



# **Challenges of Sea Search and Recovery Operations**

## **- Sharing of Experience from a Recent Joint Operation**

**Presented by:**

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**MENASASI 2015**

**3 - 5 November, Dubai, UAE**

# Accident Summary



- Departed Juanda Int'l Airport, Surabaya on 28 Dec 2014 at 0635 SG LT
- Aircraft at 32,000ft. Pilot requested to climb to 38,000ft at 0712 SG LT



- Last radar contact 0718 SG LT
- SAR launched by Indonesia Search & Rescue Agency, BASARNAS

## **Annex 13 Investigation Standards**

- State of Occurrence (Lead investigation agency), State of Registry, State of Operator
  - Indonesia (Agency: NTSC)
- State of Design, State of Manufacture
  - France (Agency: BEA)
- State with appointed Accredited Representatives (i.e. Full investigation participation)
- States that provided facilities or assistance
  - Singapore (Agency: AAIB Singapore)
  - UK (Agency: AAIB UK)

# **International Assistance & Cooperation**

- **BASARNAS received support from**

- China
- Japan
- Malaysia
- Russia
- Singapore
- South Korea
- United States

- **NTSC received support from**

- Australia
- China
- France
- Malaysia
- Russia
- Singapore
- South Korea
- United Kingdom
- United States

# Scope

- Challenges Faced
- Locating the Flight Recorders
- Recovering the Flight Recorders
- Conclusion

# Challenges Faced



# Deployment of search team

**AAIB/MPA team wanted to deploy on 31 Dec 14 :**

- **Flights for Jakarta→Tanjung Pandan full till 3 Jan 15**
- **16 boxes of heavy equipment weighing more than 400KG - logistically challenging on commercial flight**
- **Deploying with RSN**

**Problems resolved:**

- **The AAIB/MPA team flew to Tanjung Pandan by RSAF C-130 from Paya Lebar Airbase.**
- **This airlift service enabled the speedy deployment of the AAIB/MPA team.**



- **Arrival at Tanjung Pandan (31 Dec 14)**
  - Lodging was not easy to find
  - NTSC's plan to change location to Pangkalan Bun
- **Arrival at Pangkalan Bun (1 Jan 15)**
  - BEA, NTSC and SG team travelled by an Indonesian Air Force plane
  - Again there was no room





# Arrival at Pangkalan Bun (1 Jan 15)

- First priority was to look for vessel support
- Vessels must be suitable for the underwater search of flight recorders
- Dedicated vessel(s) needed as the operation requires moving to a series of specific spots to listen to ULB signal
- Vessel needs to have small motorised boats for ULB detection teams
- Indonesia NTSC could not secure dedicated vessel for the search of flight recorders



# Arrival at Pangkalan Bun (1 Jan 15)

- MPA coordinated with Indonesia DGST (Directorate General of Sea Transportation) for two buoy tender vessels (KN Jadayat and Andromeda)

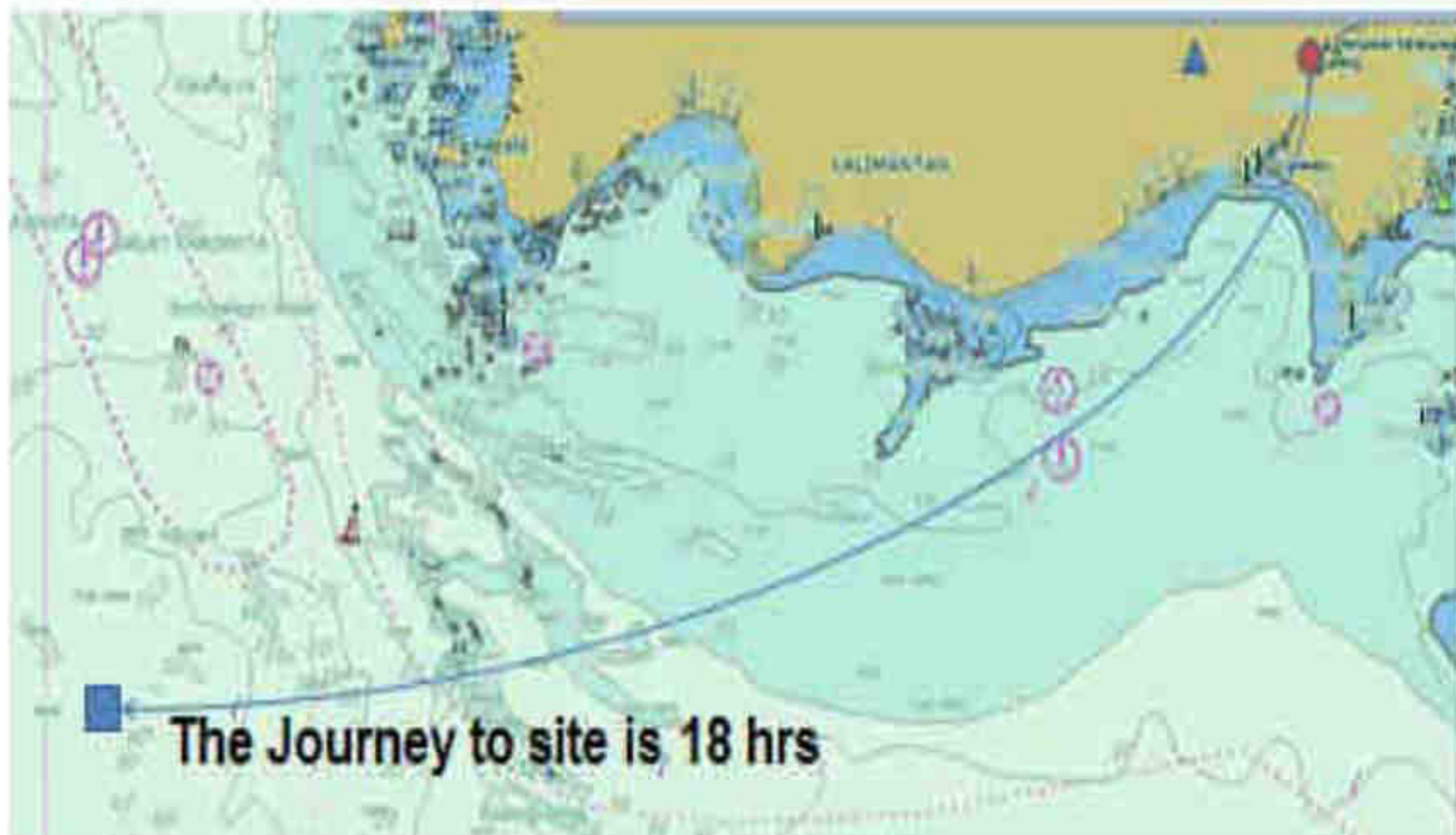


# Search Start Point Centred on Last Known Radar Contact [Location 1]

Pangalan Bun Airport - ▲

Kumai Port - ●

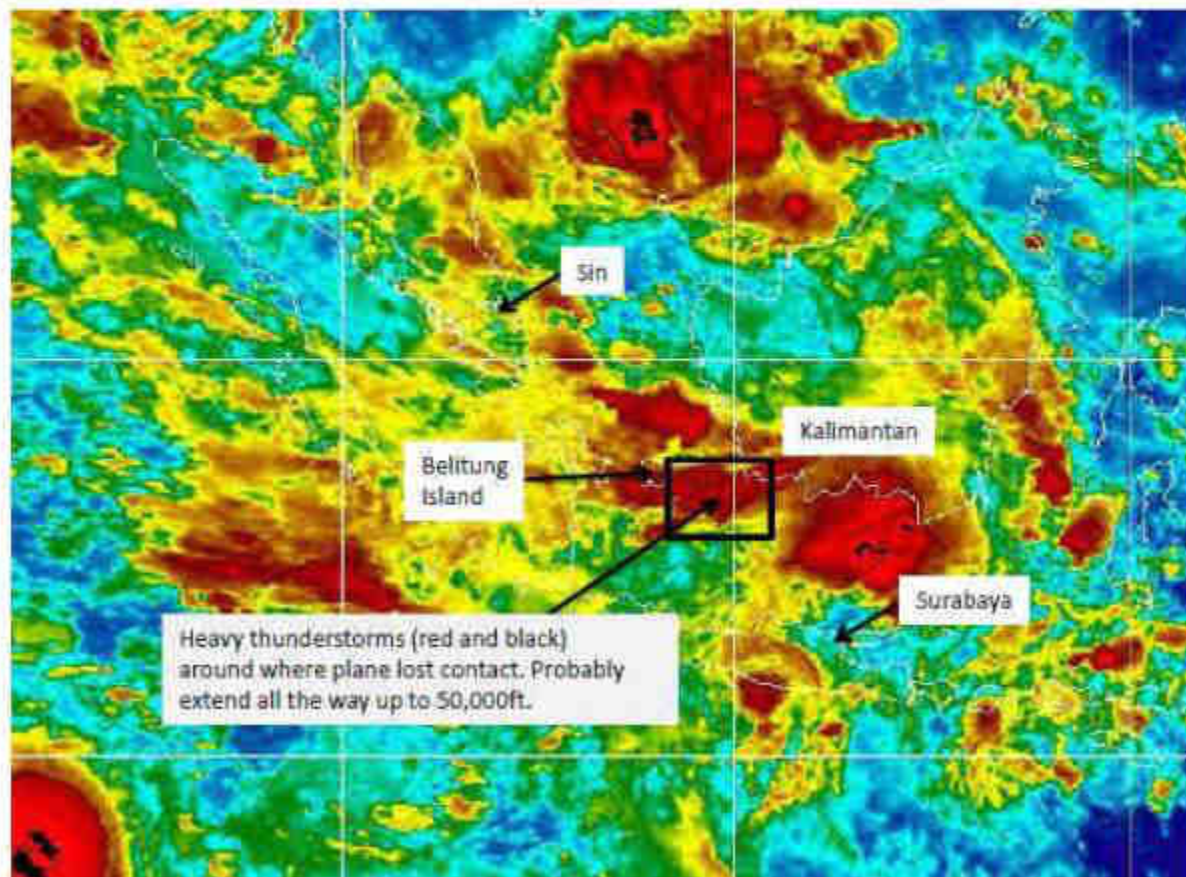
Survey Area - ■





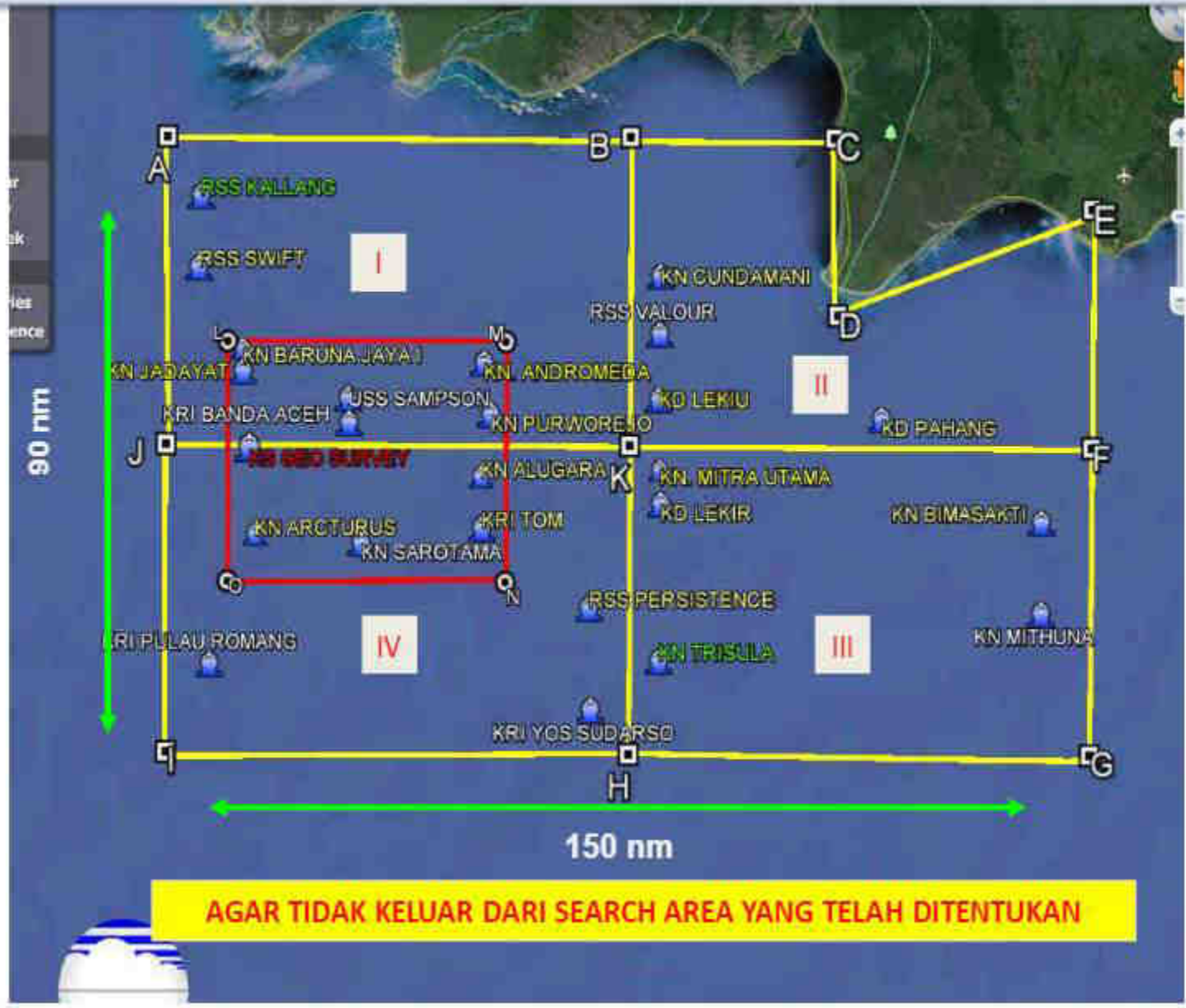
# Day 5: 2 Jan 15

## 1<sup>st</sup> voyage to the crash site was forced to turn back



# BASARNAS

Operational Plan for Lost Contact AW-139 PK-AXC, Day 9 (09 January 2014)



On 3 Jan 15, LMNO is declared by BASARNAS as the "most probable area" [Location 2]

2<sup>nd</sup> voyage, 4 Jan 15 this time Location 2

# Locating the Flight Recorders



# Day 9: 6 Jan 15 - Locating the Flight Recorder





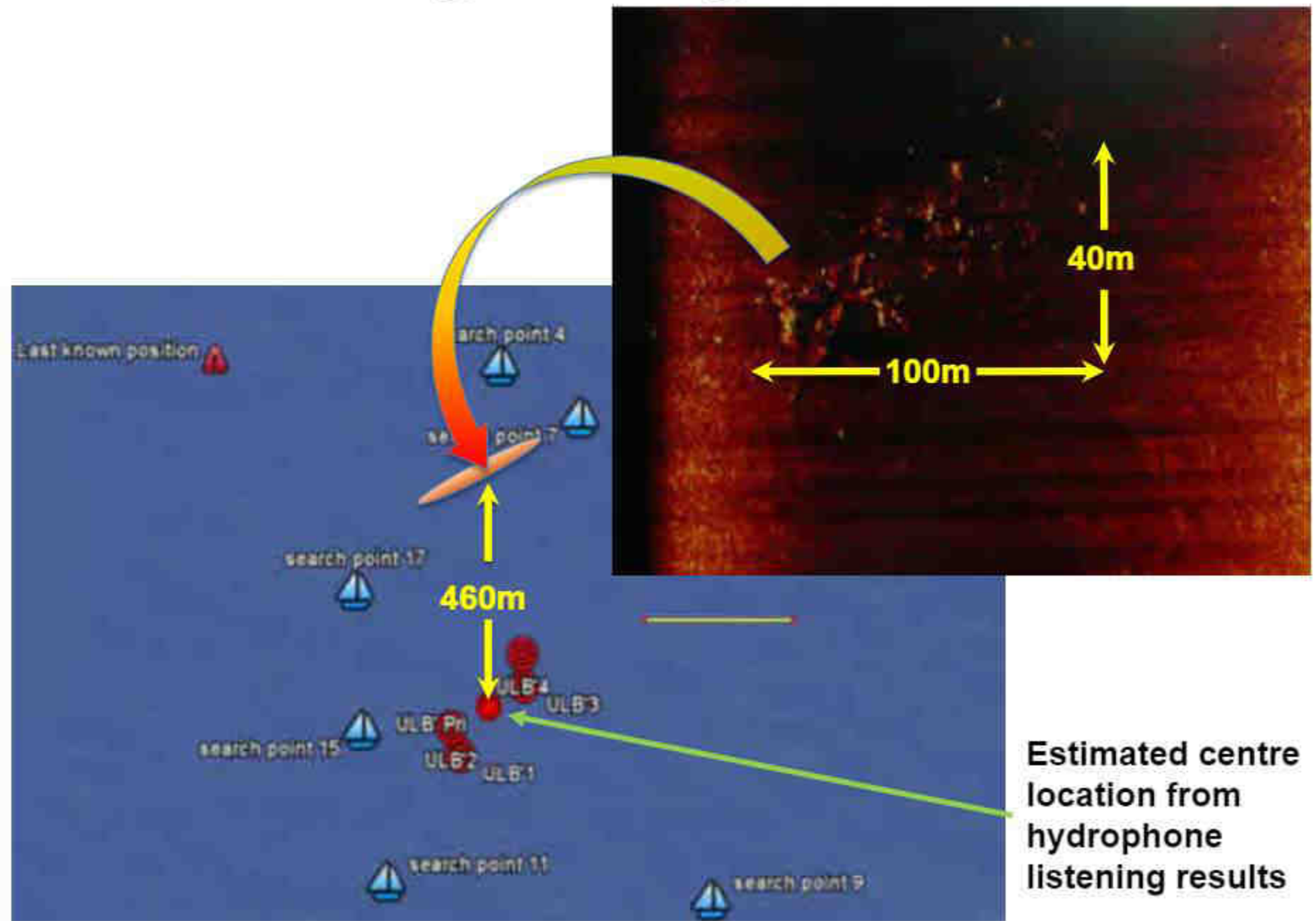
Aircraft tail section recovered from location about 3km southeast of the last known radar position





**Day 10: 7 Jan 15 - Detection of  
ULB ping signals at Location 1**

# Locating the Flight Recorder



# Locating the Flight Recorder

- **Day 11:- 8 Jan 15:**

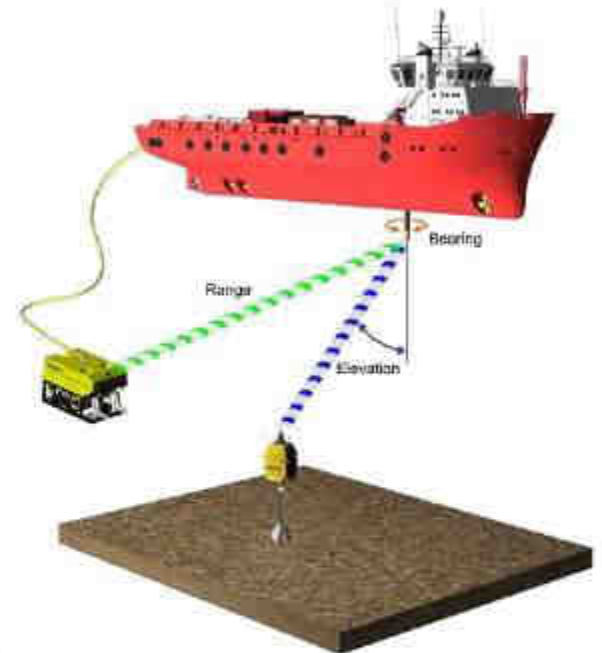
- **2<sup>nd</sup> round of ping signal detection**

- Focusing on the debris field
    - Presence of 2 ping signals confirmed, likely position further localised
    - AAIB's software suggested two possible ULB locations
      - One location 40m south of the possible debris field identified by side sonar scan

-



# Locating the Flight Recorder



Day 13:- 10 Jan 15:

Detection using Ultra Short Base Line System  
Java Imperia installed with Sonardyne USBL  
system

Ping locating function detects ULB 37.5Khz

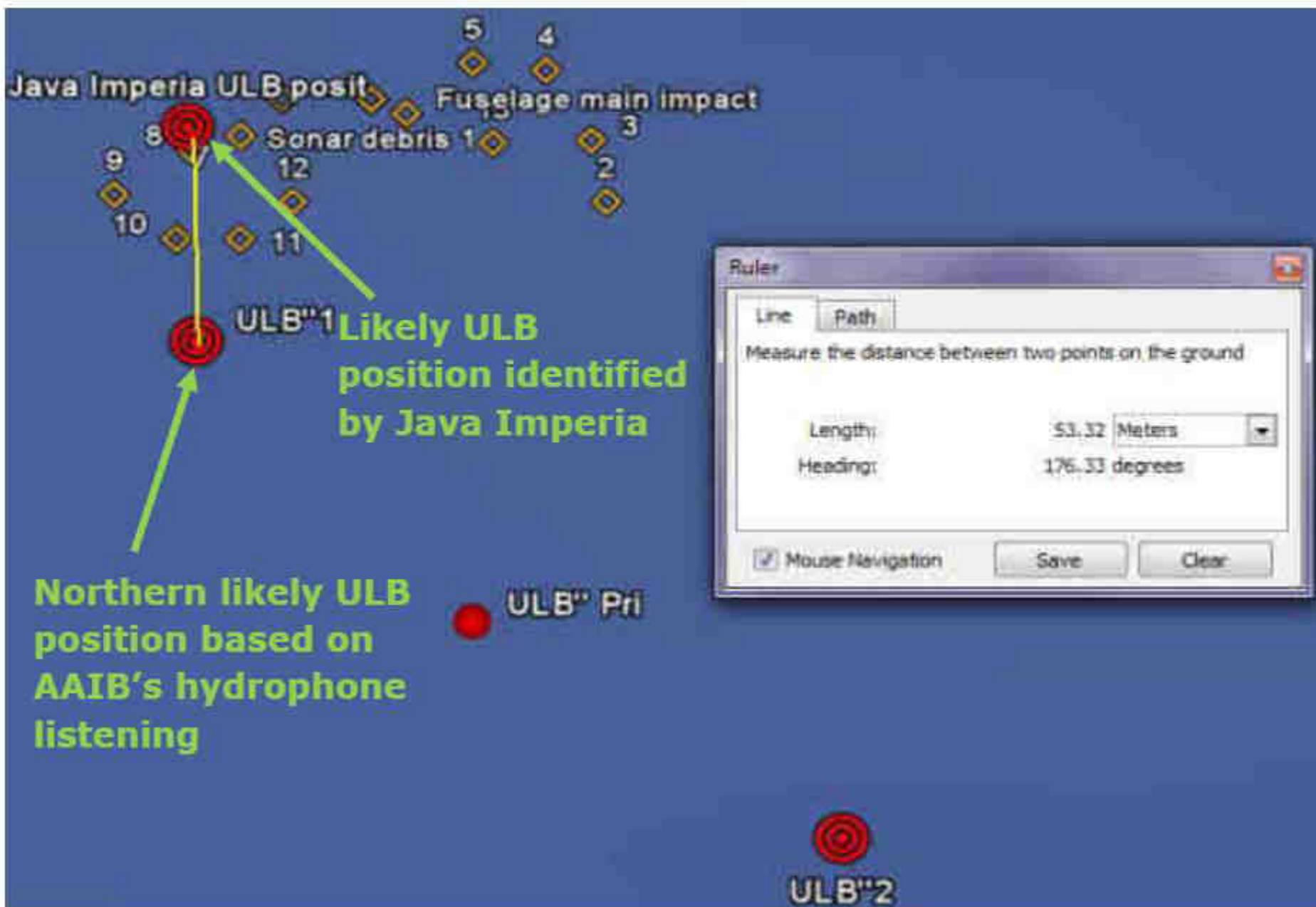
Identified 1 likely ULB location

Within side sonar scan debris field

Accuracy was about 20m



# Locating the Flight Recorder



# Recovering the Flight Recorders

# Recovering the Flight Recorder

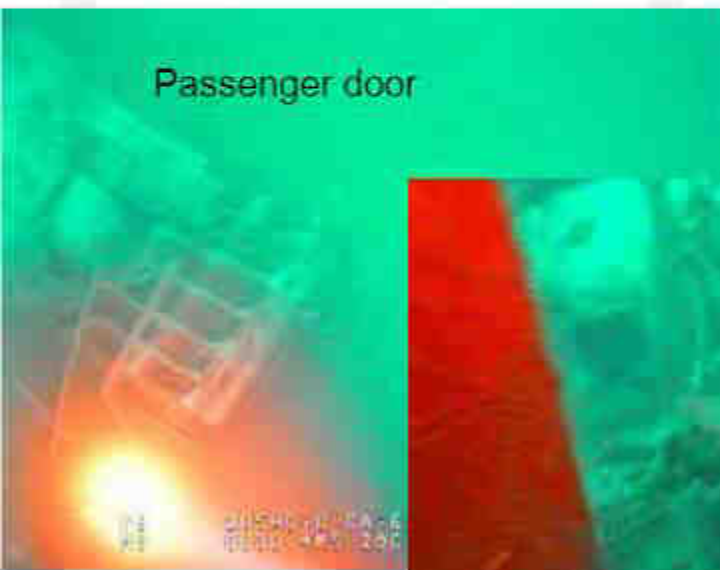






# Day 14: 11 Jan 15 - Recovering the Flight Recorders

- Divers found wreckage that appeared to be part of wing and engine section, they reported that the 2 pinger signals was coming from under the wreckage
- Divers brought the mini-ROV down to the wreck site by hand, video capture shows a door, possible wing section and engine.

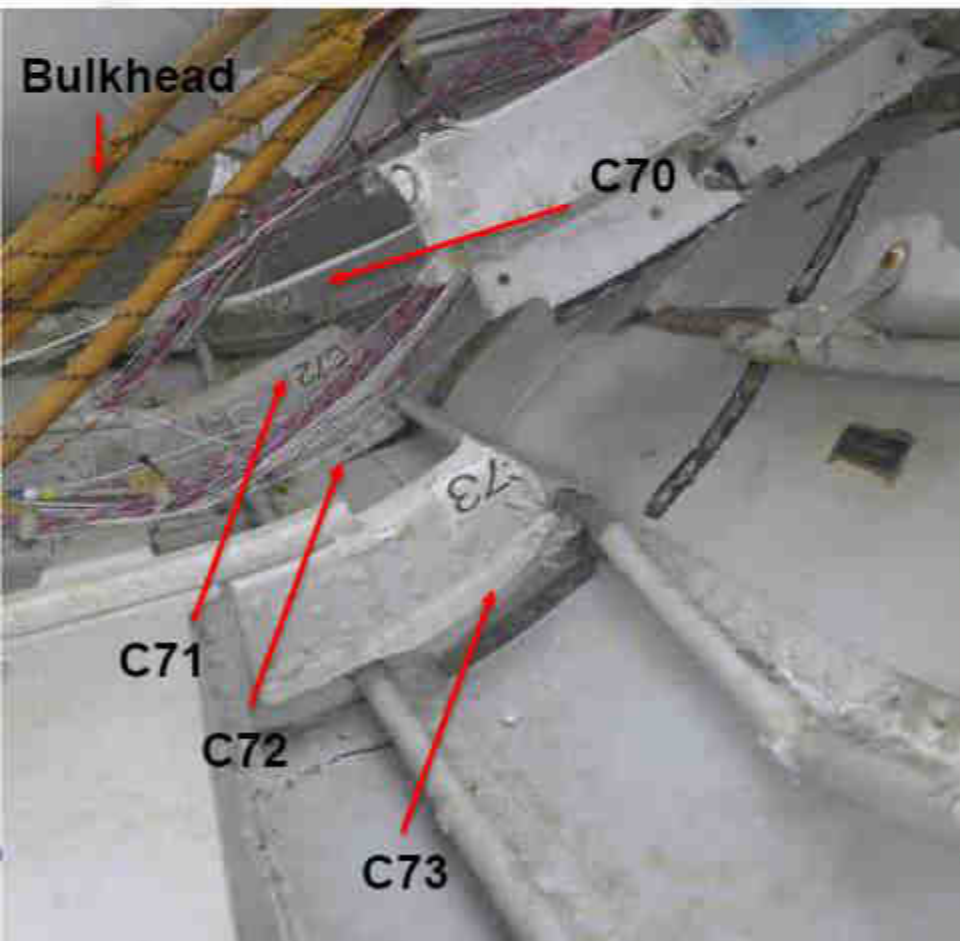


Note next slide:C77



# Recovering the Flight Recorders (11 Jan 15)

- The tail wreckage retrieved the previous day had rib sections C70, C71, C72 and C73 (aft bulkhead). Other sections were missing.
- Video by mini-ROV shows rib section C77, indicating the wreckage location contains the remaining tail section. Possibly the black boxes.



U9  
H9

037HD-1 CA-3B 31OCT14 80W  
0032 0MS 28C 11 46 57

TRANSPORT  
CONNECTING SINGAPORE



# Recovering the Flight Recorders (11 Jan 15)

- Based on the new finding that the picture in the video was likely the tail section of the aircraft
- Divers were briefed to search 1m - 1.5m aft and forward of the C77 section



# Day 15: 12 Jan, FDR recovered

- Divers recovered DFDR on second dive of the day, it was found covered in the sand of the sea floor (about 30m from the tail section wreckage). NTSC team escorted the DFDR to Banda Aceh which then sent it off to Kumai Port.





## Day 16: 13 Jan, CVR recovered

- Divers recovered CVR on second dive of the day. Similar to the DFDR, it was found covered in the sand of the sea floor (10m from where he retrieved the FDR)

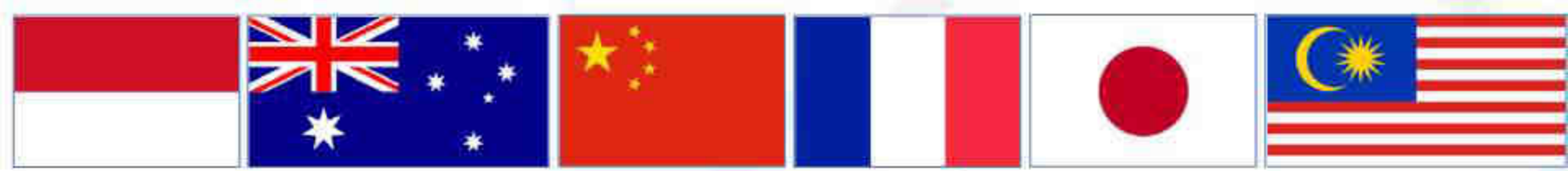


# Conclusion



# Conclusion

- **International cooperation is beneficial to all involved parties**
  - Great opportunity to share and learn from one another
  - Availability of resources
  - Exposure to new technologies
- **Successful recovery of flight recorders was the result of excellent multi-national cooperation**



Thank you



# 3<sup>rd</sup> International Accident Investigation Forum

19 – 21 April 2016

Singapore

Hosted By:

**AAIB**  
SINGAPORE

Co-organised By:



Supported By:



# International Accident Investigation Forum 2016

- Date: 19-21 April 2016  
Venue: Singapore Aviation Academy
- IAI Forum held every 3 years
  - Previously held on 21-23 April 2010 and 23-25 April 2013
- Supported by
  - International Civil Aviation Organisation (ICAO)
  - European Civil Aviation Conference (ECAC)
  - International Society of Air Safety Investigators (ISASI)
  - Flight Safety Foundation (FSF)
- Keynote speaker: Mr Stephen Creamer, Director ICAO  
Air Navigation Bureau





# International Accident Investigation Forum 2016

- Aim: Bring together the world's top government investigation officials and experts to discuss issues relating to the organisation, infrastructure and management of accident investigation
- Forum Topics:
  - Formation of the ICAO Accident Investigation Panel (AIGP)
  - Protection of safety information
  - Safety initiatives arising from recent accidents
  - ICAO High-Level Safety Conference in February 2015
  - Amendments to ICAO Annex 13
  - Regional corporation in accident investigation

# International Accident Investigation Forum 2016

- Event details and registration at (online after mid-Nov 2015):

[www.saa.com.sg/iaif2016](http://www.saa.com.sg/iaif2016)

- Interested parties to speak at forum or general enquires, please contact Mr Ng Junsheng:

[ng\\_junsheng@mot.gov.sg](mailto:ng_junsheng@mot.gov.sg)



**MENASASI 2015 Seminar and Workshops**

# Management of Sea Search



# Management of Sea Search

- Assets available:

Sea Operation	Vessels
BASARNAS	11
Indonesia Navy	21
Indonesia Army	1
Indonesia Police	12
Indonesian Government Institutions	7
Ministry of Transportation	11
China	1
Japan	2
Malaysia	5
Singapore	5
United States	2
<b>Total: 78</b> (63 Indonesia, 15 other States)	

Air Operation	Planes
BASARNAS	4
Indonesia Military (Air Force, Army & Navy)	19
Ministry of Transportation	1
Indonesia Police	4
Australia	2
Japan	2
Malaysia	1
Russia	2
Singapore	4
South Korea	1
United States	2
<b>Total: 42</b> (28 Indonesia, 14 other States)	

# Management of Sea Search

- **SAR operation led by BASARNAS**
- **Flight recorder recovery coordinated by NTSC**
- **NTSC handled**
  - Overall management of underwater search team
  - Logistic support for underwater search team
  - Coordination with BASARNAS
  - Facilitation for necessary clearance required for foreigners

# International Cooperation

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# International Cooperation

- **NTSC coordinated with MFA for necessary diplomatic clearance**
- **One NTSC personnel to each group of foreign participants**
  - Translator to communicate with locals
  - Coordinator with HQ
- **Search team able to focus on task**
- **Importance of close relation with counterparts**
  - Developed before crisis
  - Through attending ISASI seminars, ICAO AIG events

# International Cooperation





# International Cooperation

