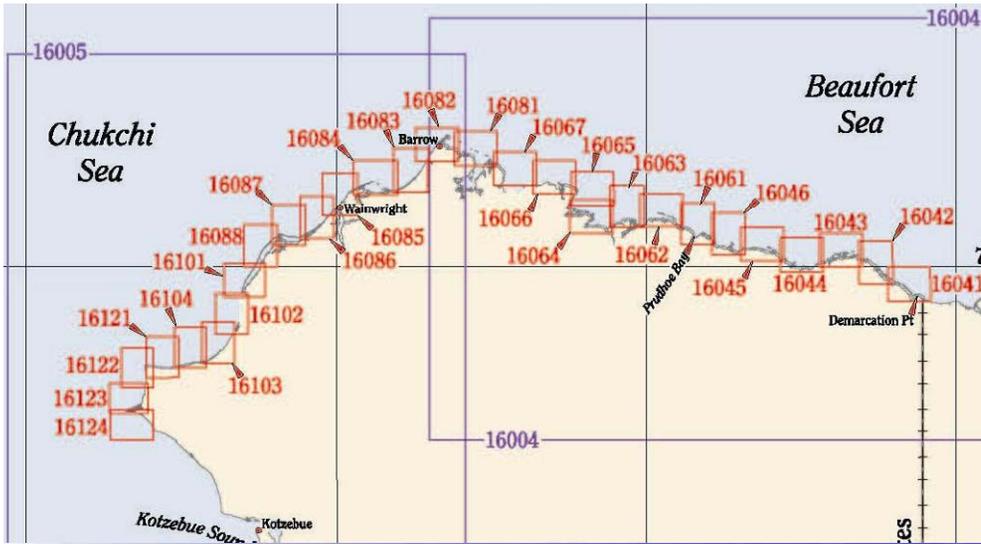


- Bathy lidar job 2006 S of Kodiak
- Island misplaced by a mile
- Based on 1874 astro position
- Google had it correct!

# Unsurveyed areas common on published charts

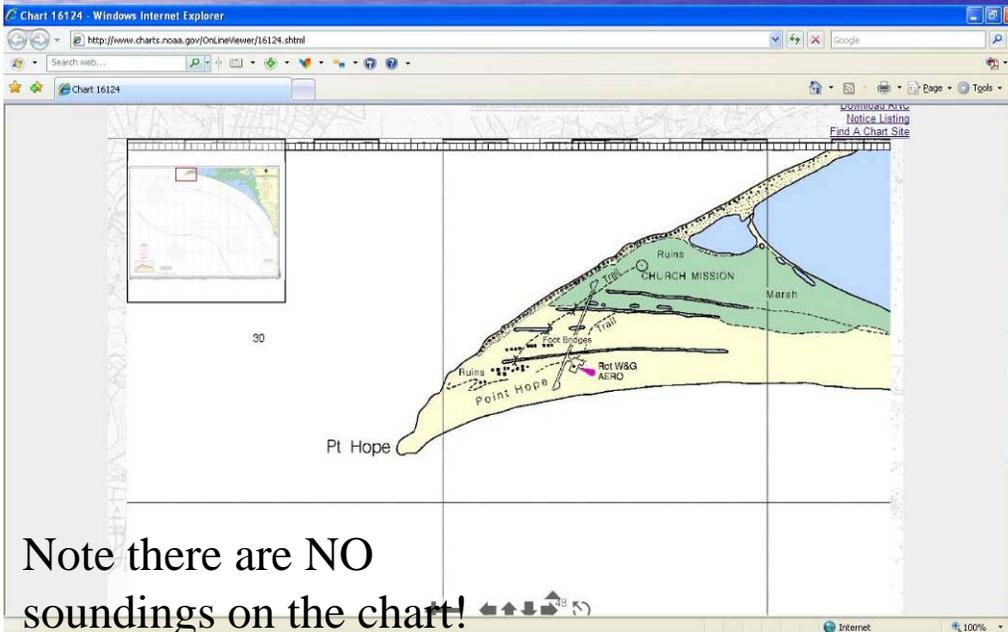


Captain Cook 1770's soundings  
on Alaska charts



- 1:50,000 scale NOS charts, source 1947-53, classified To support DOD/DEW line

Steve Oomittuk house, pre 1970's

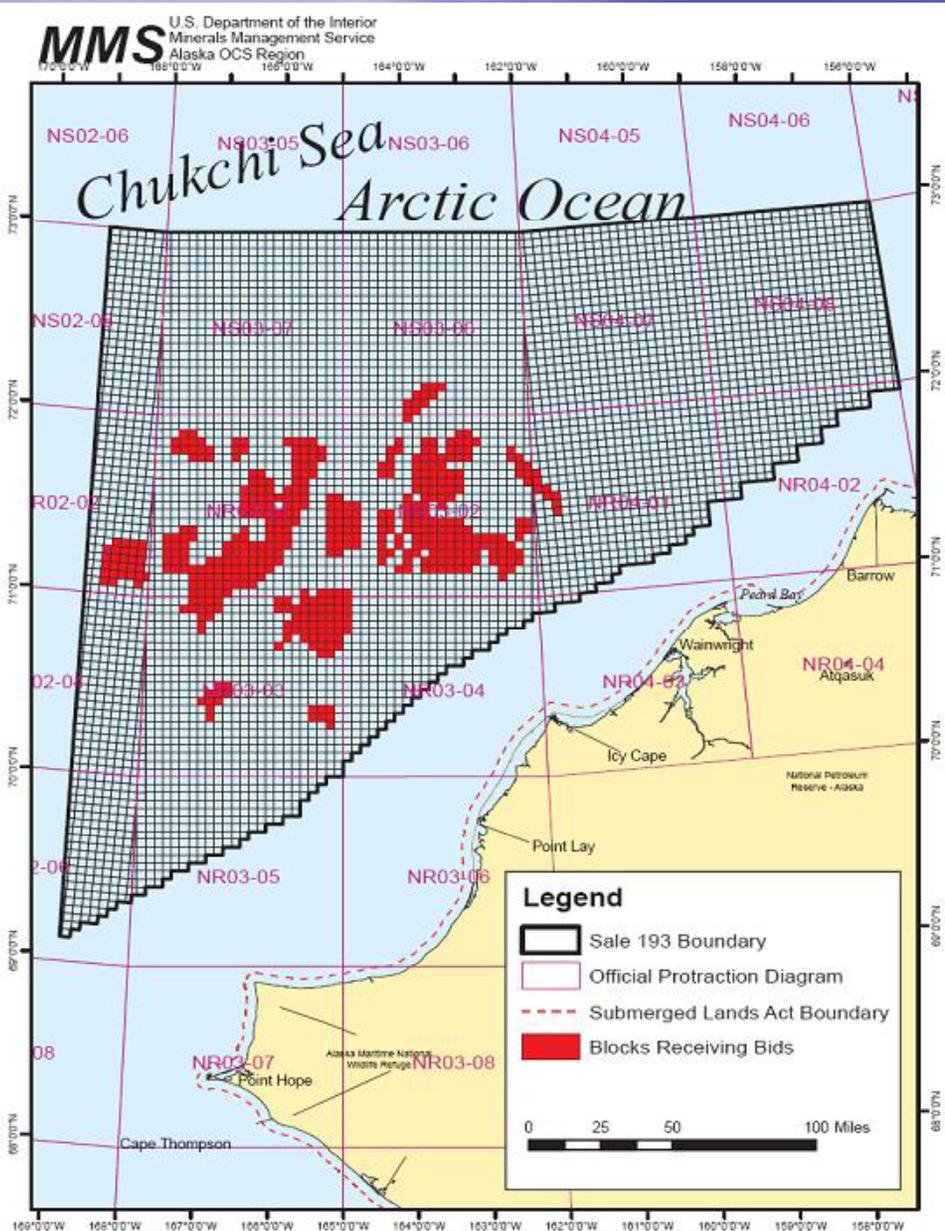


Note there are NO soundings on the chart!

- Pt Hope, 3000 years old
- 700 population
- Village moved in 1970's



# Modern Oil Industry has been involved with Arctic MTS since 1960's



## Feb 2008:

\$2.66 Billion to Feds; Chukchi Sea Lease

- MMS 5 year plan:
  - 9 leases; 5 in Arctic
  - Four areas of Alaska
  - Chukchi and Beaufort
- 
- 31% of Nations' oil and gas in Alaska
  - More oil in Ak OCS than has been
  - Produced at Prudhoe 16B barrels
  - 77% approve but lawsuits ongoing



- Oil Industry post WWII
- Onshore and offshore production
- Summer and winter ops

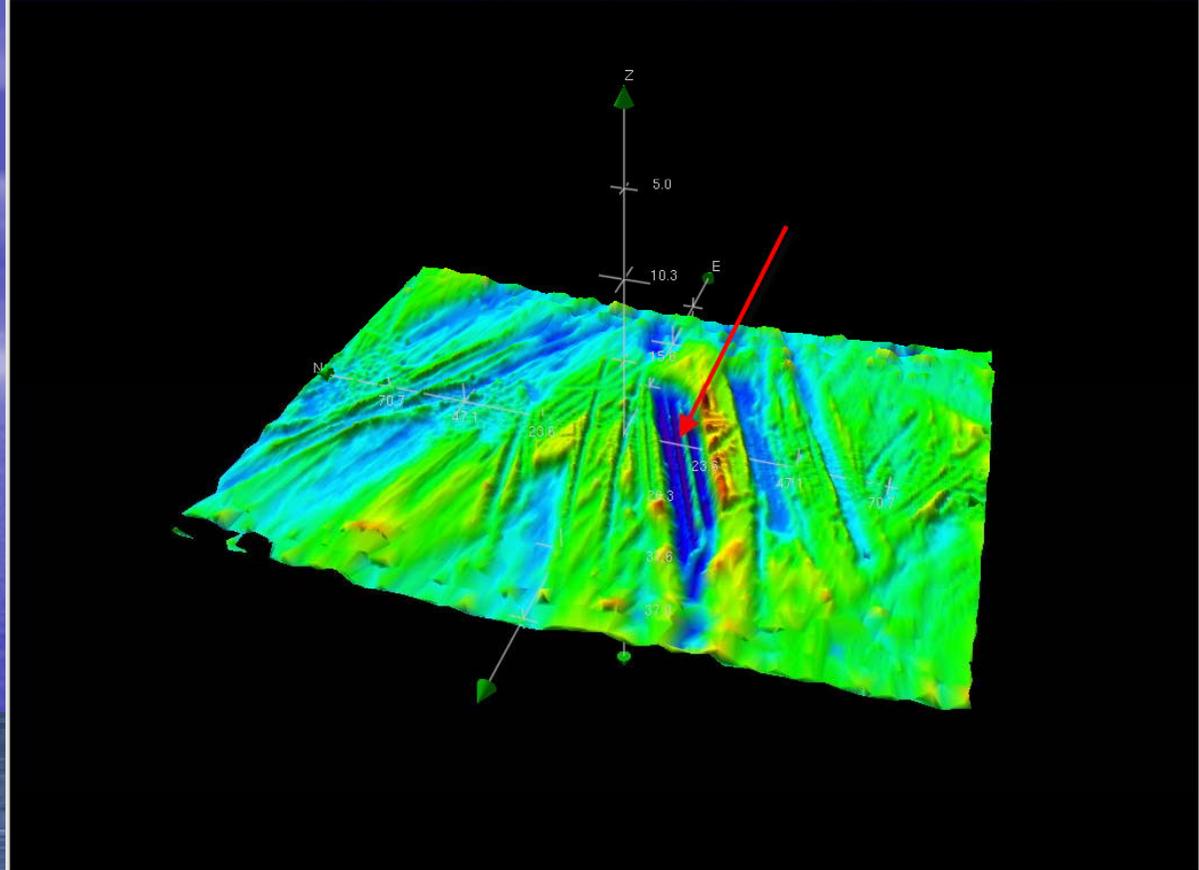


- Ice one day
- Water the next
- Small tide big surges
- Forecasting???



- SSDC Beaufort Sea Tow
- Corridor and site surveys required

Subset Editor - 3D View



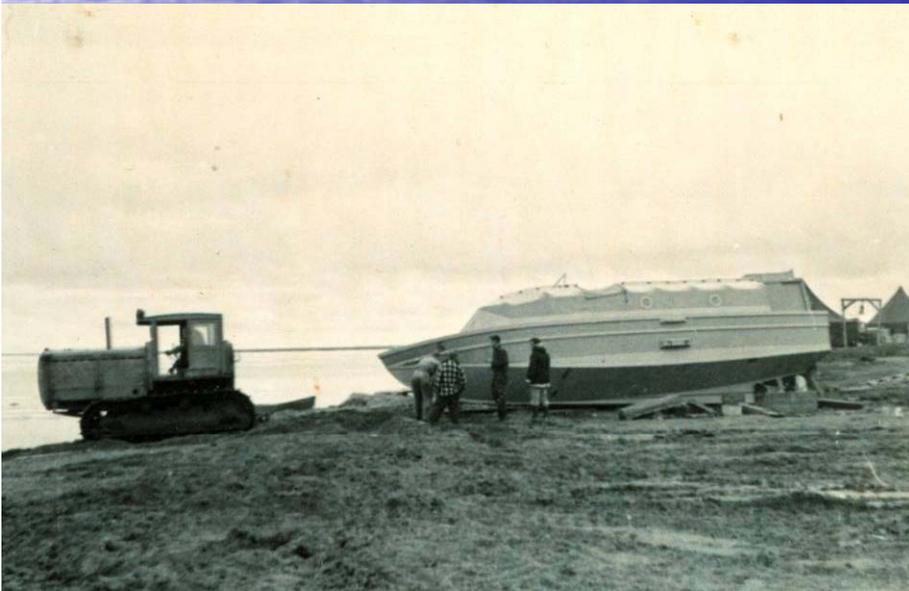
- Beaufort, Chukchi Sea Ice Scours
- Engineering for sub sea pipelines
- other applications
- NOAA wants least depth



1947-1953 C&GS hydro



Support and hydro/seismic work with landing craft type vessels is common



“take apart” Peregrine Falcon



- Prudhoe Bay oil fields
- Modules made in lower 48
- Barged to Prudhoe and remote sites
- Emphasis on minimal surface impact
- Directional drilling
- Discovery March 1968
- Production since June 1977
- 2M b/d at peak, now about 700K b/d



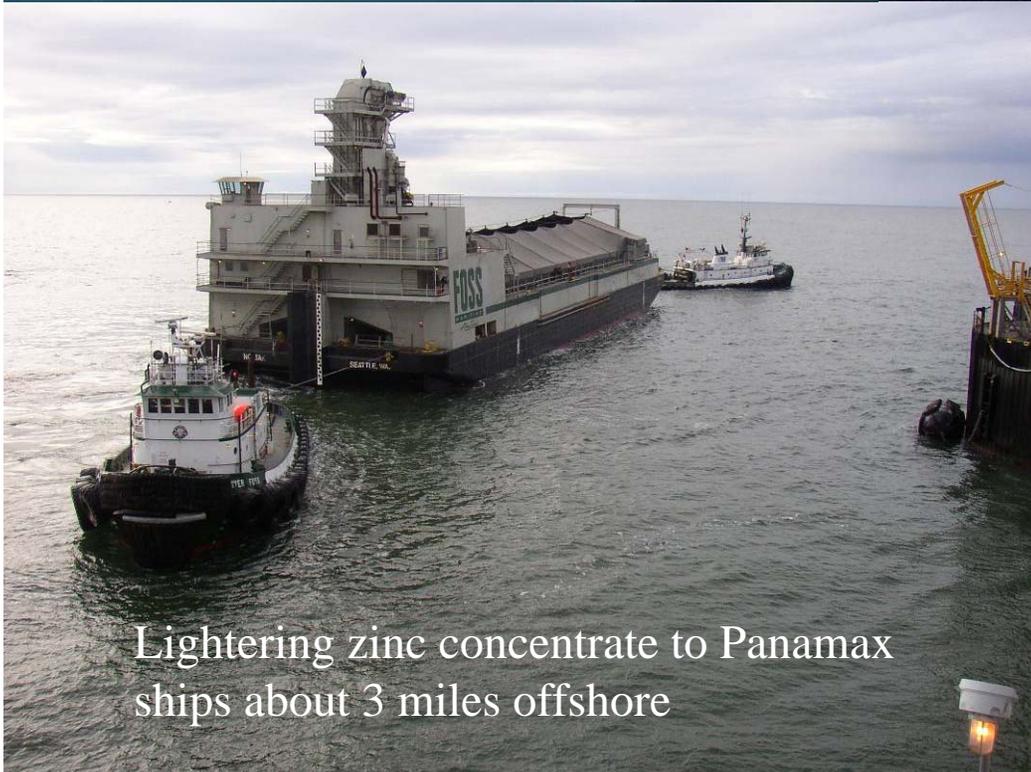
- NGS provided geodetic leveling
- Entire pipeline Prudhoe – Valdez
- OCS provided charting in PWS
- CO-OPS NWLONs at Prudhoe and Valdez
- New Gas pipelines in works



Red Dog Zinc Mine Port & NWLON



Image © 2009 GeoEye  
Aug 8, 2006  
Eye alt 386 m



Lightering zinc concentrate to Panamax ships about 3 miles offshore

- State builds port and road
- Tech Cominco and NANA
- Year round mining
- 30 Panamax ships per year, seasonal
- Largest zinc mine in world
- Port enlargement planned
- \$1B/year revenue
- Few soundings on the chart



Red Dog storm – fall, 20' waves & surge



Red Dog storm - summer

Russia just to right...really!



- More mining in Delong Mountains
- More infrastructure
- More shipping
- Responsible development
- More erosion!

# Cultural Awareness

## Tikigaq Whaling Equipment 2007

	Local	Other
Darting Gun	\$877.00	N/A
Bronze Barrel	\$411.00	N/A
Steel Barrel	\$200.00	N/A
Darting Bombs	\$85.00	N/A
Shoulder Gun	\$1999.00	N/A
Shoulder Bombs	\$95.00	N/A
Gun Harpoons	\$84.00	N/A
Brass Shell Case	\$12.50	N/A
Felt Wads	\$.30 Ea	N/A
Fuse (25ft)	\$7.00	N/A
Brass Rod Tip	\$18.99	N/A
D/S. G. Spring	\$10.99	N/A
D/S.G. Firing Pin	\$10.99	N/A

**Purchaser Must Be a Local Captain !!!**  
No Exceptions  
TIKIGAQ MANAGEMENT



- Whaling Traditions
- Very strong
- Conflicts with oil development
- Conflicts with marine surveys!



- Thousand year old traditions
- Inupiat Eskimo whaling
- Must work with local people



- Beluga and Bowhead whaling
- Other subsistence activities

# Nulakitaq in Pt Hope

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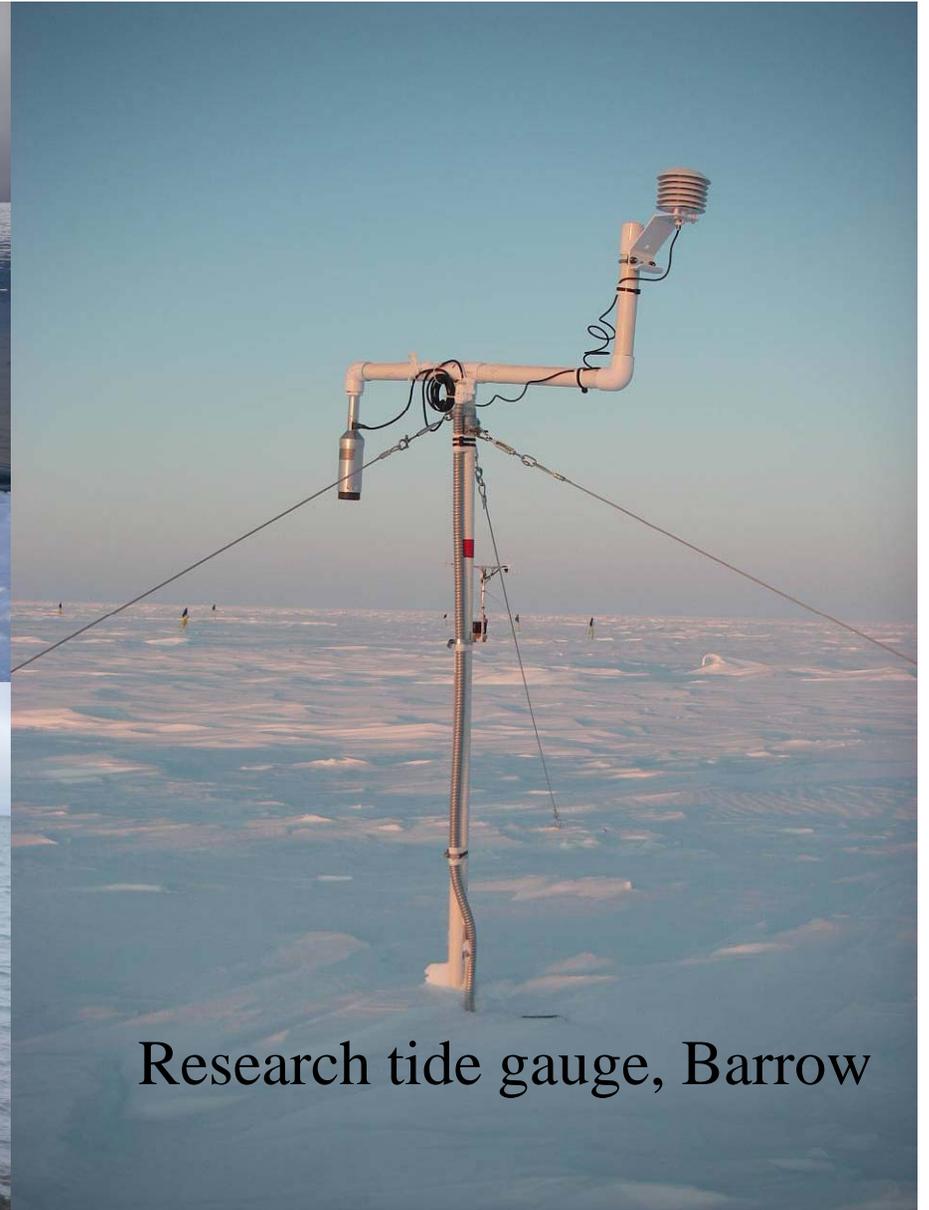


- CO-OPS Barrow 2008 - ???
- Tides and CTD
- Bottom mounted
- Use GPS and conventional

Independent QC check for gauges



Tidal Mark from 1981, Kaktovik



Research tide gauge, Barrow

## Barrow movable boat ramp



## Barrow fuel barge and hydro vessel for dredging



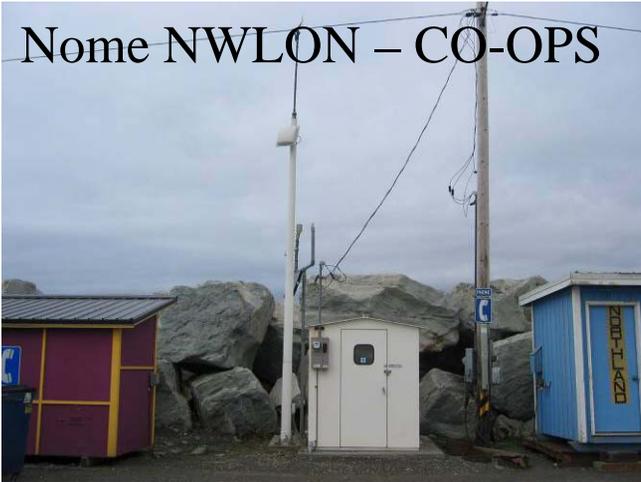
- Small boat hydro
- Single beam, MBES, side scan
- Oil, mining, dredging
- Beach nourishment



Planes for access to remote sites

JOA Surveys, LLC

Nome NWLON – CO-OPS



Kotzebue Tertiary - NGS



Eskimo helpers – Pt Hope



- Beach erosion is serious
- Big fetch, fall storms & surges
- Millions spent on:
  - Beach nourishment
  - sand bags, cells, mats
  - relocation studies
- Funded by State, COE, NSB
- State Climate Commission
- Senate hearings in Anchorage

Tide gauge demob – Wainwright  
at 20 below



Three bears at tide gauge-Wainwright

Looking for tidal bench marks under  
25 feet of snow at demob in Kaktovik



Not uncommon to work at:

- 30-50 below
- 30-40 mp winds
- Blowing snow
- Little or No light much of year



Vicinity of CO-OPS tide gauges, 2 miles offshore Barrow – February 2008



Tide gauge demob, Pt Lay, Barrow



Gauge demob – Wainwright Inlet



Niksiuraq gauge, Barrow

- Highly variable ice
- Late breakup in 2008
- Early freeze up 2008

## Mosquitoes – Pt Lay



Sandals, 75°, on the beach near Prudhoe



NOAA ship Surveyor in Bering Sea

Ice Forecasting/Risk Analysis

JOA Surveys, LLC

## Ideas for NOAA consideration

### Office of Coast Survey:

- ✓ Define and prioritize emerging areas in NHSP 2009-2010
- ✓ Shallow water now, deep water after ice melts
- ✓ Arctic field work 2010 and beyond, develop a rational and coordinated plan ask for additional funding
- ✓ Use contractors in Arctic with highly mobile ops; Barrow project or 60 day recon in 2010
- ✓ Risk analysis for NOAA type ship ops
- ✓ Use of GPS for tides
- ✓ Fill Navigation Advisor Position

## Ideas for NOAA consideration

### National Geodetic Survey:

- ✓ Much of shoreline out of date, work with USGS, BLM, and State of Alaska in joint effort...the periodic updates
- ✓ VDATUM, GRAV-D
- ✓ Use of GPS for tides, assist OCS
- ✓ CORS density and true sea level change
- ✓ Fill Geodetic Advisor position

## Ideas for NOAA consideration

### CO-OPS:

- ✓ Continue long term tide observations at the two NWLONS and Barrow
- ✓ True sea level change
- ✓ GAP Analysis Report: add CMTS and climate priorities
- ✓ New technology to reduce cost and risk
- ✓ Quicker turnaround on publishing results
- ✓ Outreach through Alaska advisors

## Ideas for NOAA consideration

### Coordinated Effort by ALL

- ✓ One Executive for charting or Arctic functions
- ✓ In Alaska to make decisions/recommendations
- ✓ Be proactive to climate change/charting/mapping in Alaska NOW
- ✓ Funding requests to Congress...before there is a problem...so NOAA not left behind



Redoubt Volcano last week from “almost” my house



*respect the past - live the present - plan the future*