10th Meeting of the
DBCP ACTION GROUP

INTERNATIONAL TSUNAMETER PARTNERSHIP (ITP)

WEIHEI CHINA

AGENDA

1. Background and Introduction
2. National Reports
3. Product, Technology or Process Developments
4. Use of Tsunameter Data by Warning Centres / Performance Standards
5. International Data and Metadata Exchange
6. Sustainability and challenges
7. Other Matters
8. Review of Actions and Recommendations from Prior Meetings
9. Engagement with International Tsunami Warning Groups
10. Election of Officers
11. Closure of the meeting

Draft -Terms of Reference

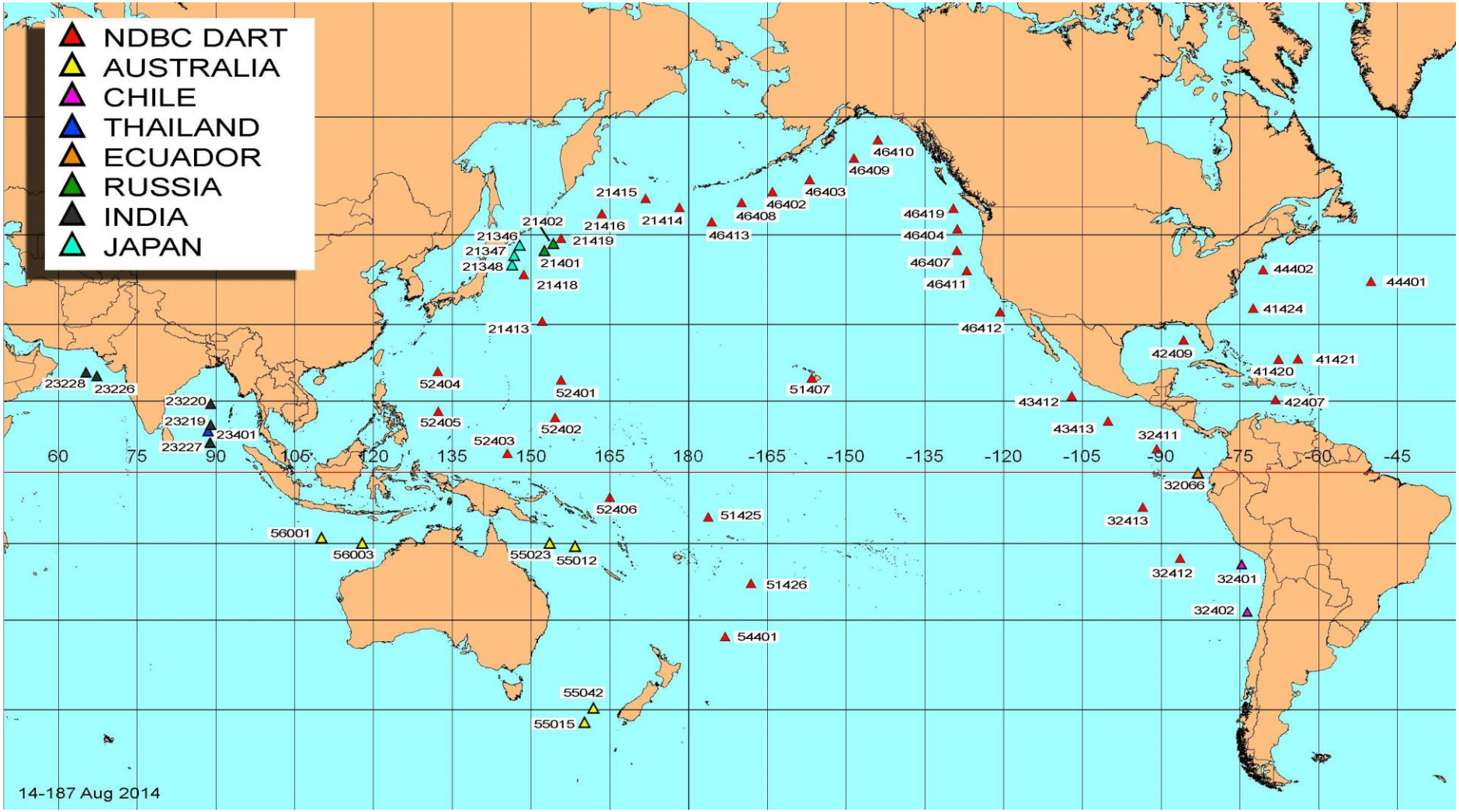
- Tsunameters are instruments that measure tsunamis in the open ocean. To deliver tsunami measurements in real-time requires that a tsunameter be coupled to a highly sophisticated communication system to report the passage of tsunami in deep ocean waters to tsunami warning centers. For the purposes of this Terms of Reference, a tsunameter is a real-time reporting tsunameter. In the aftermath of the Indian Ocean tsunami of 26 December 2004 a number of countries have announced national plans to operate tsunameters or increase the number of tsunameters they operate in pursuit of our common goal of preserving lives and property. Tsunameters are critical to the rapid detection and forecast of tsunami

TOR

1. To establish, coordinate and support international tsunameter research and development efforts, including joint activities;
2. To set common tsunameter standards, including performance standards and testing and calibration protocols, to ensure that designers and operators of tsunami warning systems can rely on the consistency, comparability and availability of tsunameter data to the maximum extent possible;
3. To provide input as appropriate to sea level observation network design with a view to optimizing the contribution of tsunameter instruments to the operational and cost effectiveness of tsunami warning systems;
4. To maximise the sharing of tsunameter technology and cooperation among members and with suppliers of tsunameter equipment and components to achieve secure global supplies of high quality systems;
5. To maximise opportunities for coordination and cooperation with regards to ship access, deployment, operation, maintenance and support of tsunameter systems; and
6. To help build capacity among members to accelerate the viability and success of regional tsunami warning systems.

Global Tsunameter Network								
Country	Planned Network	Currently Operational	Tsunameter Types	Local Reception	Data to GPS	Data to FTP	Data Formats	Vandalized Stations
Australia	6	4	SAIC - STB SAIC - ETD	Yes	Yes	No	NOAA-DART BUFR/CREX	Yes; 1 event
Chile	3	2	SAIC - DART - II SAIC - STB	Yes	Yes	Yes	NOAA-DART	-
China	2	2	DART - STB	Yes	No	No	NOAA-DART BUFR	Yes; 3 - 5 events
Ecuador	2	2	EBM22TS Mediterráneo Señales Marítimas (MSM)	Yes	Yes	Yes	NOAA-DART	-
India	7	7 5 NIOT 2 SAIC	SAIC-STB Indian Buoy Sagar Bhoomi - Sonardyne	Yes	Yes INCOIS	No	BUFR/CREX	-
Indonesia	14	-	InaBuoy SAIC-ETD	Yes	No	No	Local Format NOAA-DART	-
Japan	6	3	SAIC-STB-MF	Yes	Yes	No	CREX	-
Malaysia	3	-	-	Yes	No	No	-	-
Republic of Korea	2	-	-	-	-	-	-	-
Russia	3	2	SAIC-STB SAIC-ETD	No	Yes	Yes	NOAA-DART	-
Thailand	3	1	SAIC-STB Environtec	No Yes	Yes Yes	Yes No	NOAADART -	No No
USA	39	33	DART - II	Yes	Yes	Yes	NOAA-DART	No

GLOBAL NETWORK



National Reports

- Australia
- India
- USA

DART 4G System Description and Update

Dr Christian Meinig

- The DART-4G (4th generation) is an enhanced version of DART-ETD technology developed at NOAA-PMEL
- A prototype system was deployed for 12 months ~80nm W of Newport, Oregon USA.
- No tsunami was detected and it was an encouraging test of the new system enhancements.
- The enhancements include a new pressure sensor and software that run a PMEL detection and filter algorithm to transmit tsunami height data while the earthquake is still rupturing, thereby increasing warning time to the local communities.
- The new algorithm was developed by studying near-field tsunami data from cabled systems and applying the most effective techniques at acceptable power level for long endurance.
- Advancements in power management allow for a system endurance of five years for the tsunameter and two years for the surface buoy. Shore-side software has also been upgraded to receive the higher-frequency observations during events. Standard MET sensors (Wind/ATRH/SST/Baro) are included as part of the 4G system. Additionally, component obsolesence issues(acoustic modems, Iridium modems, counting board) in the DART 2 system have been addressed.
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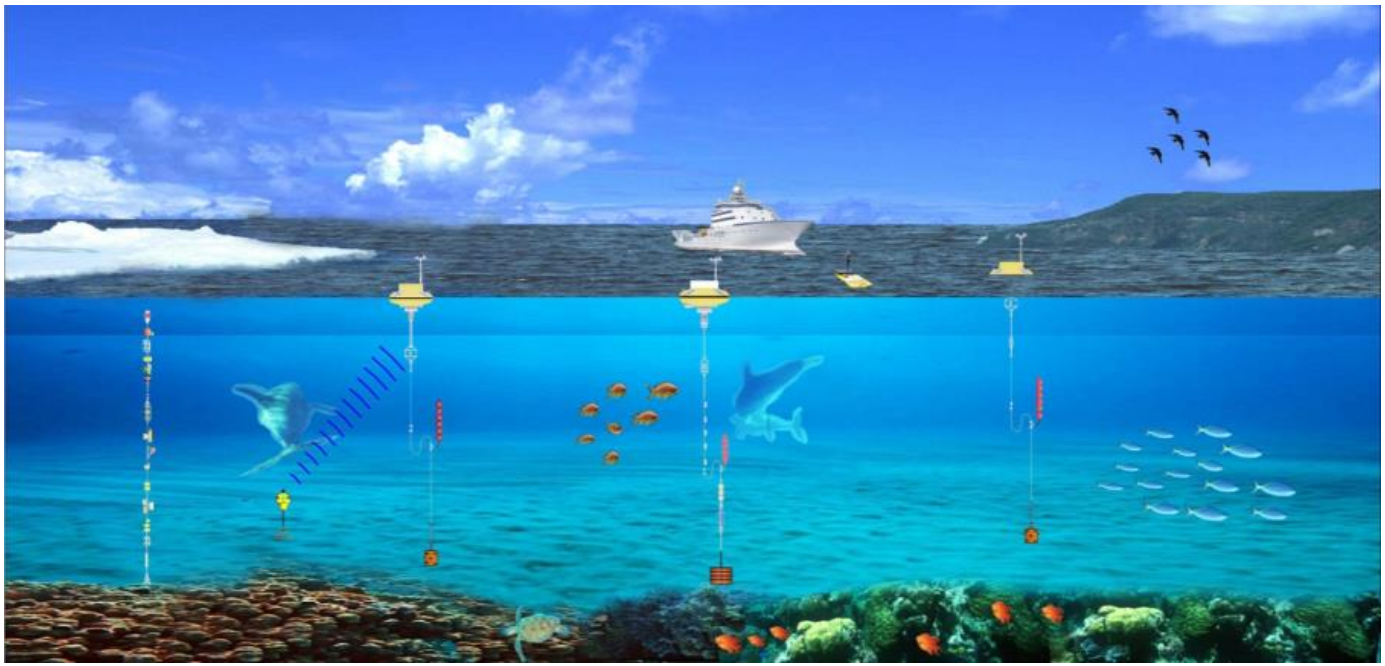
Tsunameter Equipment Performance Standards and Guidelines

India
Tsunami Buoy Network



Tsunami buoy Network in India

- Ministry of Earth Sciences

INCOIS Indian national Centre for Ocean information Services

- SAIC Buoys 2 nos
- Operational mode available through NDBC

NIOT National Institute of Ocean Technology

- NIOT assembled with Sonar Dyne BPR - 5 Buoys
- Tsunami buoy network from 2007 onwards
- Technology advancement in Tsunami buoy System
- Indigenized Development of Tsunami buoy System

Achievement of Tsunami buoy Network in India

- Maintain the Tsunami buoy network from 2007 onwards
- Technology advancement in Tsunami buoy System
- Indigenized Development of Tsunami buoy System

Technology Advancements

Technology Advancements

1. Dual Power System
2. Twin Mode Communication system
3. BPR Tracking System
4. Buoy –BPR Watch Circle

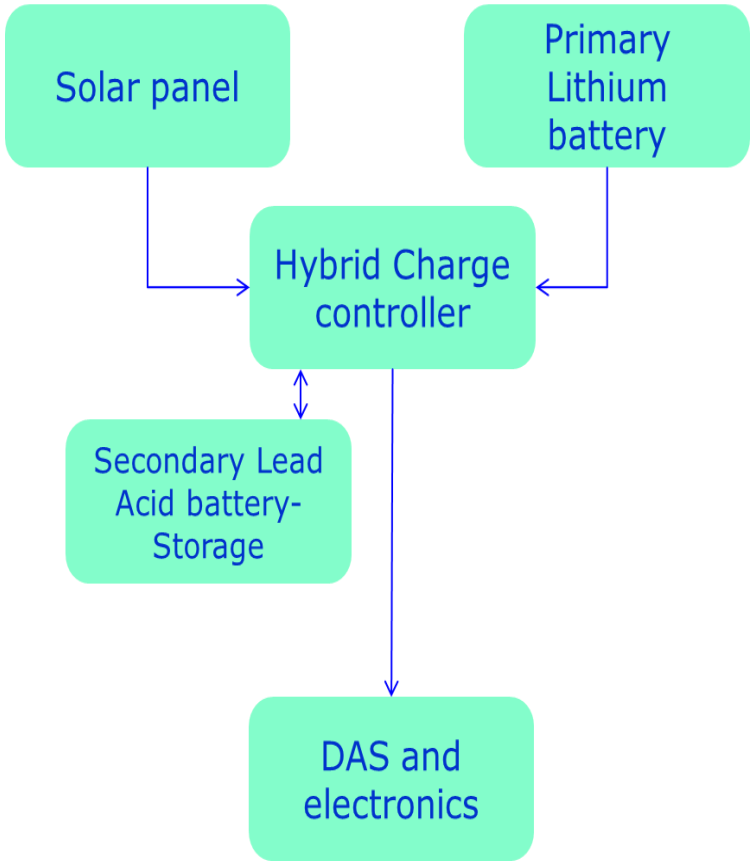
Dual Power System

- Non-rechargeable lithium batteries are being used as primary power source because the buoy systems with Lead Acid batteries charged by solar panels are prone to damage.

- Later a dual battery system was implemented wherein lead acid battery would power the buoy system and in case of failure, the primary lithium battery takes over.

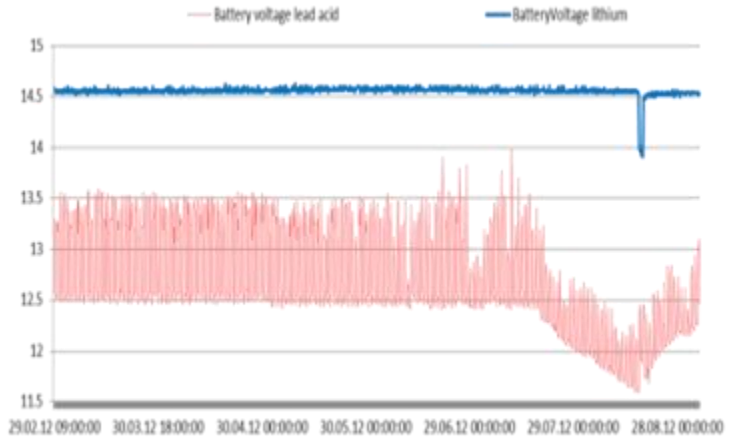
Buoy Power System

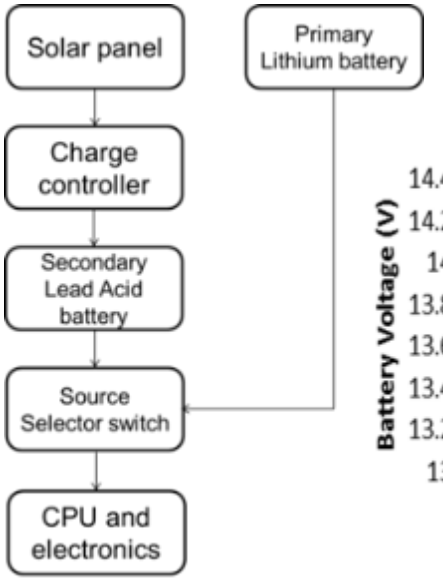
- The buoy electronics are powered by Primary Lithium battery and secondary rechargeable lead Acid battery with solar power

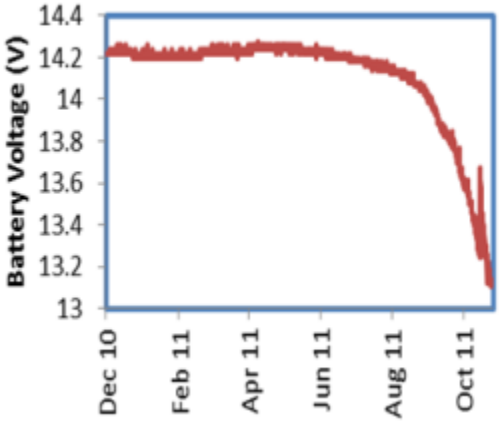


Buoy Power System

- In order to receive continuous data the lead acid battery along with primary lithium battery systems are being used to run the buoy even in case of failure of rechargeable lead acid battery system.







System overview

INSAT Modem

Type 1: Normal Mode

INMARSAT Modem

Surface Buoy DAS

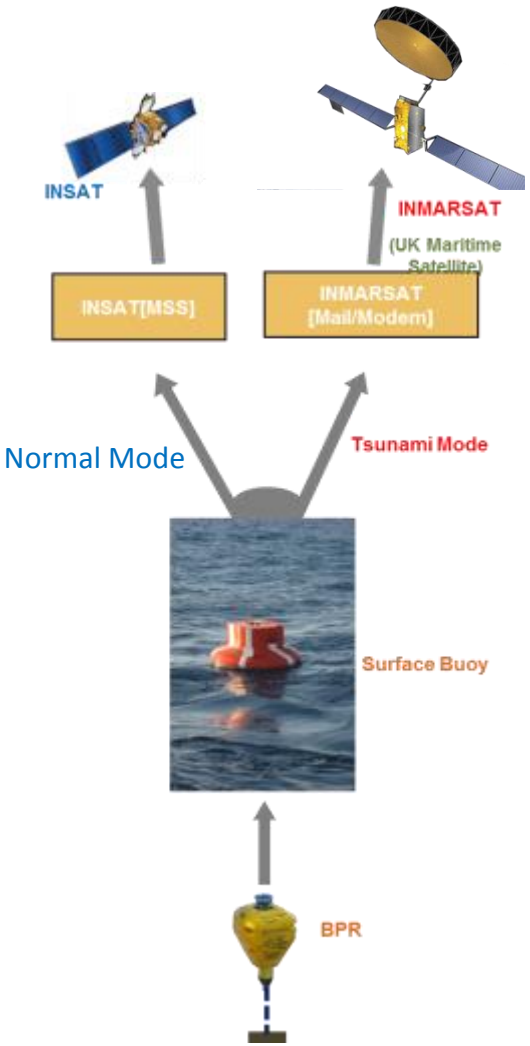
- Type 2 &3 Event Mode
- Every 5GMT hour data

Bottom Pressure Recorder

- Type 1 : Normal mode / Standard mode
- Type 2: Event mode
- Type3:Extended reporting mode

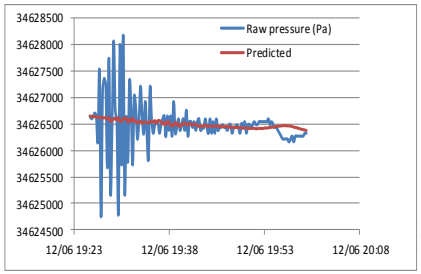
Features of Twin mode Communication

- Daily hourly Standard mode data will be sent through INSAT at predefined time slot
- Daily every 5th hour GMT standard mode data will transmitted through INMARSAT (if both INSAT and INMARSAT available) to check the status of INMARSAT modem.
- Event data, Post event data will be transmitted through INMARSAT.
- INMARSAT Modem can be configured for destined E-Mail ID (Maximum 2 email ID) and Modem destinations (Maximum 2 modem no) during Tsunami Event
- Data from INSAT and INMARSAT [INSAT E-mail, INMARSAT E-mail and INMARSAT Modem] can be received in same GUI application and updated in same log file.



Low Power Integrated Tsunami system

Evolution of IDAS for Tsunami



Design and development of In-house Tsunami IDAS (Nov 2009- March 2010)

2009 to 2010

2009

With the past experience in maintenance of Deep Ocean Tsunami *Buoy* systems, the requirement was finalized.

Development of Integrated Low power Data Acquisition system (LIDS)

2013

2012

working satisfactorily at many locations

2011

Industry standard IDAS-Production

To Industry for further production

2010

Deployment of Prototype system on 17th Apr 2010 in TB04 Location

2010

Prototype system successfully captured Tsunami event on 10 June 2010

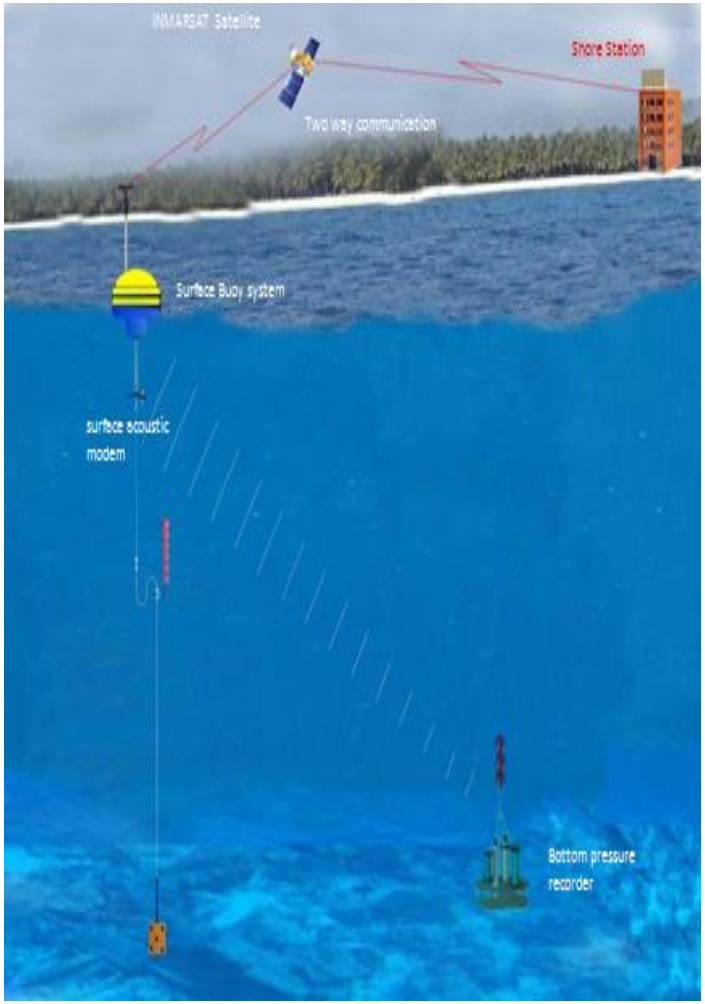
2010

2010

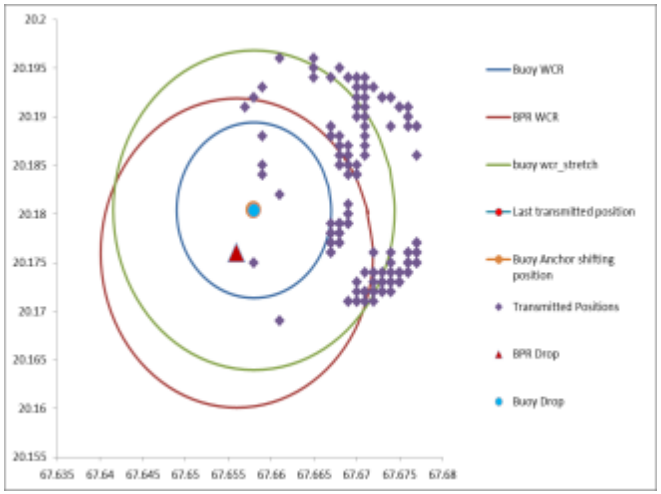
Prototype System worked satisfactorily through out the estimated working period.

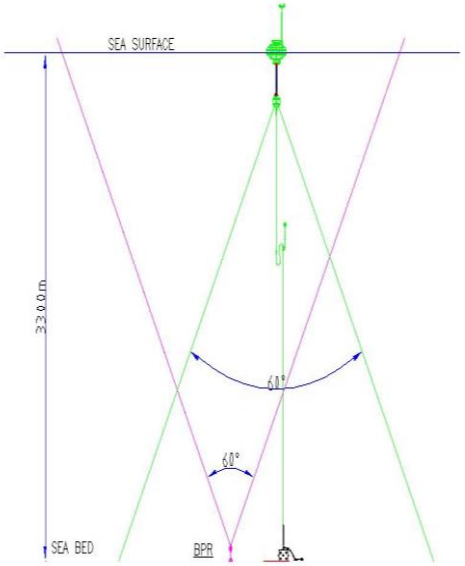
ITBS System

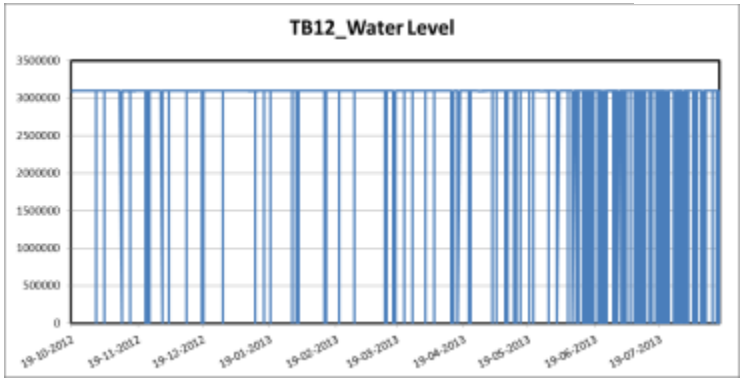
- Indian Tsunami Buoy System (ITBS) comprises Two components:
  - ✓ Indigenous Bottom Pressure Recorder (BPR) anchored to the sea floor.
  - ✓ Indigenous Surface Buoy System (Buoyancy module with mooring & Buoy electronics)
- Significance of the ITBS
  - ✓ Increased life time of the system (BPR -5 years & surface buoy -2 years)
  - ✓ Redundant surface buoy electronics (Dual chain)
  - ✓ Bi-directional communication links which is able to send and receive data from the shore station
  - ✓ Reliable Acoustic communication

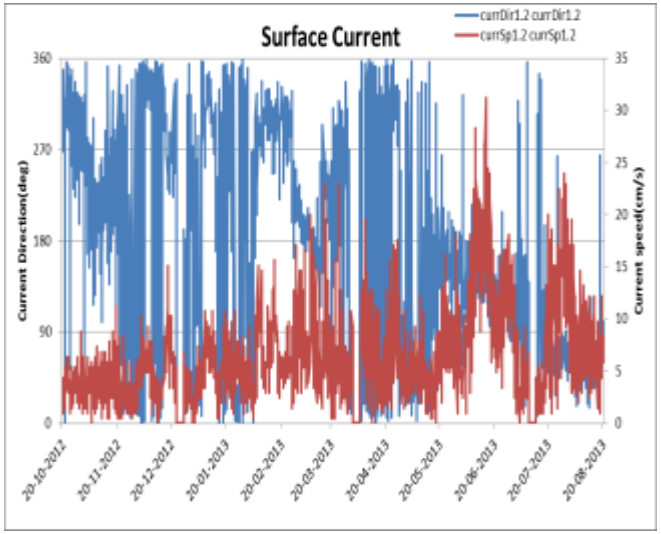


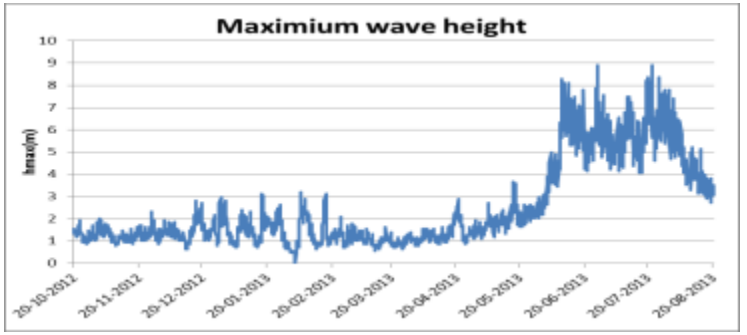
Acoustic link between BPR & Surface Buoy











Significance of ITBS- BPR

	Sonardyne	DART II	ITBS
Pressure Sensor	Parascientific. 410K Digiquartz	Parascientific. 410K Digiquartz	Parascientific. 410K Digiquartz
Acoustic modem	directional (30°)	directional(40°)	Omni directional
Life time of BPR	1.5 years	4 years	5 years
Retrieval	During retrieval the surfaced unit hardly visible	BPR unit remain submerged after surfacing, it enables us to communicate with the BPR unit to know its position for retrieval purpose	BPR unit remain submerged after surfacing, it enables us to communicate with BPR unit to know its position for retrieval purpose

Significance of ITBS- Surface Buoy

	Present System	DART II	ITBS
Data Acquisition system	16 bit A/D with 10 Channels, 16 RS 232 channel, 3 level watch dog timer, battery backed RTC	12-bit A/D converter with 8 input channels, two RS232 channels, a hardware Watchdog timer, a real-time clock.	16 bit A/D with 4 Channels, four RS 232 channel, 3 level watch dog timer, battery backed RTC
Life time	1 year	2 years	2 years
redundancy	Single Electronics system	Two identical electronic systems	Two identical electronic systems
Data transmission	INMARSAT – Two way communication	IRDIUM – Two way communication	INMARSAT & INSAT – Two way communication

DBCP ITP 10

Recommendations from this Meeting

- Noted the involvement and recognition of ITP and activities accomplished from the last meeting.
- Appreciated NDBC in proving water level data in real time mode and also appreciated the member countries which are sharing data through GTS and to encourage other countries through IOC to do so
- Approved the Tsunameter Instruments Standards document that could be uplinked in ITP web site.
- Appreciated technological advancements in 4G by PMEL and performance of Indian Tsuanmeter network and noted the feed back on performance of ETD and medium frequency Buoy systems deployed by Australia.
- Encouraged the efforts being pursued on submarine cables under the joint initiative of ITU/WMO/IOC and Joint Task force is formulated
- Reinforced the importance of the Safety of moored buoy at sea as recorded in DBCP 29 and should be given highest priority as new entrants are to be educated to incorporate best practices on safety
- Urged the need to have closer interaction with ICG Intergovernmental Coordination Group for Tsunami and other Coastal Hazards Warning Systems and IOC can urge ICGs to send invitation to ITP to depute their representative to participate in ICG meetings. And similarly ICG may be invited to participate in ITP 11 meeting.
- Echoed their concern on vandalism of Buoys and recommended to safe guard the buoys by escalating this issue through IOC to International Maritime Organisation and FAO.

R.Venkatesan is elected as Chair and Stephen Cucullu as Vice Chair to continue the activities.