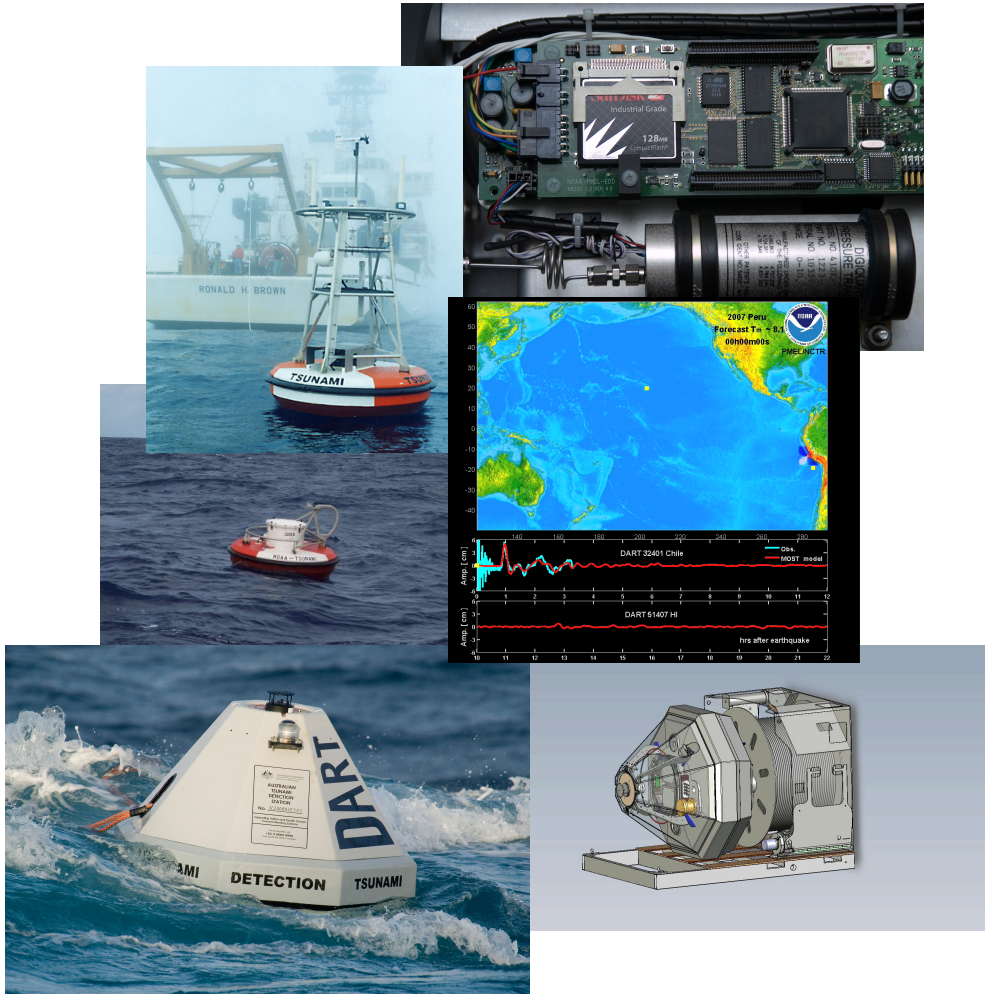


# Developments in Tsunami Measurement and Monitoring

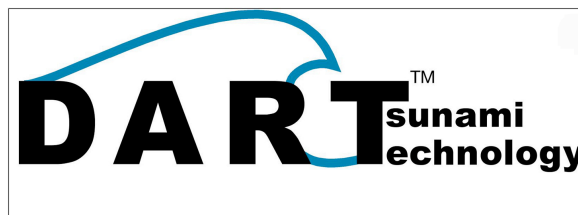
*Christian Meinig  
NOAA/PMEL*

*PMEL-Lab Review  
August 2008*



# DART<sup>®</sup> system evolution

- 1) 20 yrs+ of tsunami research *(early 80's)*
- 2) Internally recording instruments *(mid-80's)*
- 3) One-direction realtime reporting (DART<sup>®</sup> I) *(mid-90's)*  
*Transitioned to NOAA operations*
- 4) Bi-directional, global reporting (DART<sup>®</sup> II) *(2003)*  
*Patentend & transitioned to NOAA operations*  
*Concept copied/adopted by commercial vendors* *(2006)*
- 5) Bi-directional, global, easy to deploy R&D (DART<sup>®</sup>-ETD) *(2007)*
  - *SAIC licenses DART II technology*
  - *Systems deployed with Indonesian and Australian R&D partners* *(2008)*
  - *45 systems installed, adoption in 5 countries*



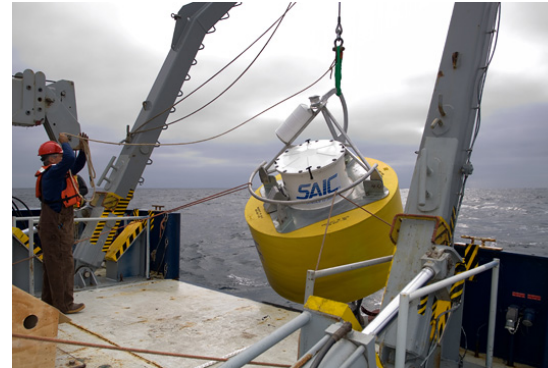
# International Leadership

- DART system description publicly available after Sumatra tsunami
- Concept copied and adopted by 4 commercial firms and 3 national efforts
- Founding member of IOC-International Tsunameter partnership (standards, tech transfer, etc)
- MOUs and tech transfer agreements:
  - NOAA-NDBC
  - Australia (Bureau of Meteorology)
  - Indonesia (BPPT)
  - Chile (SHOA)

# Commercial DART<sup>®</sup> Licensee



- Application/selection process
- Non-exclusive, royalty generating
- Sales 2007-2008 ~\$2.7M
- On going partnership





# Recognition

- Patent & Patent (Pending)
- Dept of Commerce Gold Medals (2ea)
- Dept of Commerce Bronze Medal
- NOAA Tech Transfer Award

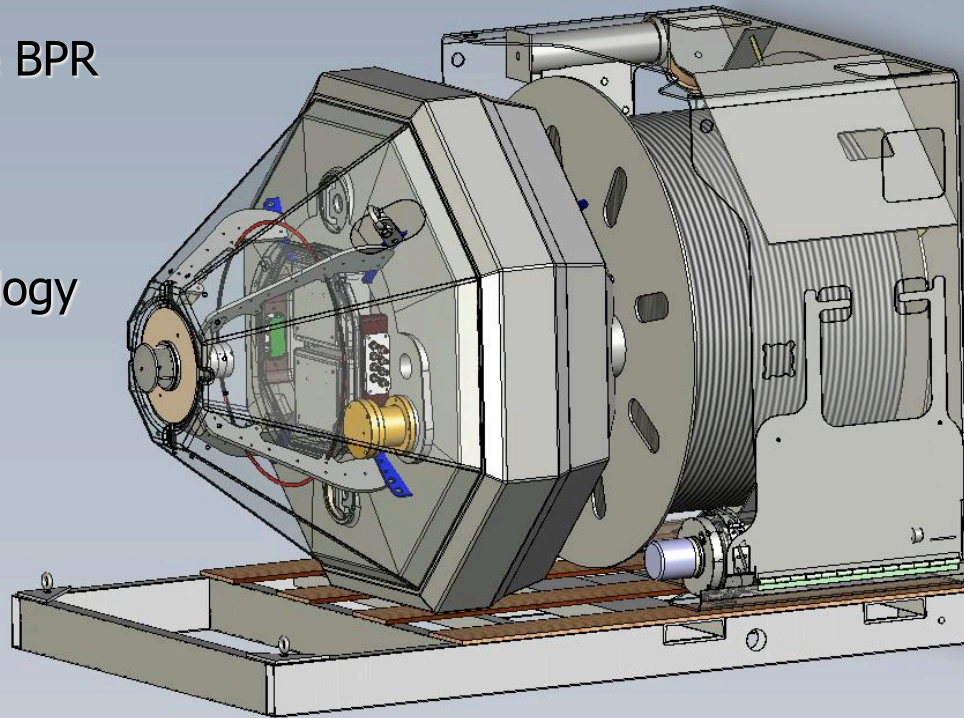
# Key PMEL Technology Developments 2004-2008

- Novel 'self-deploy' mooring design for manufacture and safe, efficient operations
- Continuous Composite Mooring (patented w/ partners)
- Vandal Resistant, flexible design
- Expendable 4-year BPR
- Robust acoustic modem integration and protocols

# DART<sup>®</sup>-ETD

## Features:

- ~4 year expendable BPR
- Conex packaging
- MET sensors
- "Factory-built"
- Transferable technology





PMEL - Engineering Development Division Seattle, WA



# Field Deployments

Present Locations:  
North Pacific, Southern Ocean,  
Hawaii, Bali

Duration: 3 months -1.5 years

Data Availability:  
>95% in all locations



Ongoing evaluations per NOAA operations  
and international standards



# Future Focus

- Transformational Energy Savings
  - Large efficiency gains actually cost less
  - End use/least cost
- Reduce size and cost (System→Sensor)
- Continued Mooring Line improvements
  - Inductive Communication to Seafloor



# Small Posters for Demo Area

## PMEL line testing & design innovations

- Bite resistant lines
- Conductor to seafloor
- Modeling advancements



# Animation of deployments & testing

- Dockside at PMEL
- At sea (Hawaii or Bali)