PUSAT HIDROGRAFI DAN OSEANOGRAFI
TNI ANGKATAN LAUT

HYDROGRAPHIC SURVEY FOR SEARCH AND RESQUE IN SHALLOW WATER AND DEEP WATER

CASE STUDY : AIR ASIA AND ADAM AIR CHRASES

By :
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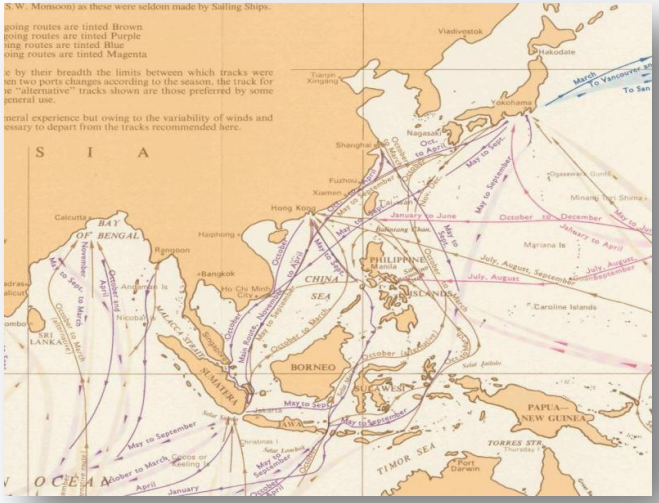
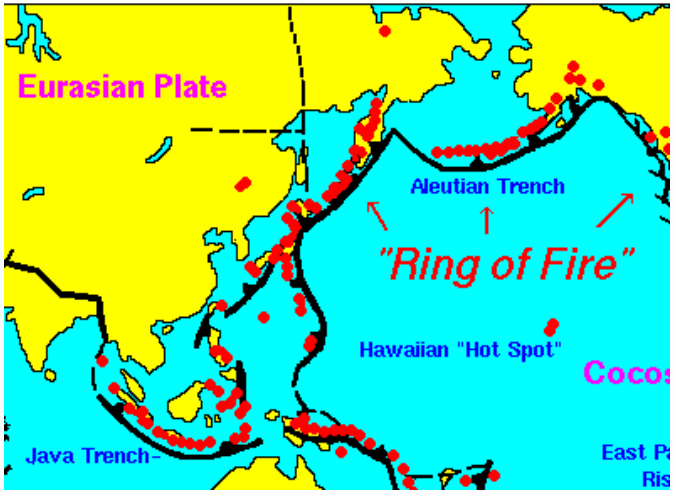
EAHC 5TH CARTOGRAPHIC AND HYDROGRAPHIC COMMITTEE
SINGAPORE , 18-21 OCTOBER 2016

BACKGROUND



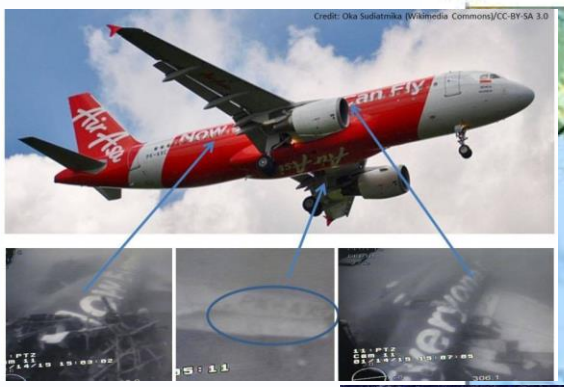


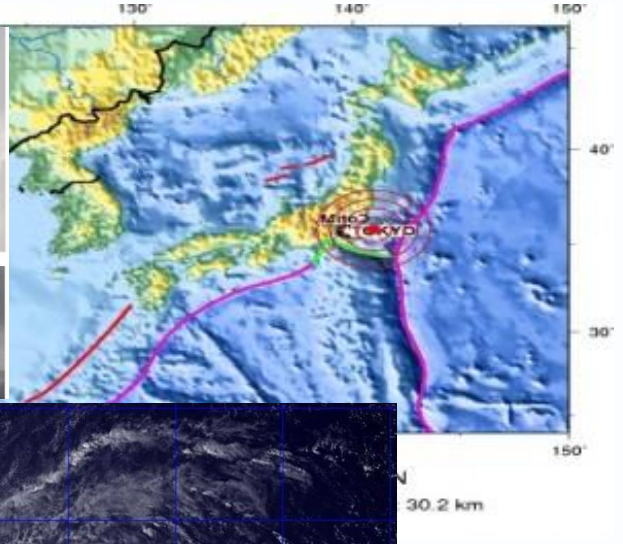
- SEA LANE OF COMUNICATION
- WORLD FLIGHT PATH
- RING OF FIRE/SUBDUCTION ZONE

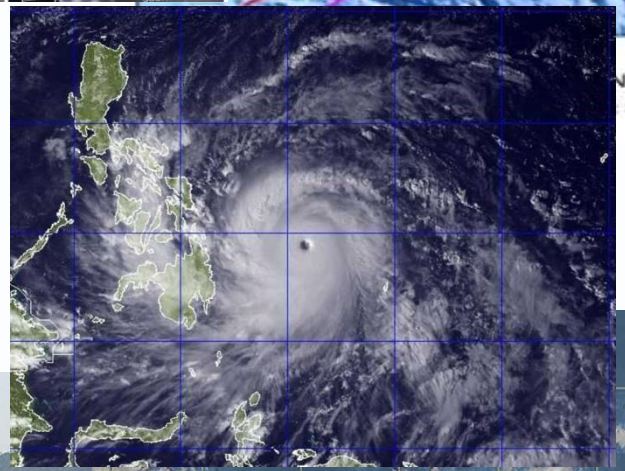
AREAS PRONE TO NATURAL DISASTERS, AIRCRAFT ACCIDENT, AND ACCIDENTS AT SEA

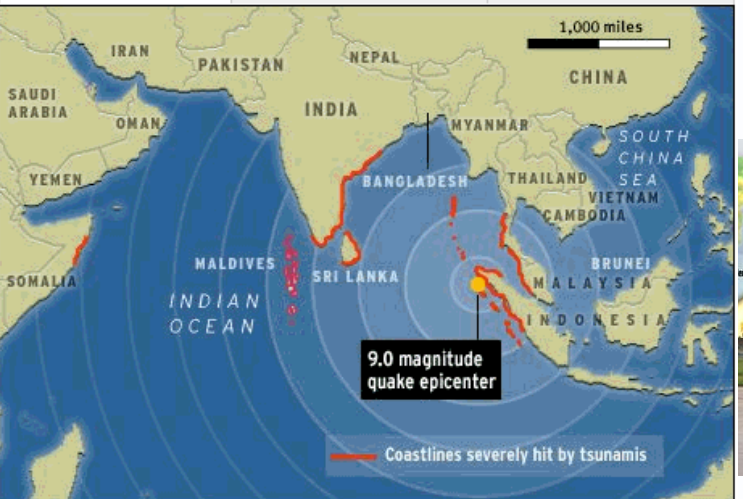
NATURAL DISASTER

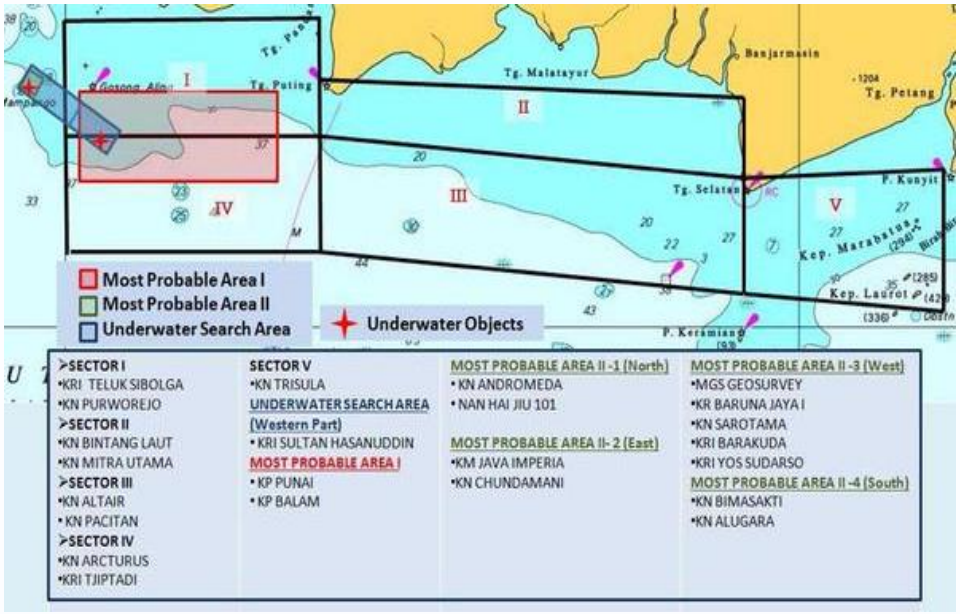
- TSUNAMI
- EARTHQUAKE
- TYPHOON
- AIRCRAFT ACCIDENTS
- ACCIDENTS AT SEA





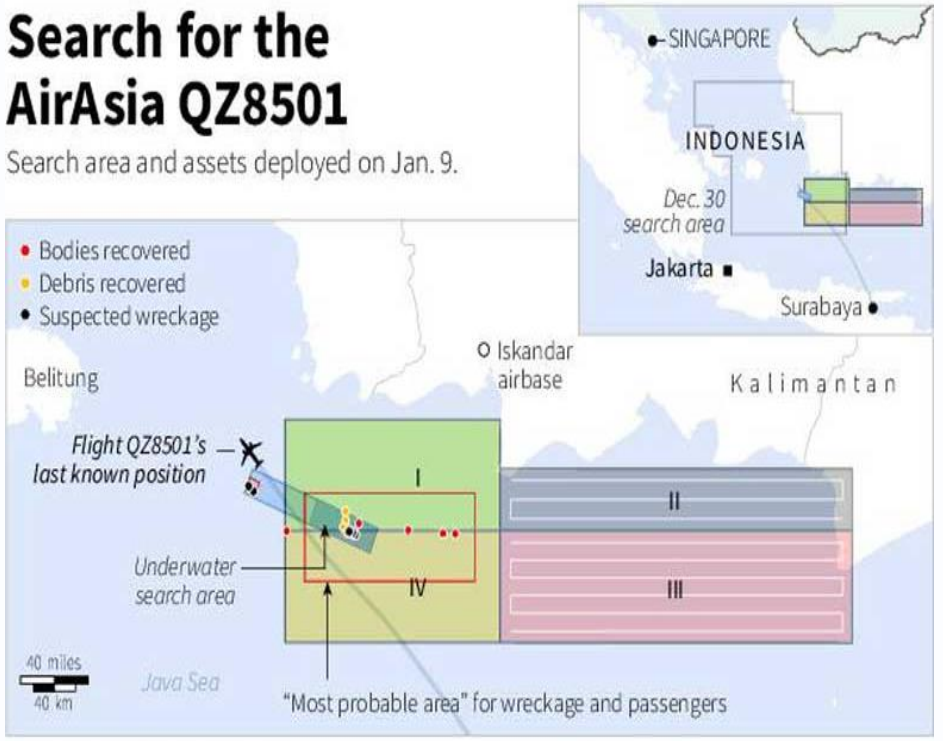






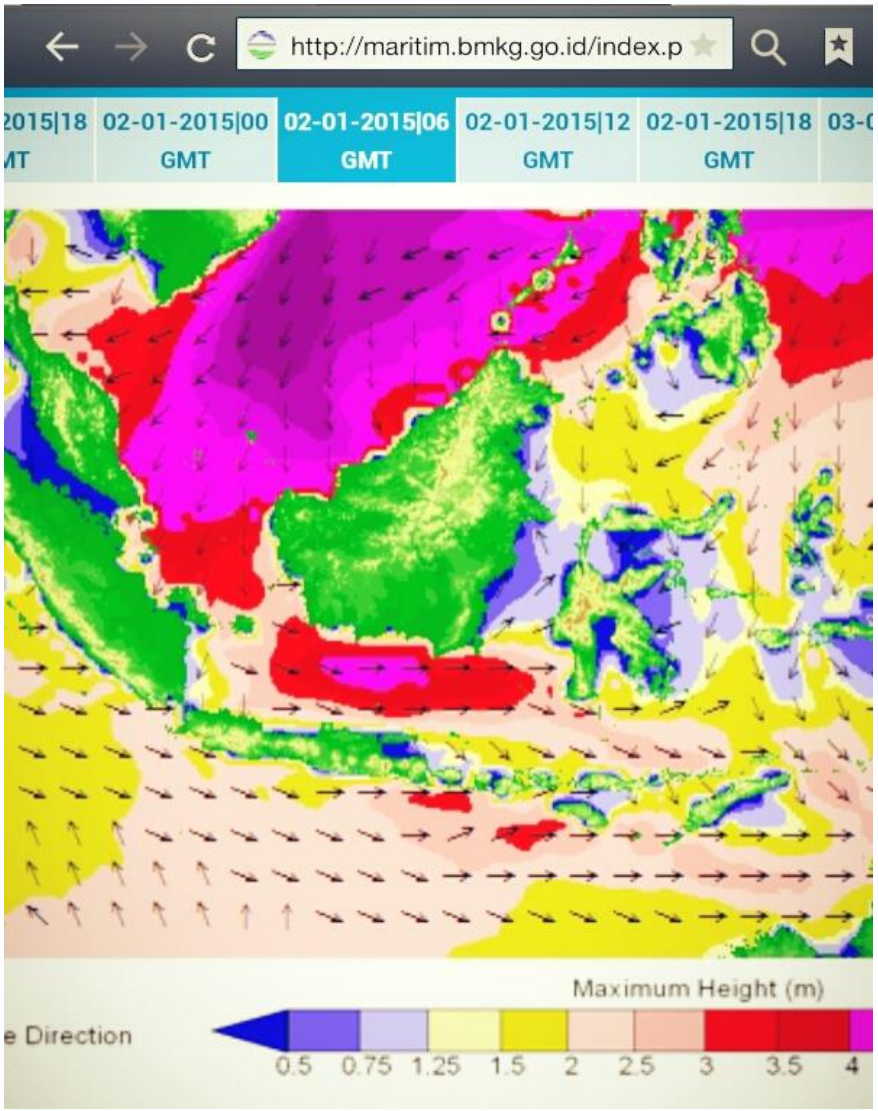
Search for the AirAsia QZ8501

Search area and assets deployed on Jan. 9.



Search aircraft deployed:

Area:	I	II	III	IV	"Most probable area"
Aircraft:	AS-332	Unspecified	BE-200	P3	P3
Altitude:	2,000 ft	1,500 ft	1,000 ft	500 ft	1,500 ft
Operator:	Singapore	—	Russia	Korea	Korea



DATA REQUIRED

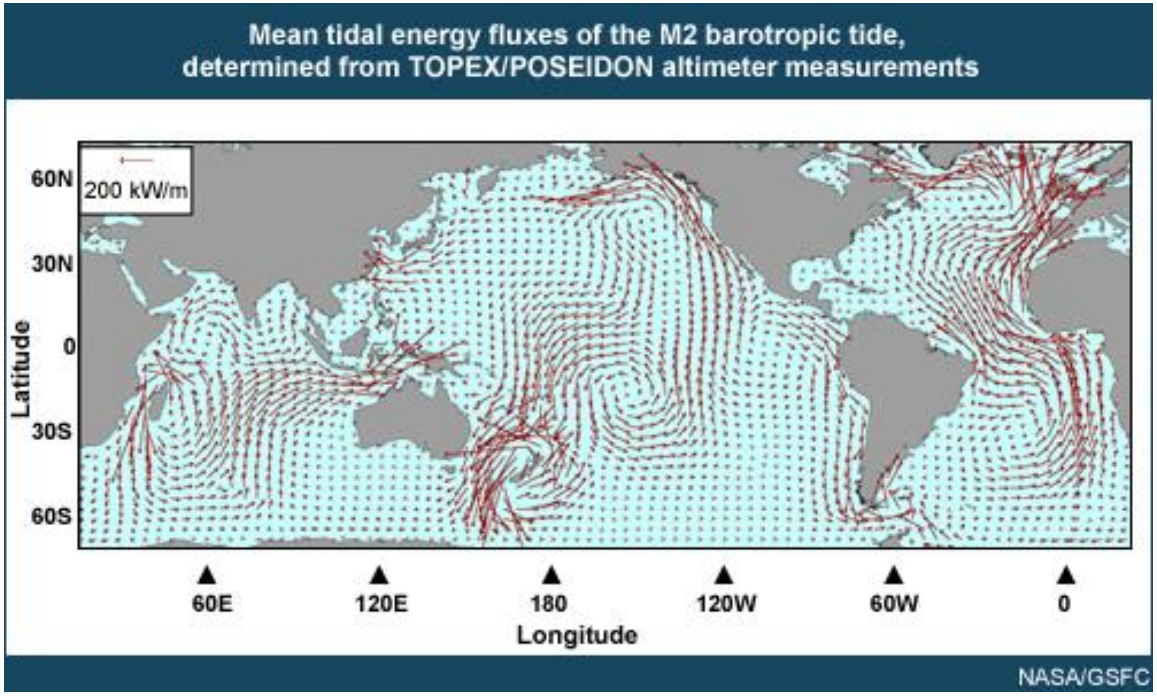
- PA TARGET
- TYPE OF TARGET
- METEOROLOGICAL DATA
- OCEANOGRAPHIC DATA
- SEA BOTTOM TYPE

HYDROGRAPHIC SURVEY EQUIPMENT TO SUPPORT SEARCH & RESCUE EFFORT

- MBES
- SSS
- AOV
- ROV
- PING LOCATOR
- DGPS

OCEANOGRAPHY

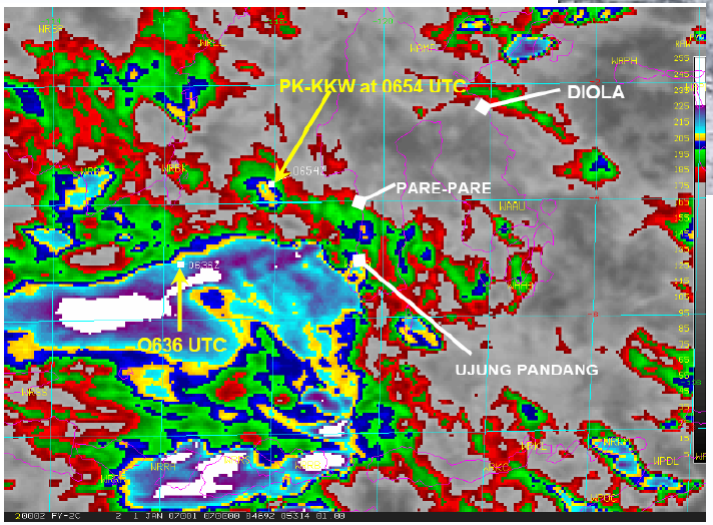
- TIDE
- CURRENT
- WATER CLARITY



SEA & OCEAN CONDITION AFFECTING THE SEARCH

METEOROLOGY

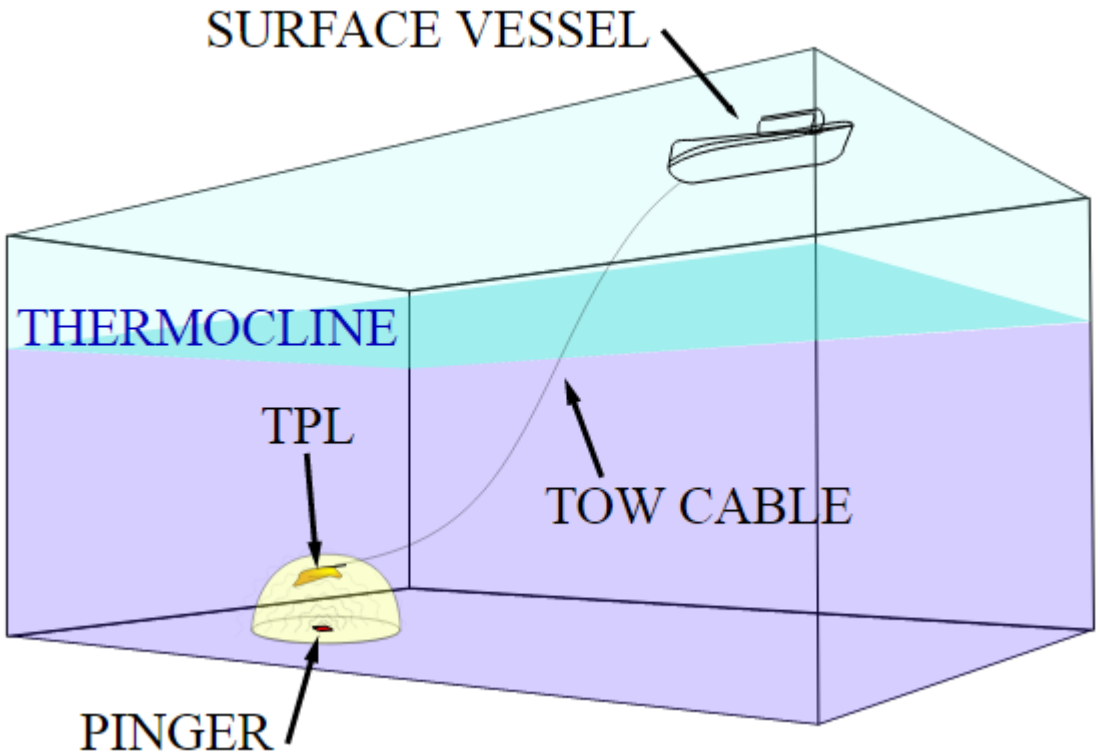
- WIND
- WAVE



CRITICAL TOOLS FOR SHALLOW AND DEEP WATER

UNDERWATER LOCATOR BEACONS

Towed pinger locator



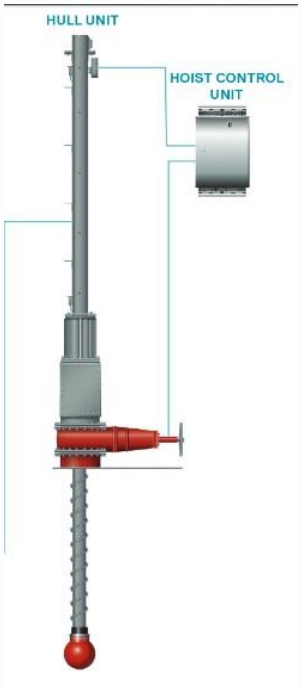
SIDE SCAN SONAR

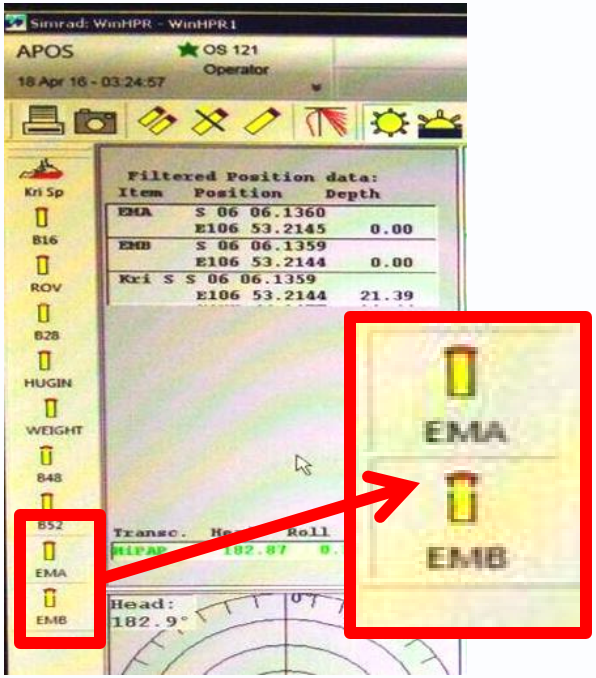
DEPICTING OBJECTS/DEBRIS ON THE SEAFLOOR

UNDERWATER ACOUSTIC POSITIONING – HIPAP 501

241 TRANSDUCER ELEMENTS

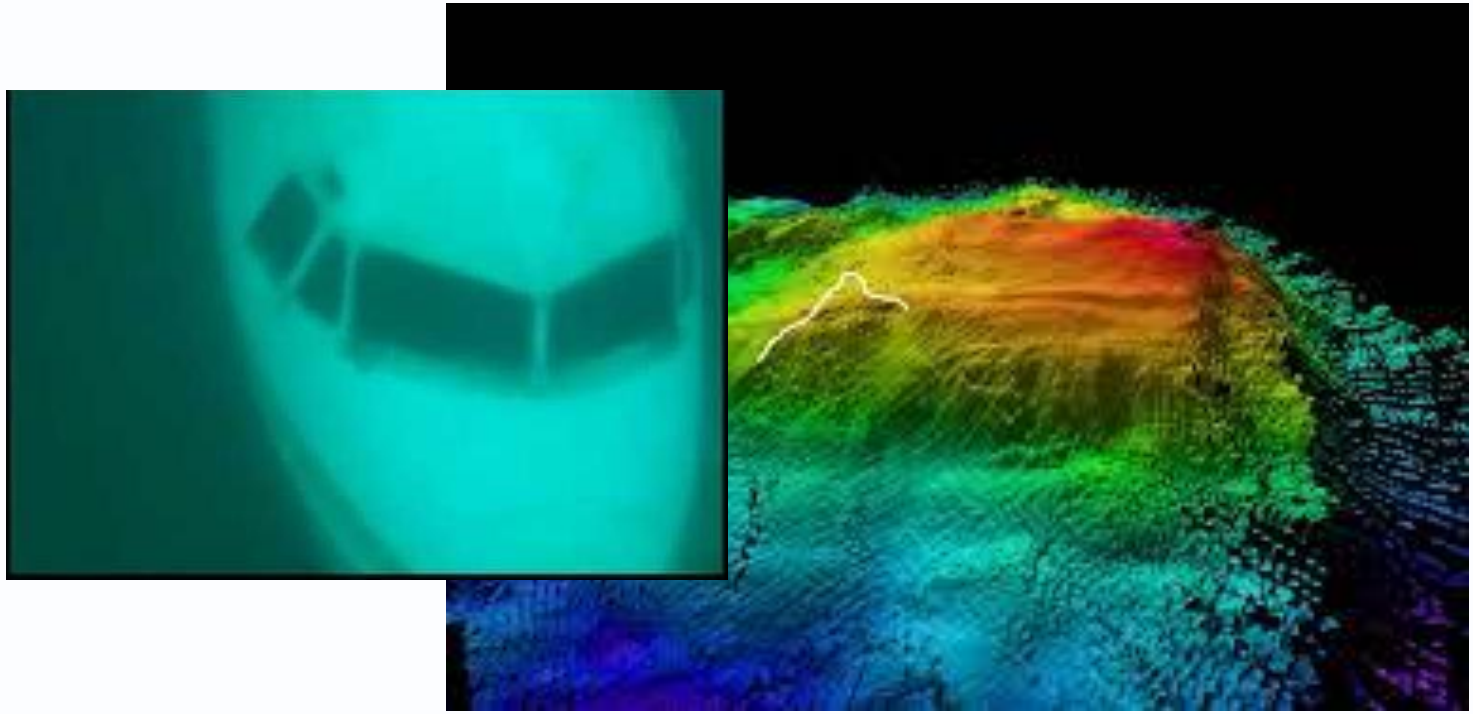
MEDIUM FREQUENCY SYSTEMS DGN FREK 21 kHz to 31 kHz



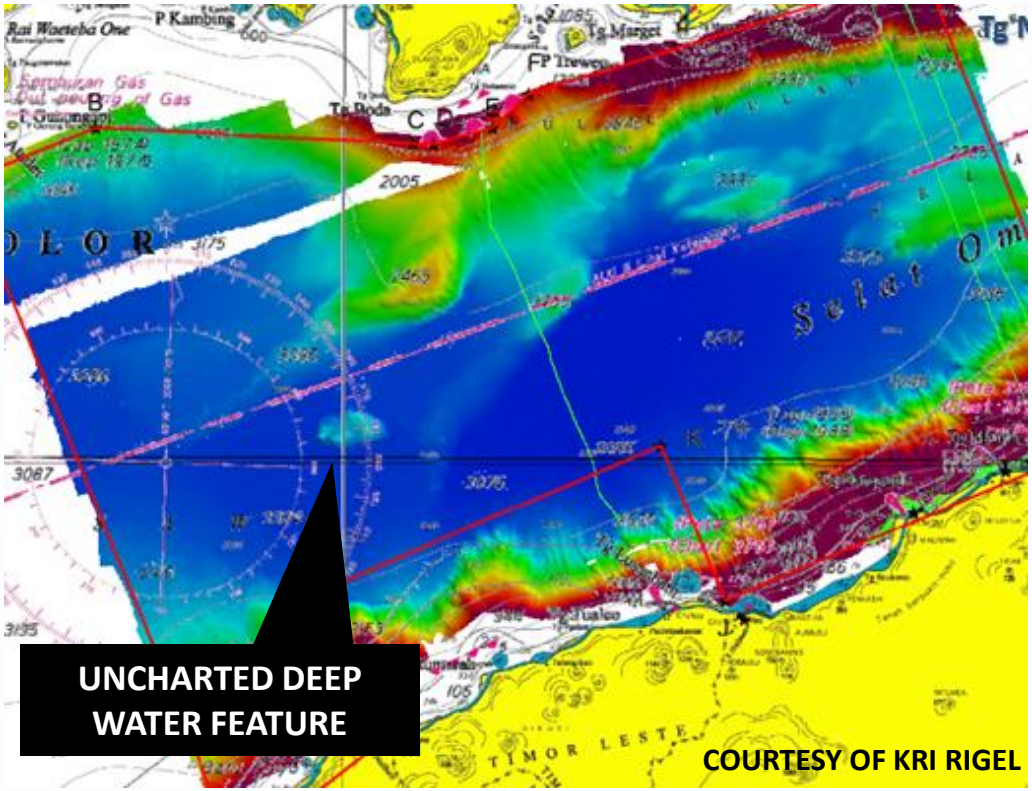


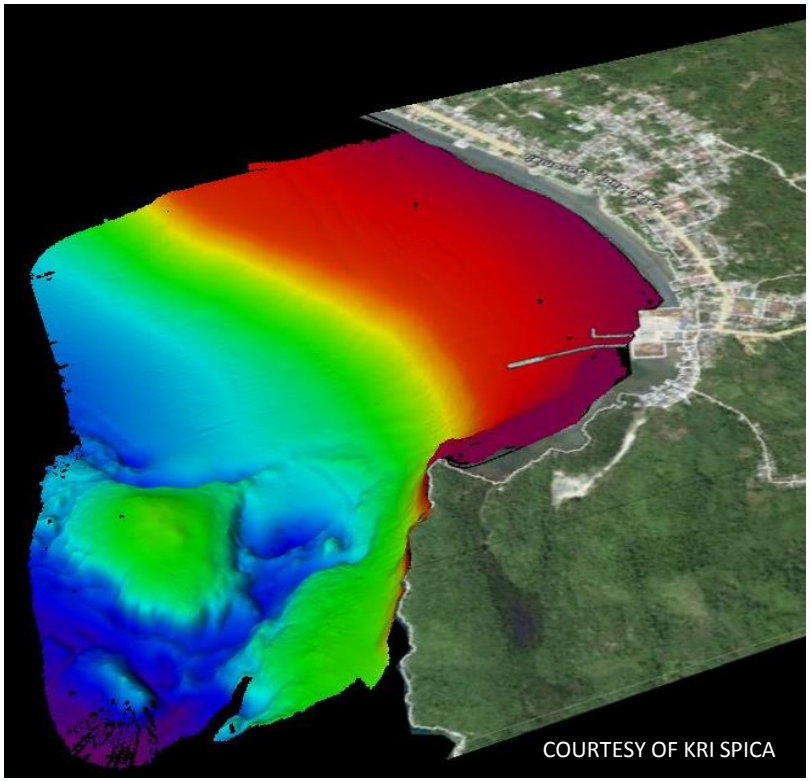
BATHYMETRIC DATA

VERY IMPORTANT TO GUIDE THE SEARCH AND RESCUE TEAM THROUGH THE SEA BED TO RECOVER DEBRIS OR WRECKAGE OF THE CRASHED AIRPLANE



BATHYMETRIC DATA ACQUISITION



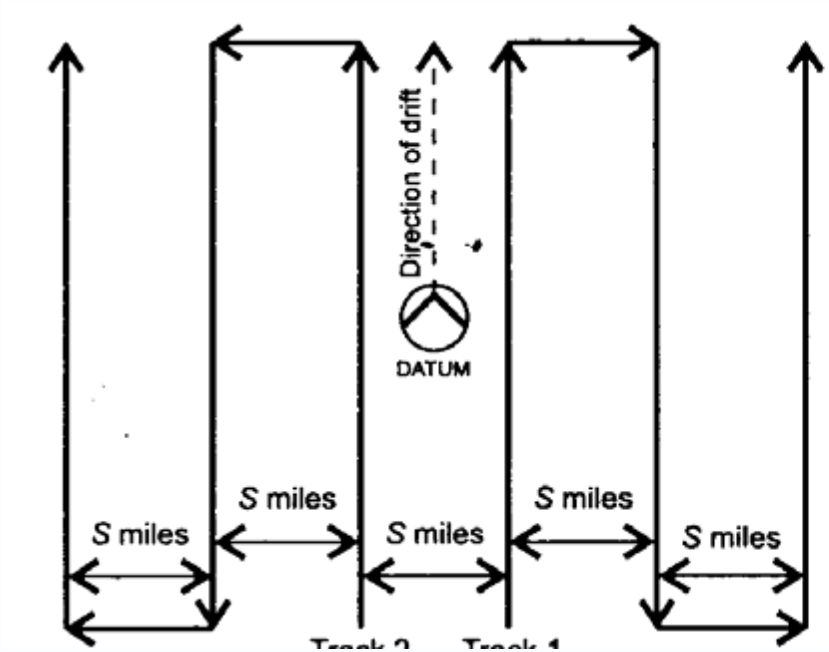


TRACK LINE SEARCH (TS)

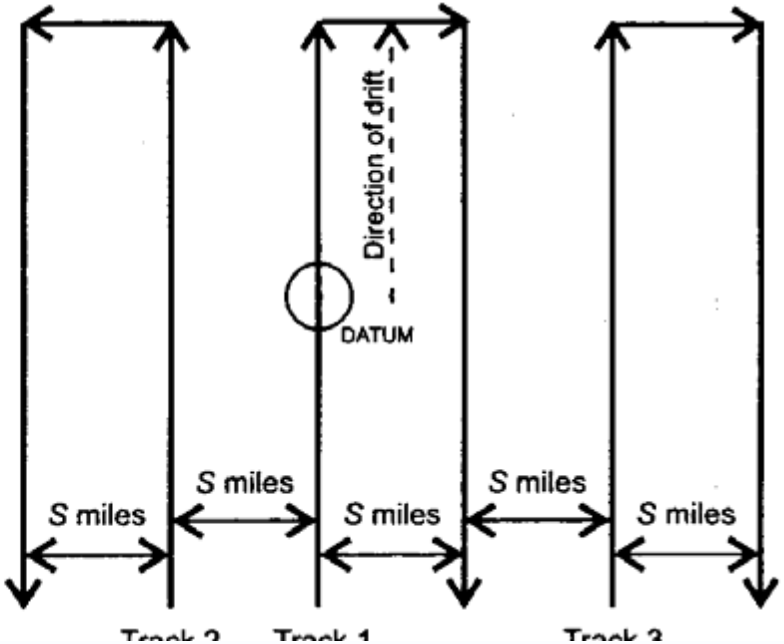
NORMALLY USED WHEN AN AIRCRAFT OR VESSEL HAS DISAPPEARED WITHOUT A TRACE ALONG A KNOWN ROUTE.

- OFTEN USED AS INITIAL SEARCH EFFORT DUE TO EASE OF PLANNING AND IMPLEMENTATION.
- CONSISTS OF A RAPID AND REASONABLY THOROUGH SEARCH ALONG INTENDED ROUTE OF THE DISTRESSED CRAFT.
- SEARCH MAY BE ALONG ONE SIDE OF THE TRACK LINE AND RETURN. IN THE OPPOSITE DIRECTION ON THE OTHER SIDE (TSR).
- SEARCH MAY BE ALONG THE INTENDED TRACK AND ONCE ON EACH SIDE, THEN SEARCH FACILITY CONTINUES ON ITS WAY AND DOES NOT RETURN (TSN).
- AIRCRAFT ARE 'FREQUENTLY USED FOR TS DUE TO THEIR HIGH SPEED

SEARCHING METHODS



PARALLEL SEARCH TRACK FOR 2 SHIPS



PARALLEL SEARCH TRACK FOR 3 SHIPS

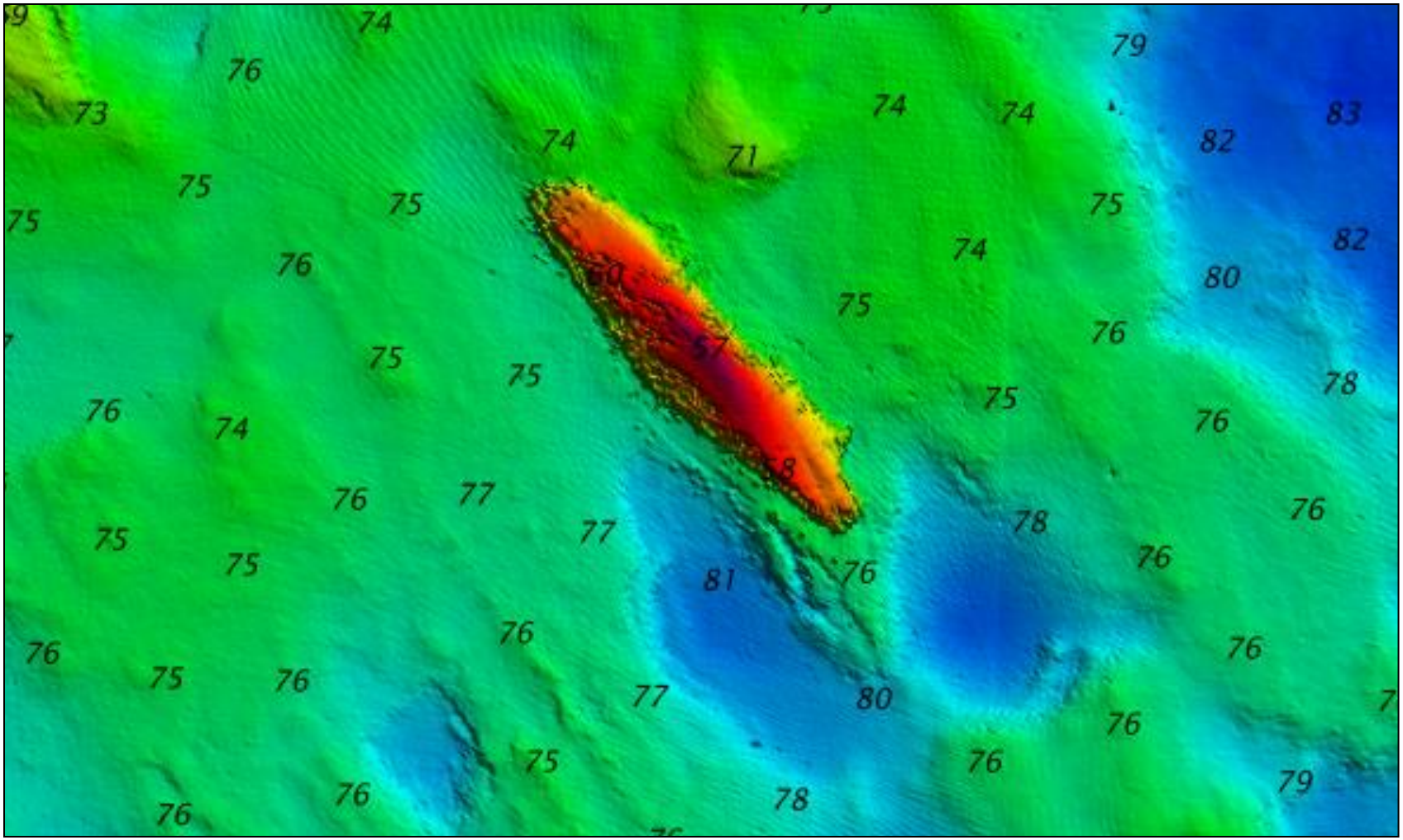
AIR ASIA QZ8501

- WATER DEPTHS RANGED BETWEEN ONLY 25M AND 38M

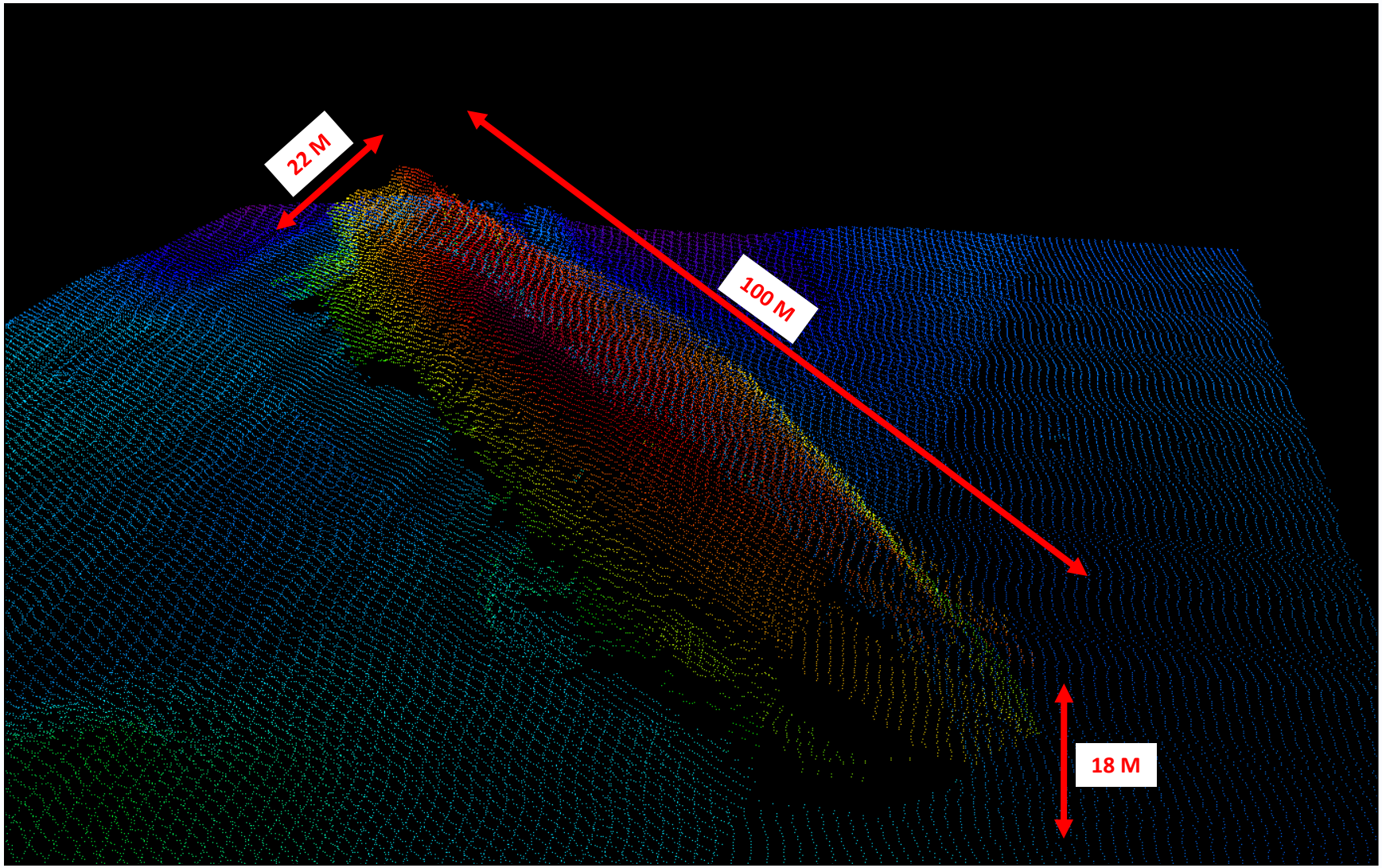
THE MISSION WAS ABLE TO DETECT EIGHT SUSPECTED OBJECTS IN ROUGHLY 12KM BY 15KM SURVEY AREA WITHIN 24 HOURS

WRECK BAHTERA JAYA LAPORAN 2013 OVERLAY DENGAN PETA NO 71

WRECK BAHTERA JAYA BERADA PADA KEDALAMAN 57 METER



DIMENSI WRECK BAHUGA JAYA



2ND CASE STUDY

- **ADAM AIR CRAHED AT MAKASSAR STRAITS IN 2006**
- **1 JANUARY 2007 REPORTED MISSING**
- **10 JANUARY – WRECKAGE WERE FOUND IN PARE PARE**
- **21 JANUARY 2007 LOCATOR BEACON SIGNALS FROM THE FLIGHT RECORDERS WERE HEARD ON AND THEIR POSITIONS LOGGED**
- **24 AUGUST – SALVAGE WAS INITIATED**
- **27 AUGUST – DFDR AND CVR WERE RECOVERED**

- **THE SEARCH WAS SUSPENDED WHEN IT WAS DETERMINED THAT THE MAIN WRECKAGE WAS LOCATED IN THE OCEAN AT A DEPTH OF ABOUT 2,000 METERS, REQUIRING SPECIALIZED RECOVERY EQUIPMENT NOT AVAILABLE IN THE REGION**

DEEP SEA OPERATION TO SEARCH ADAM AIR

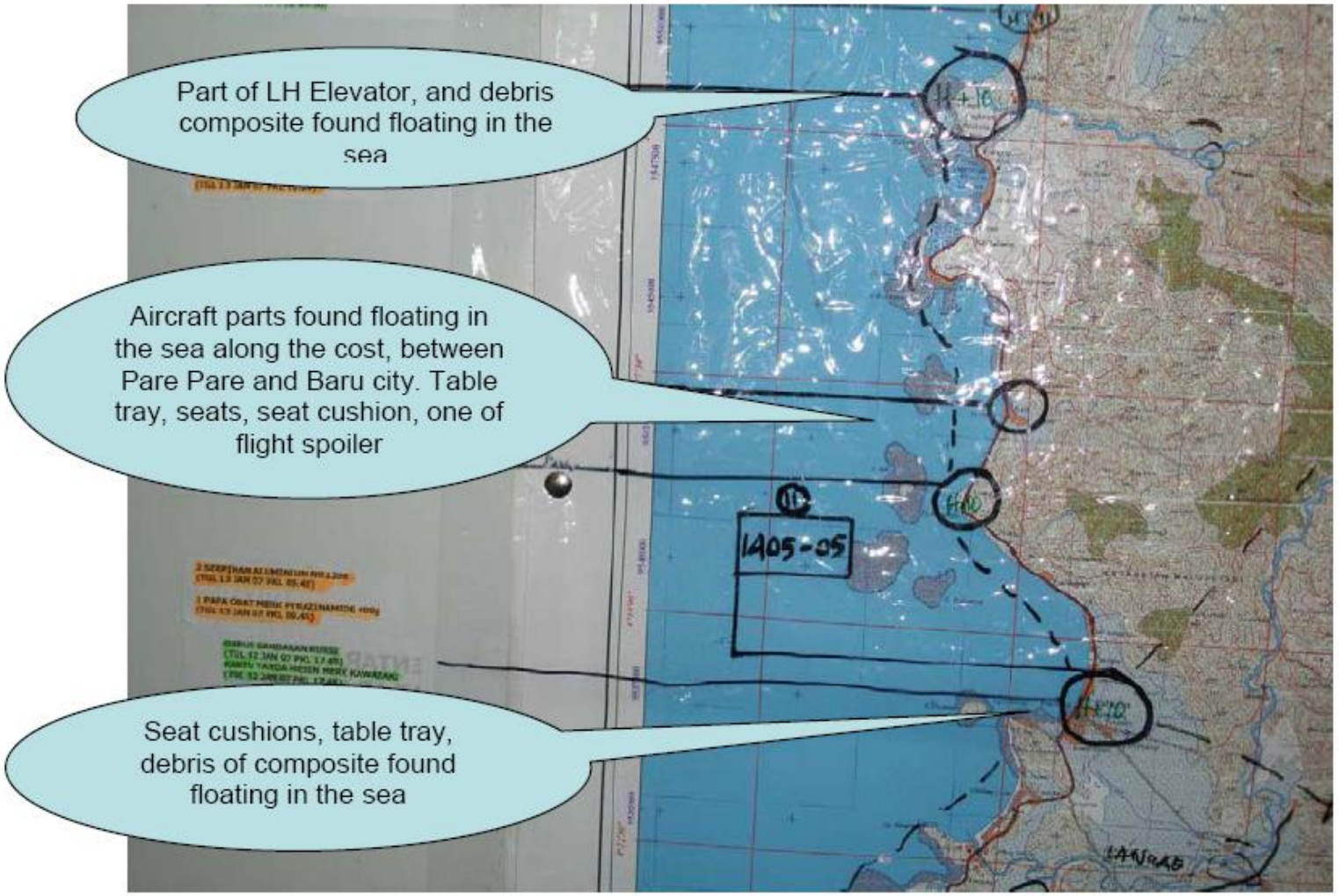
ROV, *Remora 6000*, which was capable of descending to a water depth of 3000 meters

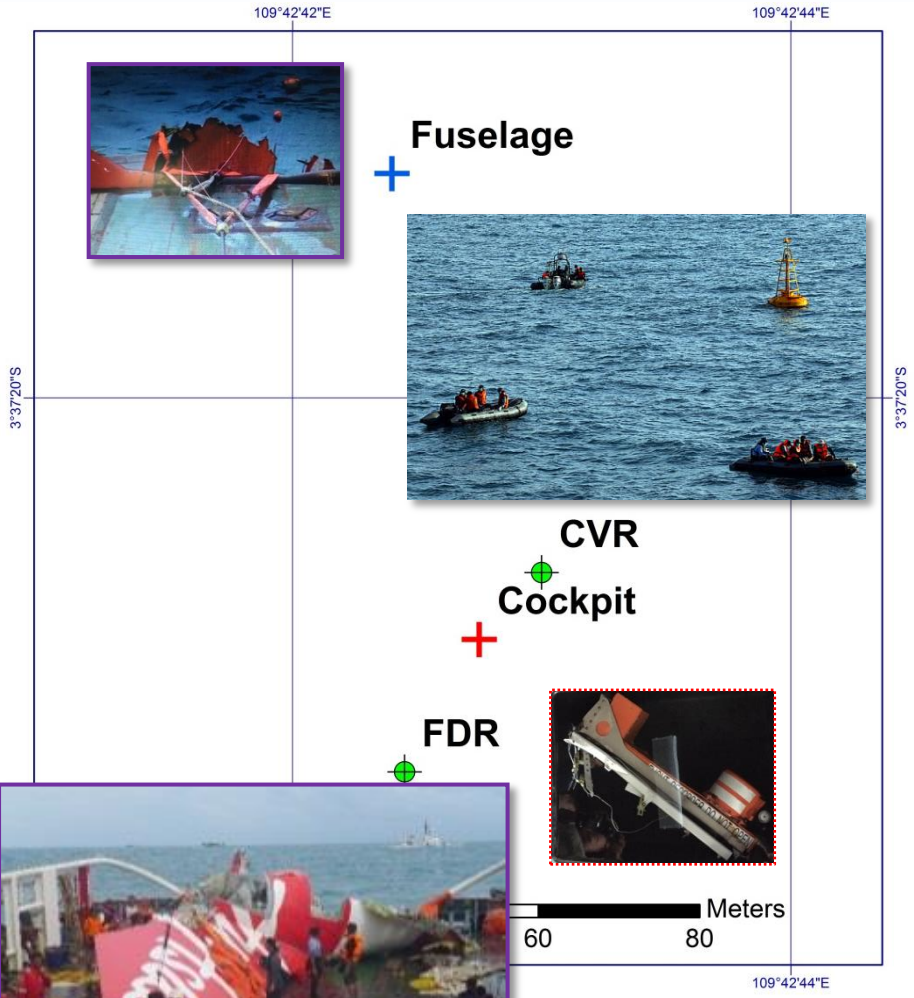
ROV REMORA 6000 USED FOR ADAM AIR SEARCH

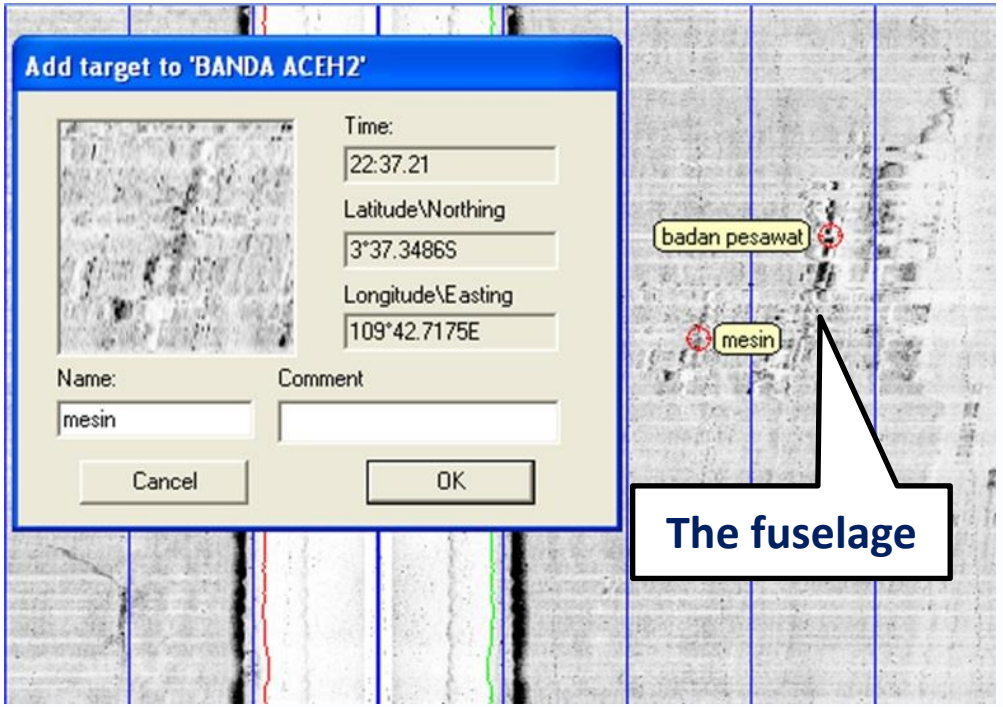
The underwater survey and recovery used a small ROV, *Remora 6000*, which was capable of descending to a water depth of 3000 meters. The ROV had three visual cameras and two fixed lights fitted on the front of the vehicle, which were used for visual scanning. The visual range of the camera was about 10 meters. The ROV was also equipped with underwater sonar with good resolution horizontally up to 100 meters. computer

NEED OF REMOTELY OPERATED VEHICLE (ROV)

TIPICAL OF DEBRIS

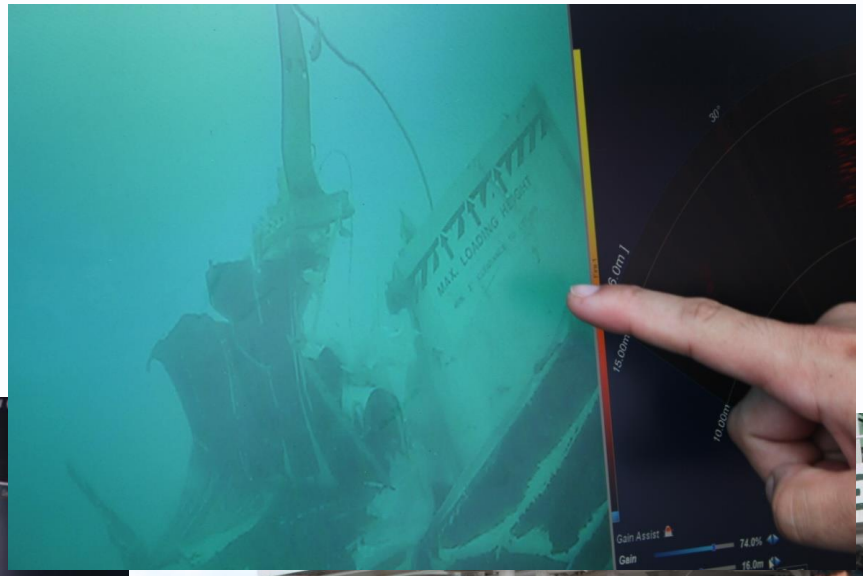


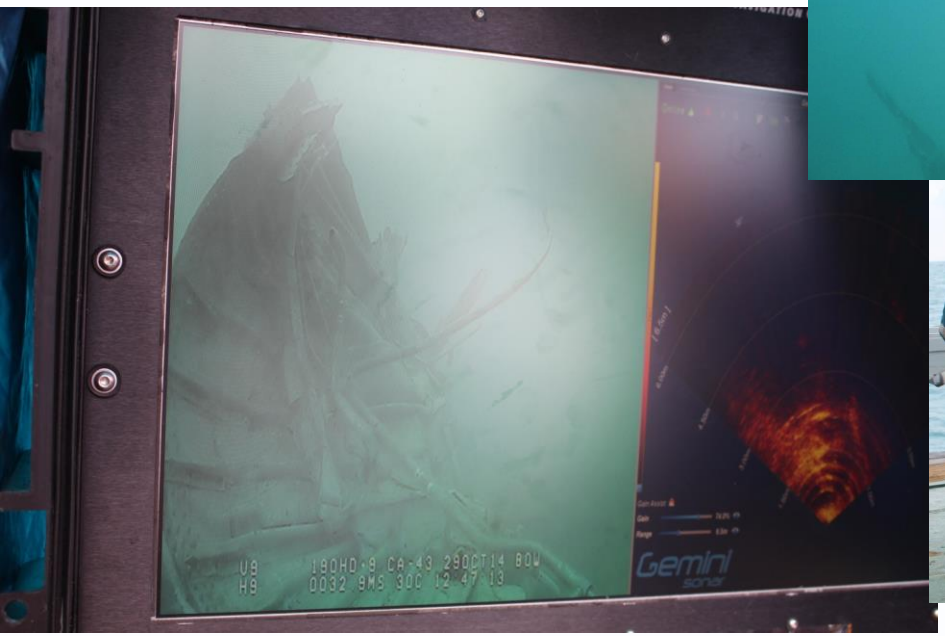




FDR	12 JAN 2015
CVR	13 JAN 2015
Fuselage	25 -27 JAN 2015 (un-evacuated)
Victims	70 recovered

Side Scan Contacts confirmed by ROV and Divers





Celebration of our Joint Efforts

SPECIAL SERVICES

- MUTUAL ASSISTANCE VESSEL RESCUE SYSTEM
- COMPUTER AIDED SEARCH PLANNING
- UNDERWATER SEARCH/HYDROGRAPHIC CAPABILITIES
- MEDICAL FACILITIES
- FUELING FACILITIES

TECHNICAL ISSUES (RELATED TO UNDERWATER SEARCH)

- THE IMPORTANCE OF UNDERWATER IMAGING
- CAPABILITY FOR DATA INTERPRETATION
- PING LOCATOR TECHNOLOGY (SHOULD BE AVAILABLE IN THE MAJOR HO'S)
- AVAILABILITY OF SEABED INFORMATIONS AND MAPS)
- AVAILABILITY OF OCEANOGRAPHIC AND METEOROLOGIC INFORMATIONS

RECOMENDATION

- TO STRENGTHEN COOPERATION BETWEEN EAHC MEMBER STATES FOR DISASTER RELIEF/HUMANITARIAN AIDS
- ADEQUATE INSTRUMENTS (NOT LIMITED TO SSS, MBES, SBES) AND METHODS FOR SEARCH AND RESCUE IS VERY DEMANDED FOR EVERY HYDROGRAPHIC OFFICE
- EAHC MEMBER STATES COULD MANAGE WORKSHOP, SEMINAR AND TRAINING OF SPECIAL SURVEY TO SUPPORT SAR MISSION IN EAST ASIA REGION
- TO CONSIDER A GUIDELINES FOR COOPERATION BETWEEN HYDROGRAPHIC OFFICES AND THE MARITIME SEARCH AND RESCUE AUTHORITIES TO RESPOND OR COORDINATING THE RESPONSE TO DISTRESS CASES IN WHICH LIFE OR PROPERTY IS THREATENED AT SEA

*) HO AS THE OWNER OF HYDROGRAPHIC RESOURCES TO SUPPORT SAR

THANK YOU

Terimakasih

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