



CASD

Center for Arctic Sustainable Development

A National Science Foundation
Industry/University Cooperative Research Center



John Hedengren
Brigham Young University



Nettie La Belle-Hamer
University of Alaska Fairbanks



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Presentation Outline

- Overview of the Center for Arctic Sustainable Development
 - NSF I/UCRC program
 - Status of CASD
 - BYU Arctic Research Overview
 - Proposed Projects
 - Plans for future



NSF I/UCRC PROGRAM OVERVIEW

- I/UCRC: Industry-University Cooperative Research Centers Program
- Objective: Bring together university researchers, industry, NGO, and government agency stake-holders to collaborate on research
 - Explore new R&D directions
 - Solve problems of importance
 - Provide training for the next generation of leaders



NSF I/UCRC Program Highlights

- Established in 1980
- 56 centers, 156 sites currently
- 754 memberships
- Average of 18 sponsoring members per center
- Average of 4 universities per center
- Average 15 faculty scientists per center
- Largest - \$12M, Average - \$1.7M, Smallest - \$120K

Well established, proven, highly successful program



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NSF I/UCRC Strategy

- Traditional research model
 - One sponsor- one project
 - Limited impact
 - Slow knowledge transfer
- I/UCRC model
 - Interdisciplinary and collaborative team:
 - Industry
 - University
 - Non-governmental organization (NGO)
 - Government agencies
 - Synergistic efforts -rapid and significant impacts
 - Pre-competitive
 - Fundamental
 - Broad support from sponsoring members



I/UCRC Model Additional Details

- Funding from members is highly leveraged
- Shared research portfolio of pre-competitive technologies
- Collective ownership, collective decision making
- Research driven by ideas of advisory board (AB)
- Focus shift
 - Problems facing an organization to problems facing entire Arctic exploration and production industry
 - Short-term narrow IP to long-term fundamental research
 - Single-organization to multiple organization

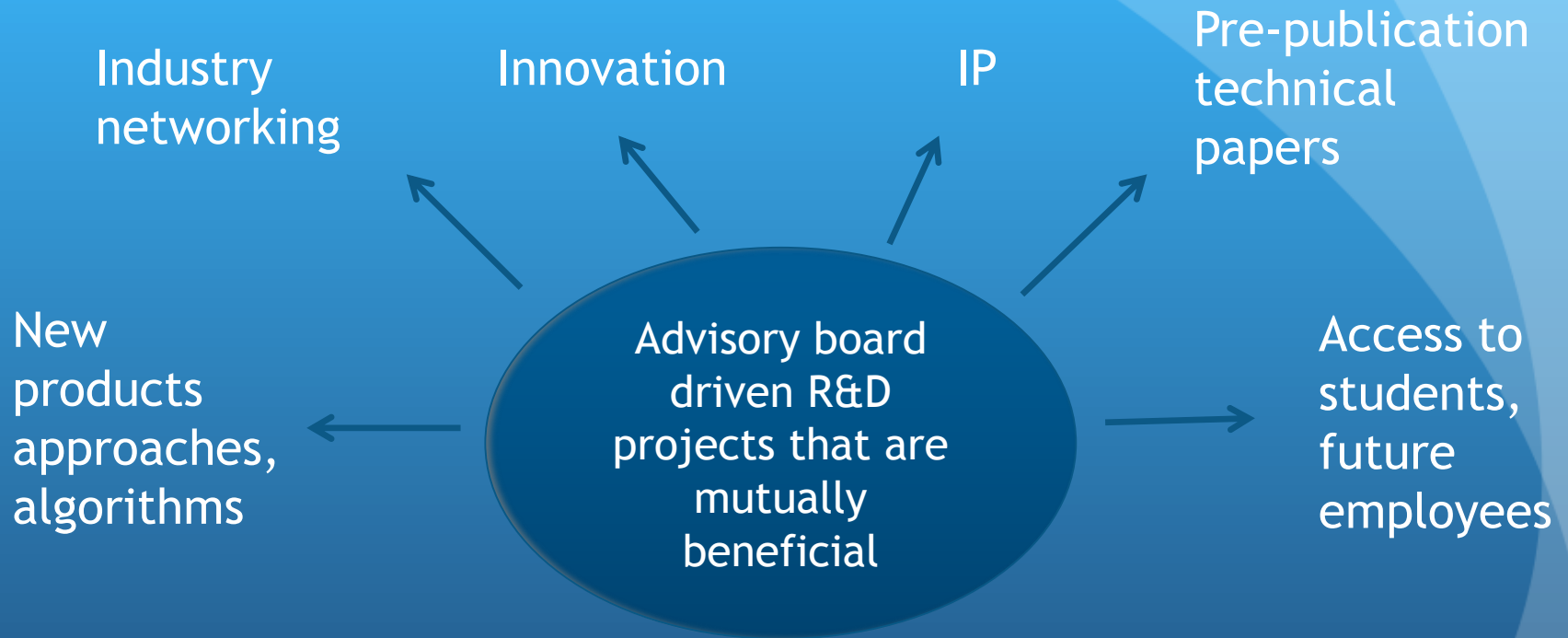


How does leveraging work?

- Initially 12 members, \$100K membership fee
 - +12 x \$100K = \$1.2M
 - +University matching = \$225K
 - +NSF funding = \$80K + \$55K = \$135K
- Total funding per year = \$1.5M
- Partners identify 3-5 key projects
 - Each project 3-4 grad students, oversight of faculty
 - Critical mass of talent, effort, focus
- For cost of one membership, partners have access to work of numerous graduate students/faculty
- Can expand with more university and sponsoring members



What are tangible benefits?



- Direct oversight of research by Advisory Board (AB)
- 10% max university overhead instead of regular >50% external research model
- Research management “franchise” with operations protocol and evaluation tools



What happens to the IP created?

- IP created within university belongs to university (Bayh-Dole Act)
- Center sponsors entitled to nonexclusive, royalty-free licenses
- Companies wishing to exercise rights agree to pay costs of patent application
- If only one company seeks license, company may obtain exclusive, fee-bearing license



Research Project Accountability

Project definition includes:

- Project leader
- Proposed budget
- Experimental plan
- Milestones for current year
- Deliverables for current year
- Benefits to member company
- Progress to date
- Estimated start date
- Estimated knowledge transfer date



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I/UCRC Executive Summary - Project Synopsis

Center/Site:

Tracking No.:

Phone : () -

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Center/Site Director:

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Project Leader:

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Project Description:

Experimental plan:

Related work elsewhere:

How this project is different:

Milestones for the current proposed year:

Deliverables for the current proposed year:

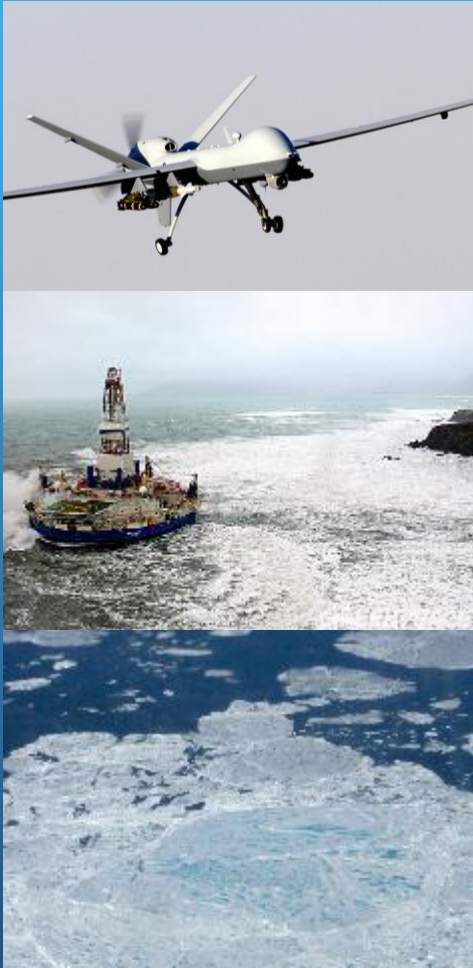
How the project may be transformative and/or benefit society:

Pre-competitive Research

- Fundamental, early phase research
- Advancements within center provide benefits to members without exposing their strategic interests
- Questions companies and agencies should consider:
 - What R&D directions should we pursue five years from now?
 - What will my customers want from my company/agency ten years from now?
 - What preliminary research can we do right now to determine viability of these potential R&D directions?



CASD Overview



Vision: Enable environmentally responsible exploration and production of energy resources in the Arctic

Mission: Address fundamental challenges for Arctic technology research and development

Guiding documents such as:

- National Petroleum Council on Arctic technology
- National Research Council on oil spill response



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Who Are We?



Center Lead



Participant



Center Site

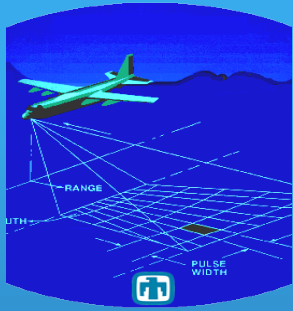


Participant



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Arctic Research at BYU



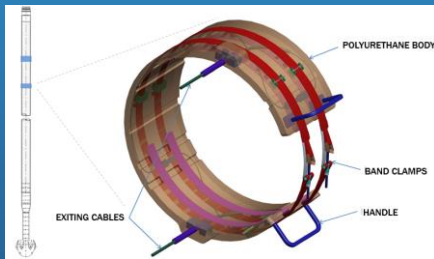
Synthetic Aperture Radars



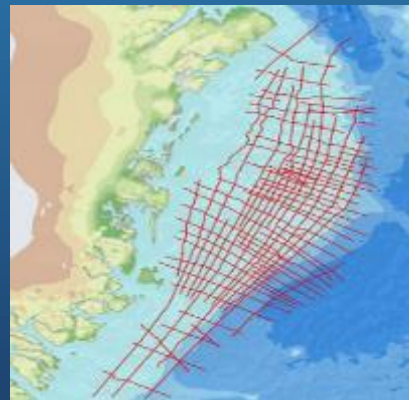
Unmanned Aerial Systems

- Weather tool
- Estimate ice thickness
- Open ice vs. sea ice
- Satellite-borne SAR

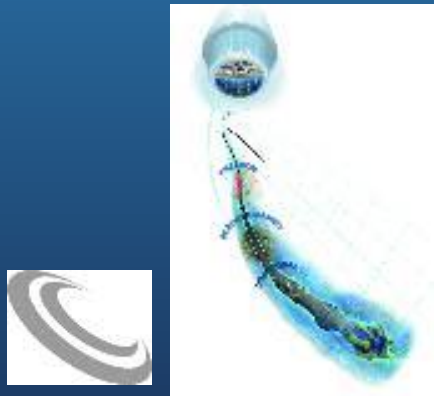
- 24 hour sea ice surveillance
- Iceberg hazards detection
- Critical infrastructure monitoring



Intelli-field Monitoring



- Wired Drill Pipe Telemetry
- Fiber optic sensors
- Real time monitoring
- sUAVs inspection of pipelines
- High fidelity reservoir modeling

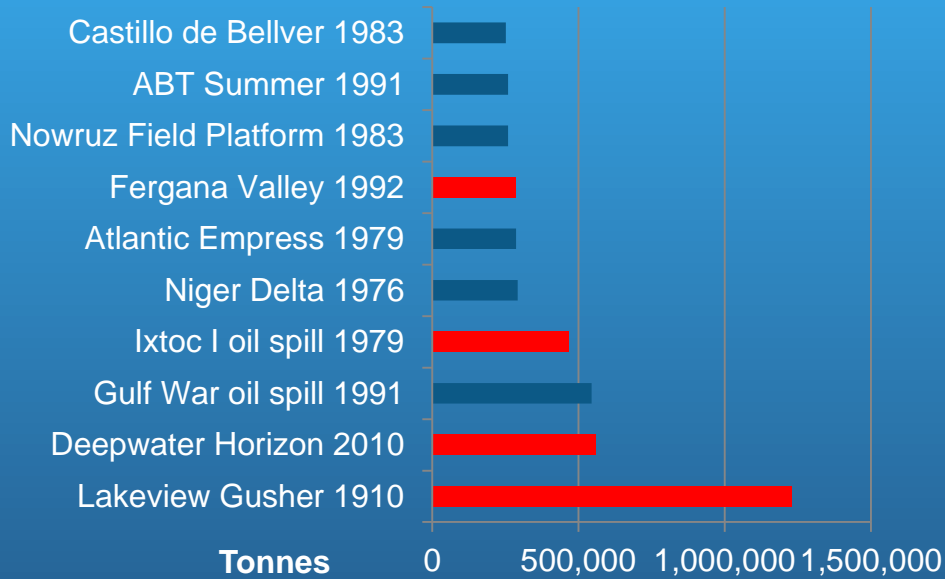


Access Industry 3D Seismic Reflection Data

- Workflows involving geo interpretations
- Structural faulting and stratigraphic anomalies affect production
- Seismic attribute analysis

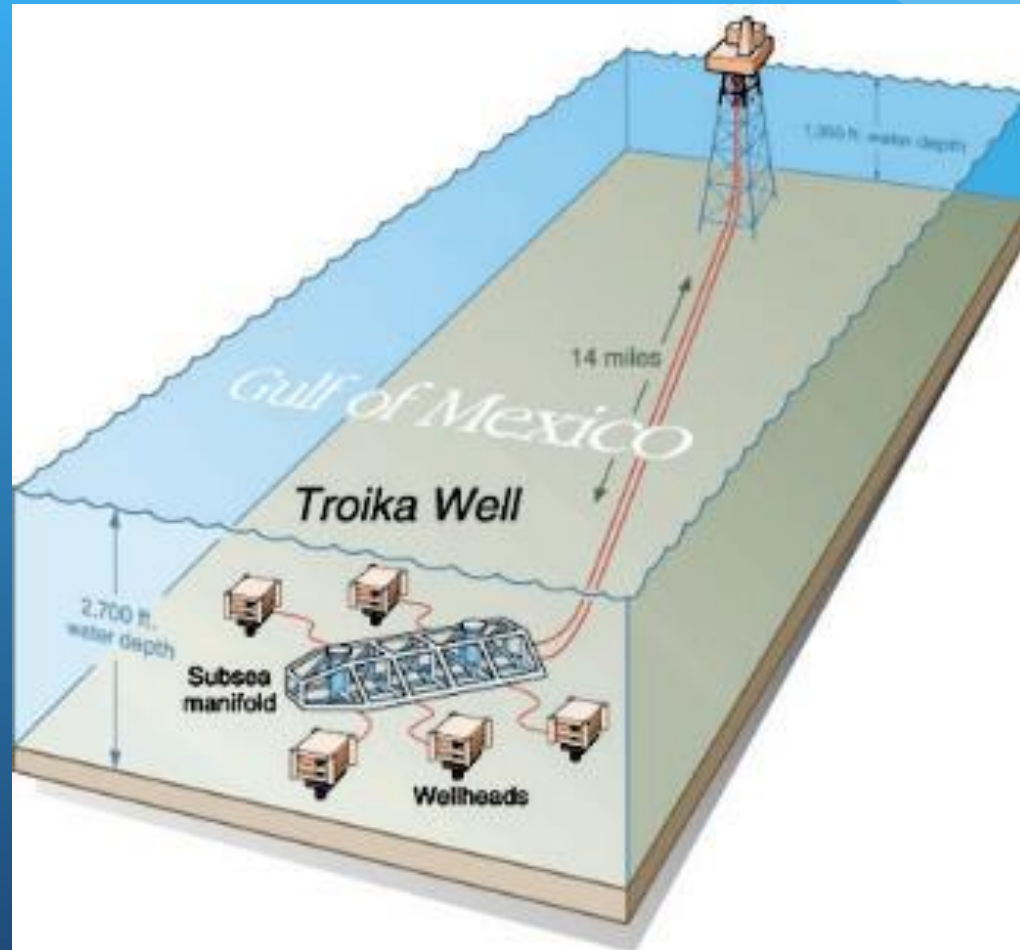
Less Risk Tolerance in the Arctic

10 Largest Oil Spills



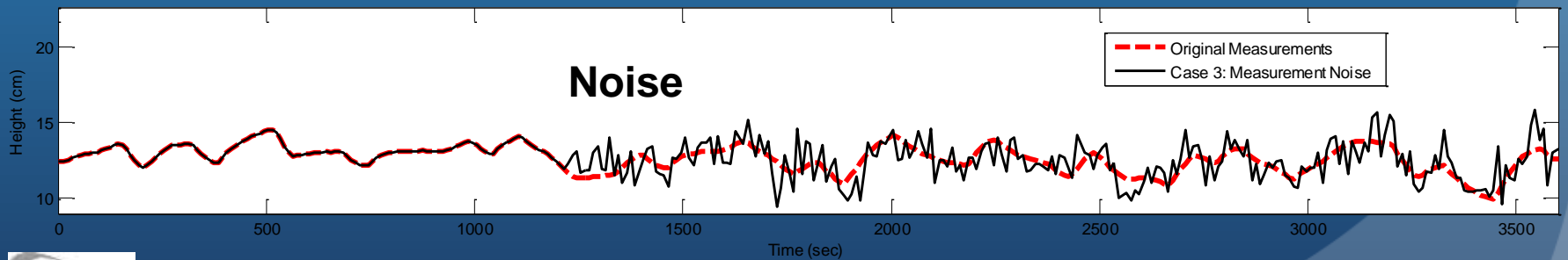
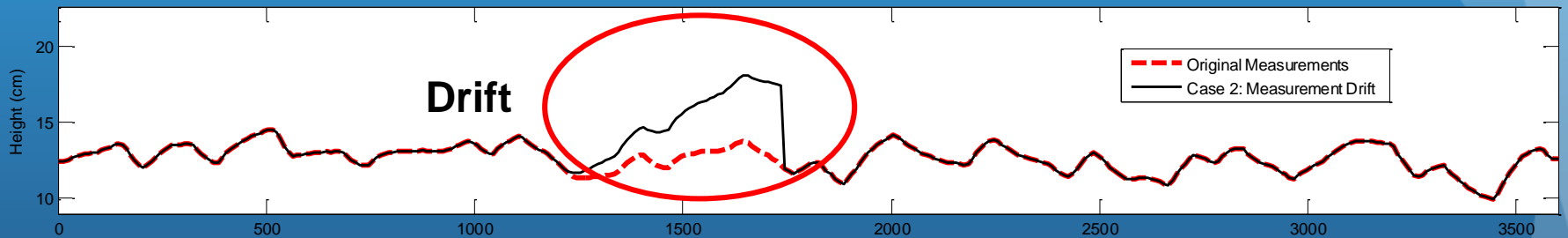
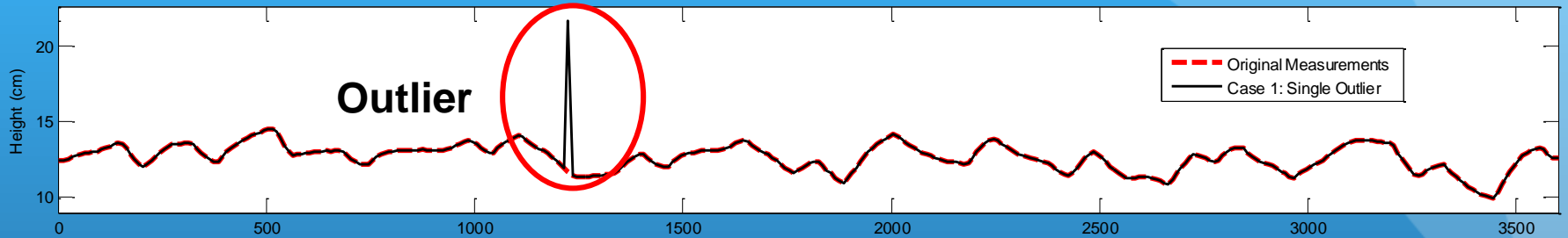
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Intelli-Field Changes Focus from Big Reaction Capabilities to Smart Prevention

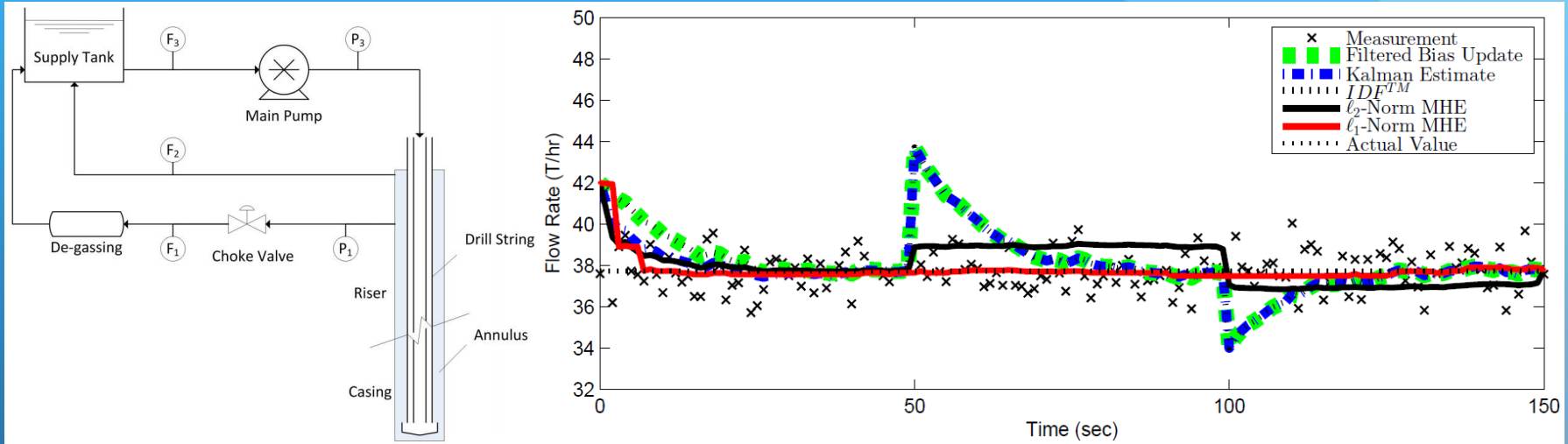


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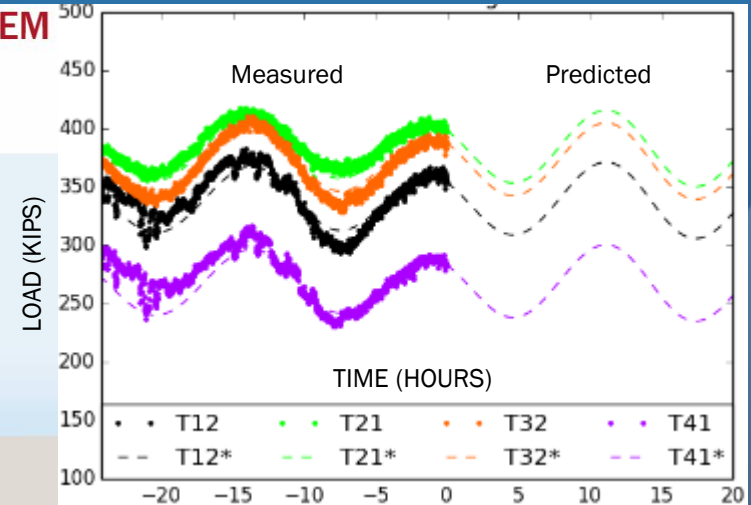
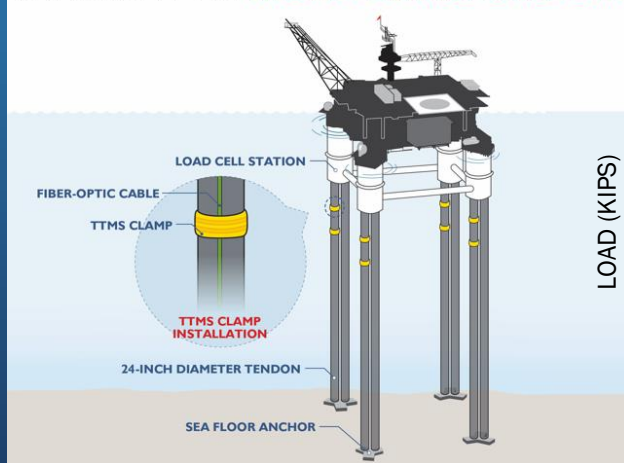
Intelli-Fields Affected by Bad Data



Need Actionable and Predictive Information



TENSION LEG MONITORING SYSTEM



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SPE/IADC-173045-MS

Rev.09 3 Oct 2014 (Deadline 31 Oct 2014)

Drilling Modeling and Simulation: Current State and Future Goals

Junichi Sugiura, SPE, Schlumberger; Robello Samuel, SPE, Halliburton; Joachim Oppelt, SPE, Baker Hughes; G. P. Ostermeyer, SPE, Braunschweig Technical University; John Hedengren, SPE, Brigham Young University; Paul Pastusek, SPE, ExxonMobil; and Geoff Downton, SPE, Schlumberger

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Abstract

Who Are We?

Leading academic researchers in Arctic studies

Academic researchers with experience working with and in the oil and gas industry

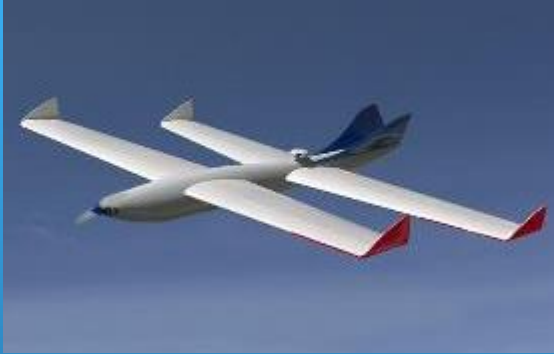
Multi-disciplinary research team in geological sciences, remote sensing, drilling automation and advisory systems, marine policy, and indigenous community outreach

Center Director, Mark Myers (UAF) former director USGS



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Center Capabilities



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Potential Industrial Advisory Board Members

- Leading oil and gas operators with interest in Arctic development
- Service companies with interest in commercializing emerging Arctic technology
- NGOs, Government, and regulatory organizations with interest in directing priorities and standards
- National laboratories, NASA, and other government commissioned organizations with interest in testing and certifying and Arctic technology



What is the Research?

- Proposed research to address fundamental challenges outlined by the National Petroleum Council's report on technology needs for the Arctic.
- Example Project Proposals for consideration by the IAB
 - Sea ice thickness measurement from satellite and airborne radar platforms - David Long, BYU
 - Oil Detection with UAV Carried Hyperspectral, SAR and Optical Sensors - Nettie Labelle-Hamer, UAF
 - sUAV-based Pipeline Monitoring - John Hedengren, BYU
 - Intelli-field sensing and preventative analytics - John Hedengren, BYU
 - Stratigraphic controls on permafrost-involved hydrate accumulations in the Alaskan Arctic - Sam Hudson, BYU
 - Predicting properties and stability of shallow hydrocarbon accumulations in the offshore Arctic - Sam Hudson, BYU



Center Timeline and Status

- August 2014 - Initial Center Advisory Board Meetings in Houston, Seattle, and Anchorage
- November 2014 - NASA Johnson space center update meeting
- March 2015- Letter of intent submitted to NSF
- March 2015- Planning grant proposal submitted to NSF with 20+ letters of interest



Top 10 Reasons to Join CASD

1. Pooling money improves return on investment in new technology
2. Members direct the selection and execution of research topics
3. Access to leading researchers at BYU, UAF and potentially other institutions
4. Opportunity to license technology generated through the center
5. Opportunity to initiate and direct research of fundamental importance to Arctic research community as a whole
6. Resume book and familiarity with graduates who are well trained in multi-disciplinary aspects of Arctic research
7. Strategic networking and synergistic cooperation opportunities with complementary and competitor companies
8. Access to semi-annual Center meetings with short courses from research leaders
9. Center participation and research enhance reputations and visibility of members
10. Industry, government, and NGOs collaborate as peers to address critical R&D needs



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How Can You Help Us?

- Join us for our next Advisory Board (AB) Meeting
- Assist us in defining research problems of paramount importance for Arctic technology development
- Build support within your organization for joining our center
- Share your contacts with other organizations that may have interest in our center
- Incorporate your center membership fee into your CY 2015 budget



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Summary

- NSF I/UCRC Program is strong, well established program with a long history of leveraged outcomes
- CASD is among the newest I/UCRC's - intent on addressing pressing problems facing Arctic challenges
- Seeking guidance and support from Arctic industry, NGOs, and government agencies



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Questions?

John Hedengren

john_hedengren@byu.edu

Nettie La Belle-Hamer

allabellehamer@alaska.edu



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