



De zoekactie naar Malaysian Airlines vlucht MH370

Kooy Symposium 2019 - Extreme omstandigheden - Ir R.W.E.Luijnenburg

Vlucht Malaysian Airlines MH370 - 8th March 2014



De passagiers en bemanning



SAR operatie door de Royal Australian Navy



SAR operatie uitgevoerd door de Royal Australian Navy



ATSB begint onderzoek naar vermissing MH370

The Sentinel
of this land, for its people
Guwahati, Wednesday, August 27, 2014 at 3:27:20 PM

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Missing plane MH370: Search contractor named
Category: Headlines
Published: 6th Aug 2014 04:18:39

Dutch firm Fugro to renew MH370 search
Canberra, August 6: Australia has appointed Dutch firm Fugro to renew operation for missing Malaysia Airlines flight MH370 in the southern Indian Ocean. The vessels will search the sea floor using side scan sonar, multi-beam and video cameras to locate and identify the aircraft debris. The under 60,000 square km area is still expected to be searched.

Niederländer suchen erneut nach MH370

MH370: Will Dutch firm Fugro be able to search the world's greatest mystery?
KATE SCHNEIDER WITH WIRES NEWS.COM.AU AUGUST 07, 2014 8:08

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Australia says Dutch contractor Fugro Survey to search Indian Ocean for missing Malaysian jet

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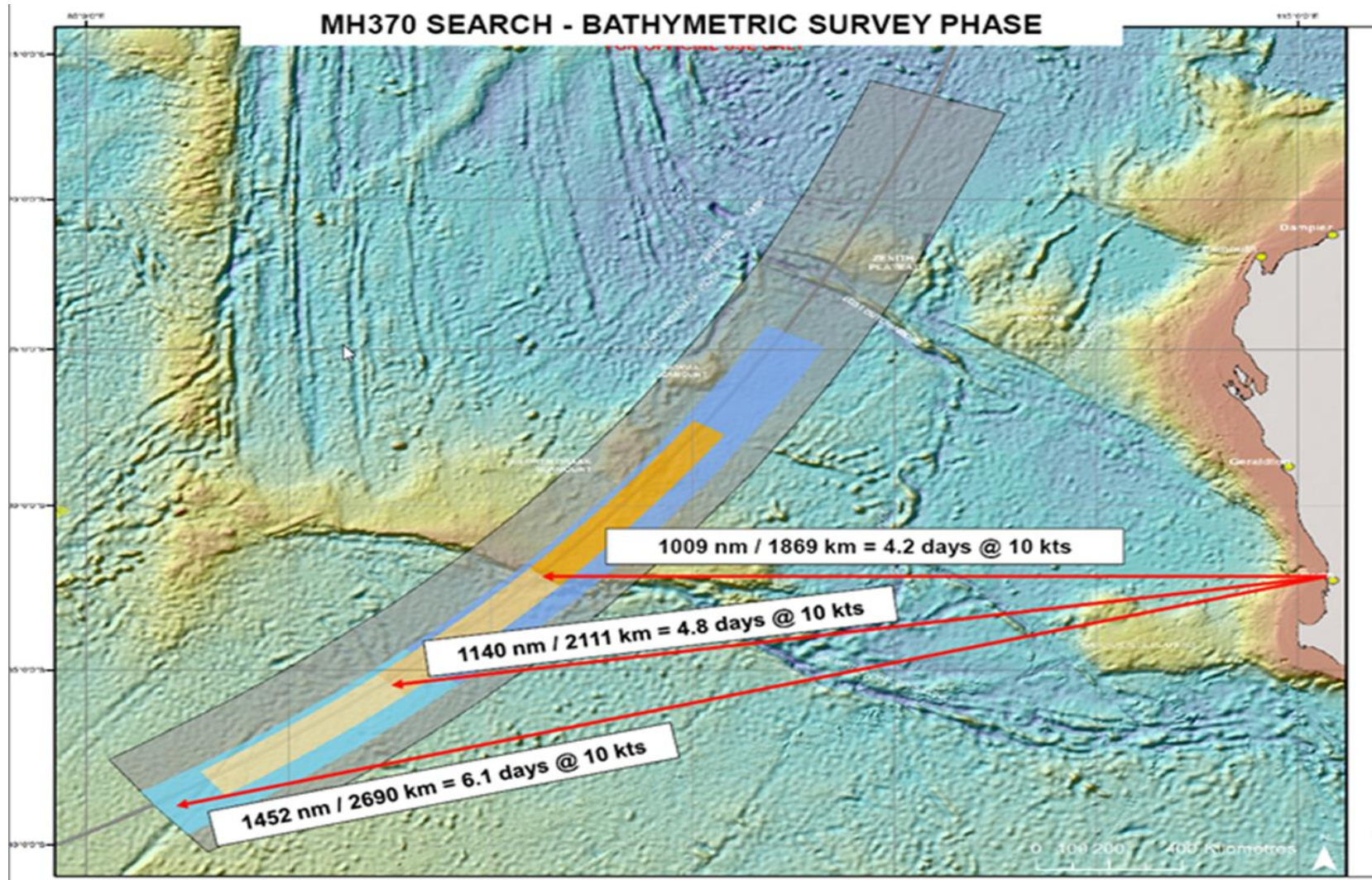
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Dutch firm to conduct MH370 underwater search
SYDNEY: A Dutch firm will conduct a deep-water search in the Indian Ocean for missing Malaysia Airlines Flight MH370 from September, Australia said, expressing "cautious optimism" that the plane will be found.

FUGRO

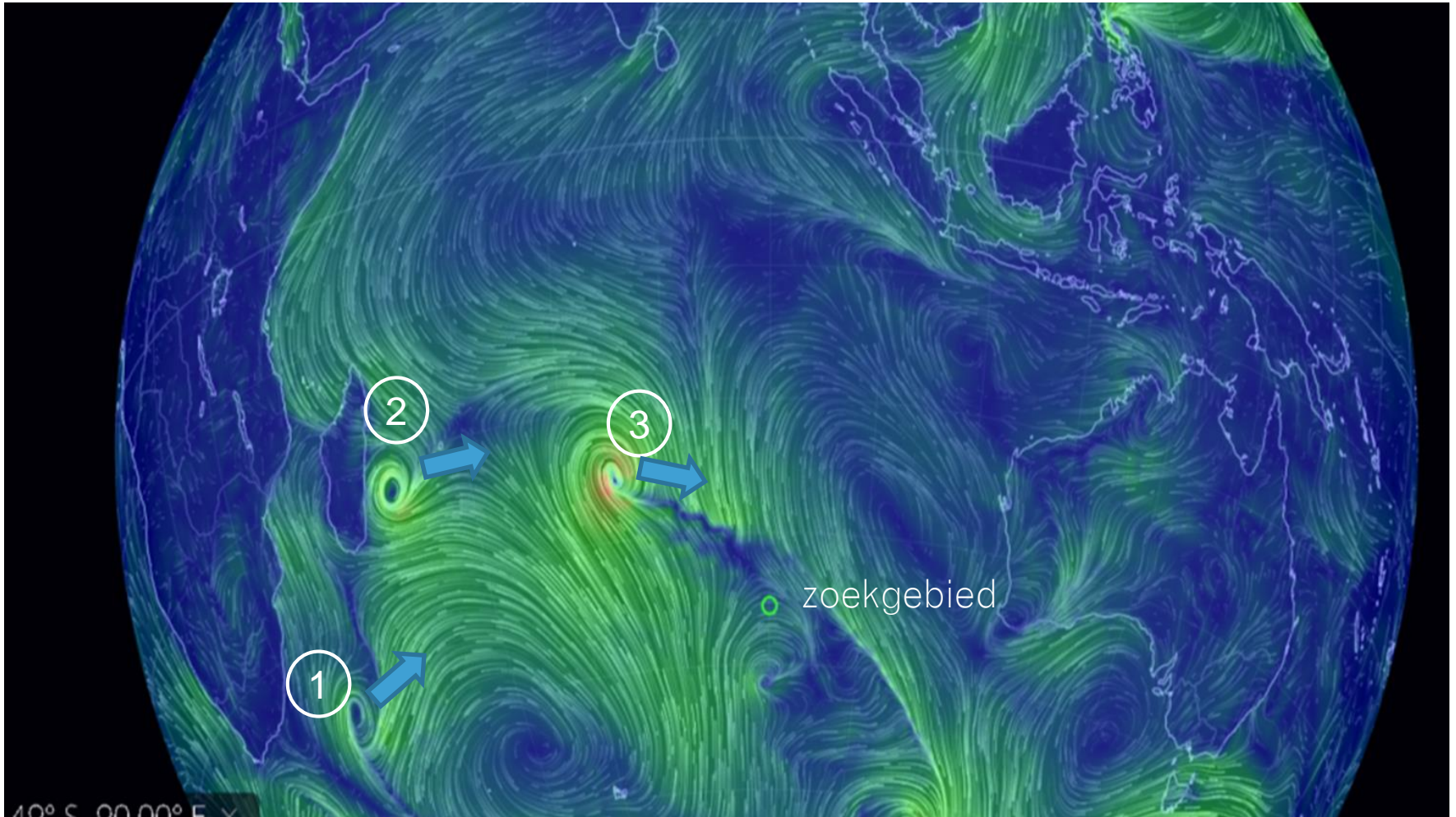
Het zoekgebied



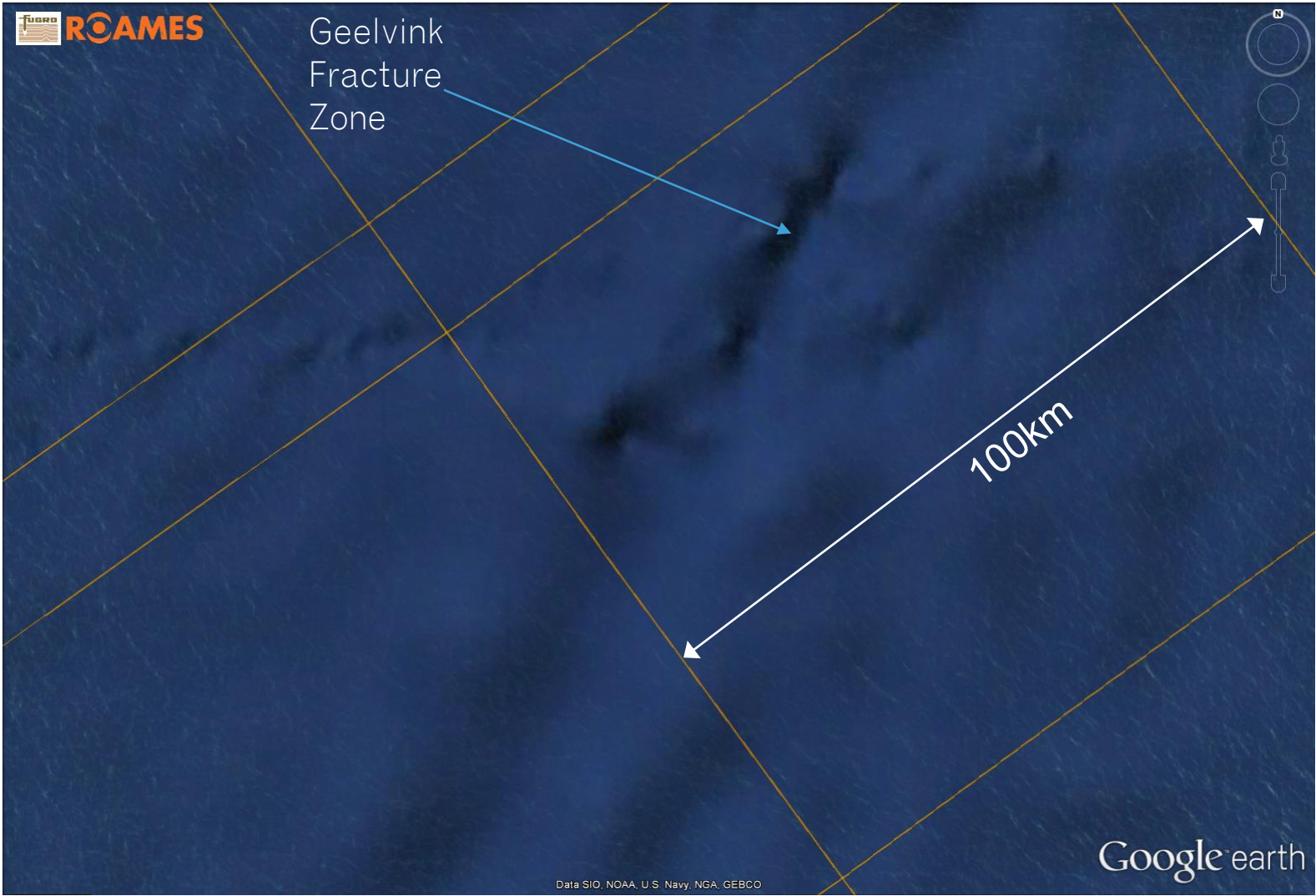
Buitengewoon zware weersomstandigheden



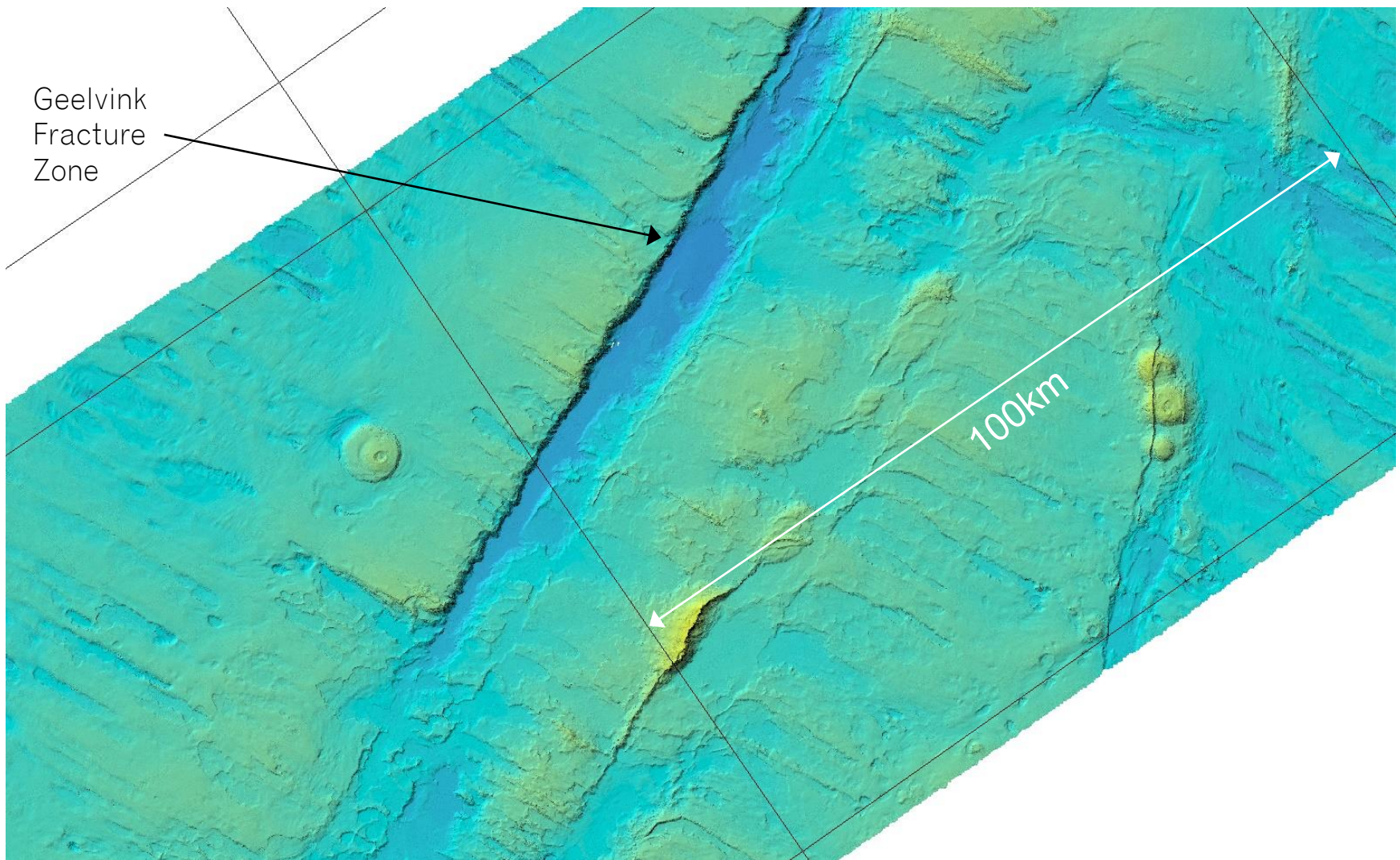
Niet ongebruikelijk - Drie zware stormen op rij



Zeebodembodem informatie door satelliet waarnemingen



Werkelijke bodemgesteldheid na detail onderzoek



Werkelijke bodemgesteldheid na detail onderzoek

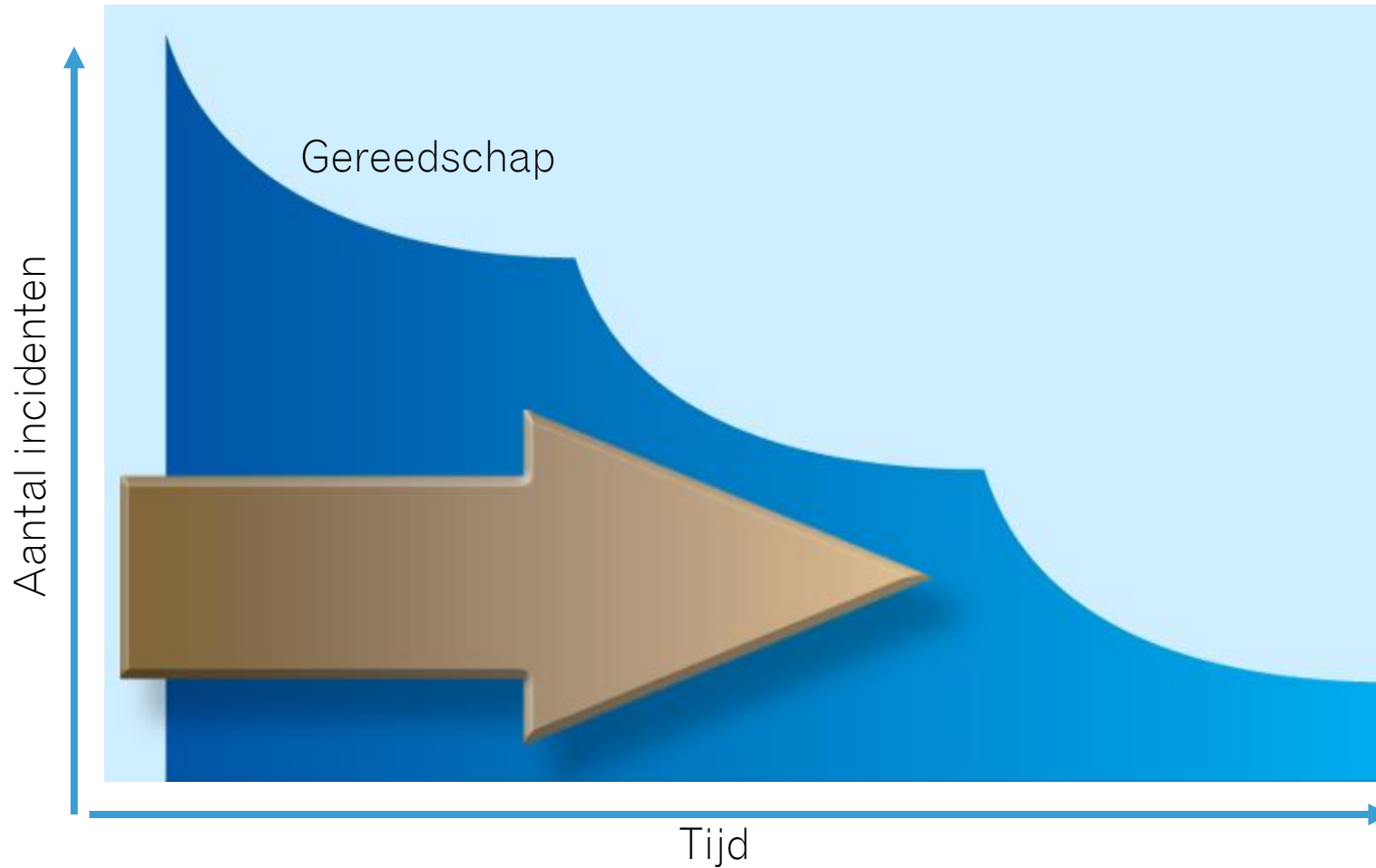




De uitdagingen

- Geen enkel direkte aanwijzing van crash site
- Stormen, sterke wind en hoge golven
- Een enorm zoekgebied - 120,000 km²
- Zeer afgelegen gebied
- Zeer ruige zeebodem en zeer diep – tussen 300 m en bijna 8000 m
- Geen gedetailleerde zeekaarten

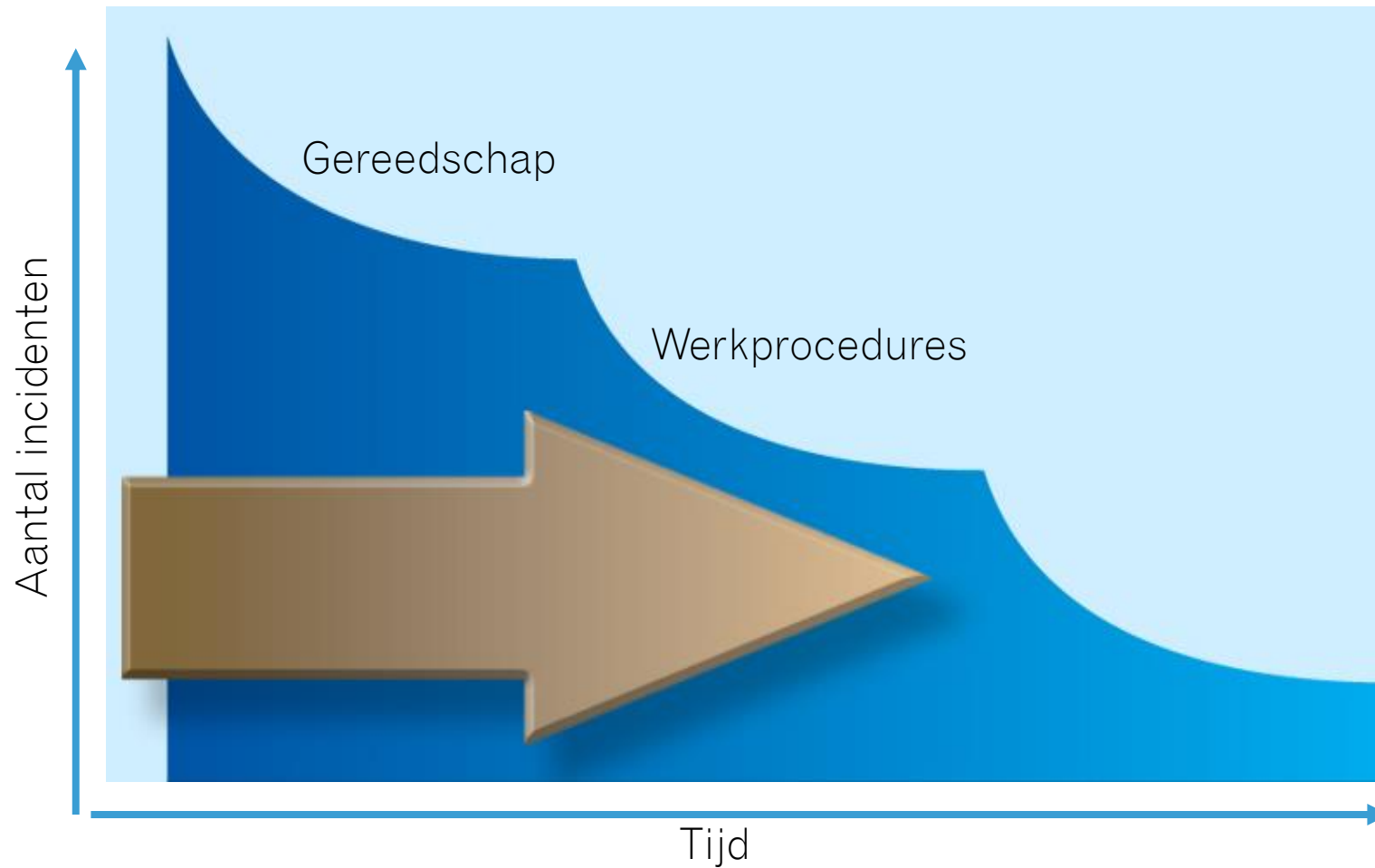
Drievouding benadering van extreme omstandigheden en veiligheidsvraagstukken



Fugro standard Survey vessels



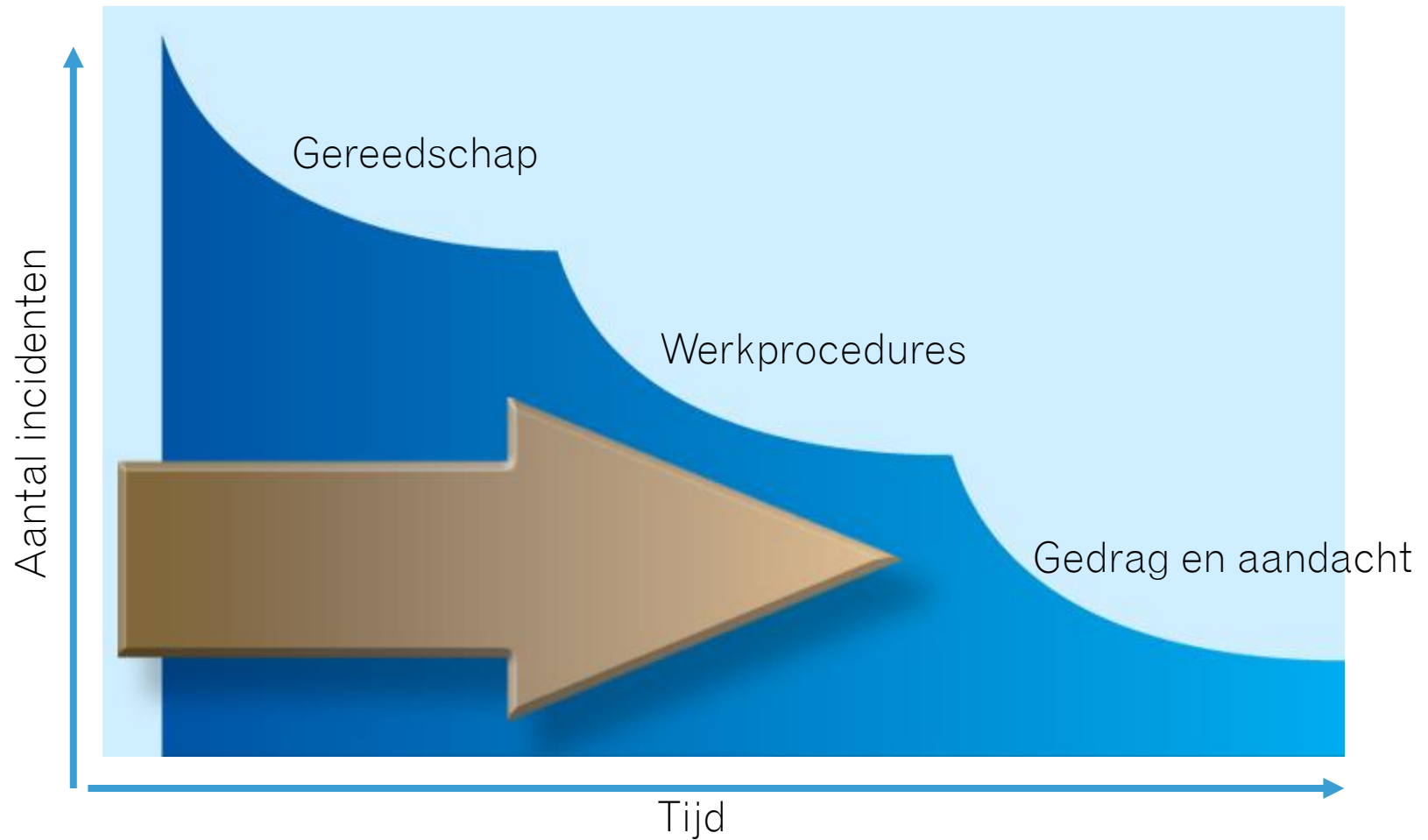
Drievouding benadering van extreme omstandigheden



Werkprocedures bv dagelijks werkoverleg



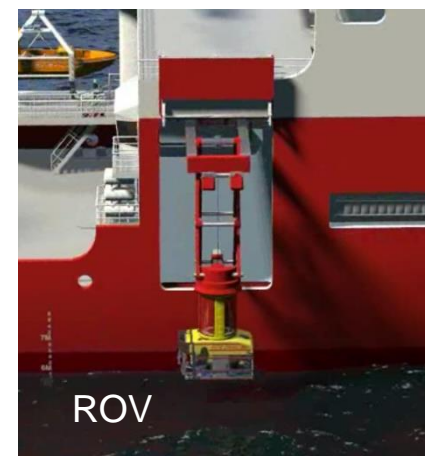
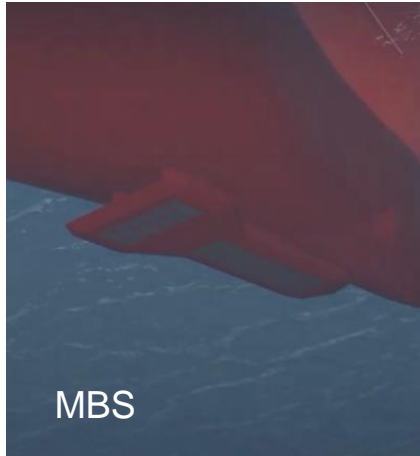
Drievoudige aanpak van extreme omstandigheden



Gedrag en aandacht



Het zoekplan – Technische afwegingen



Deepwater Multi Beam Sonar

Dekkingsgraad:
1200 km²/dag

Onderscheidend
vermogen : 104 m

100 dagen

Deep Tow

Dekkingsgraad:
133 km²/dag

Onderscheidend
vermogen : 0.7 m

902 dagen

Autonomous Underwater Vehicle

Dekkingsgraad :
17 km²/day

Onderscheidend
vermogen : 0.1 m

7000 dagen

Remote Operated Vehicle

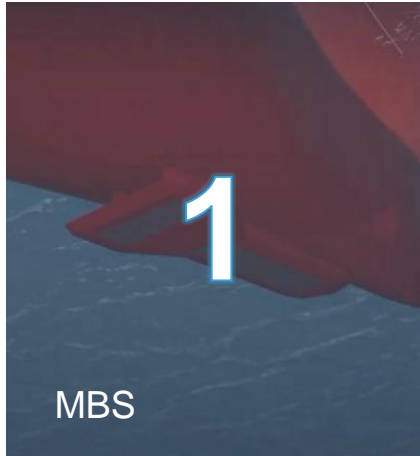
Dekkingsgraad :
24 km²/day

Onderscheidend
vermogen : 0.1 m

5000 dagen

.....om 120,000 km² af te zoeken

Het zoekplan – Vier stappen



MBS

Deepwater Multi Beam Sonar

Dekkingsgraad:
1200 km²/dag

Onderscheidend
vermogen : 104 m

Detail kaart



Deep Tow

Deep Tow

Dekkingsgraad:
133 km²/dag

Onderscheidend
vermogen : 0.7 m

Zoektocht



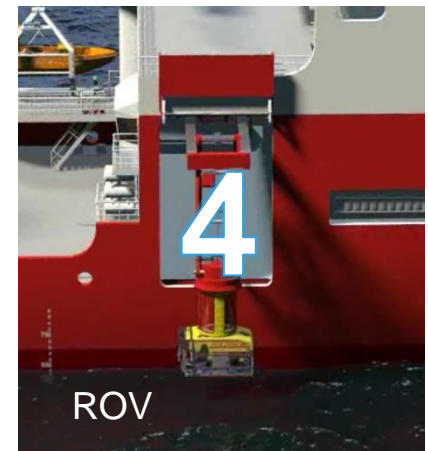
AUV

Autonomous Underwater Vehicle

Dekkingsgraad :
17 km²/day

Onderscheidend
vermogen : 0.1 m

Detail onderzoek



ROV

Remote Operated Vehicle

Dekkingsgraad :
24 km²/day

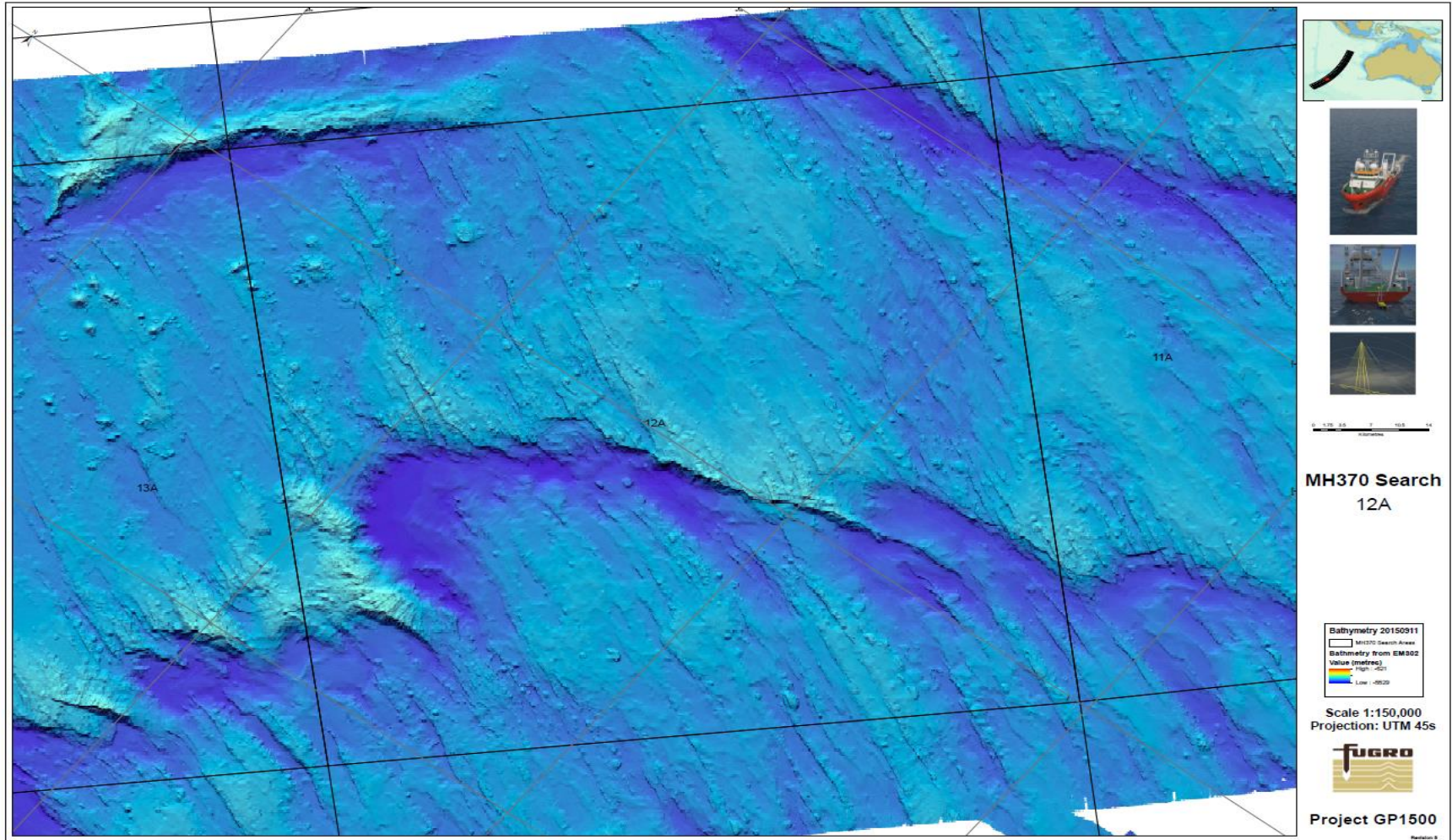
Onderscheidend
vermogen : 0.1 m

Berging

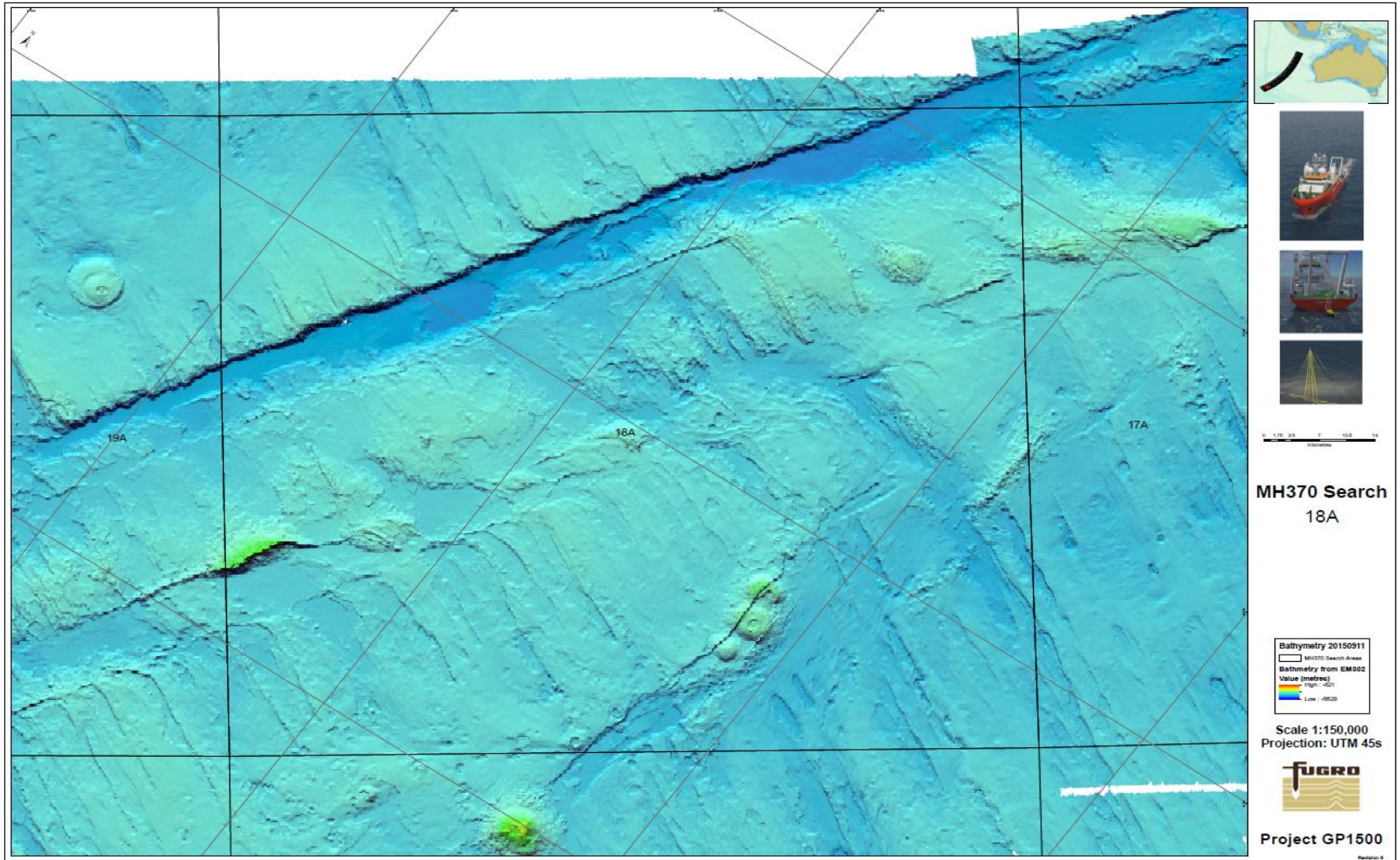
Multibeam survey



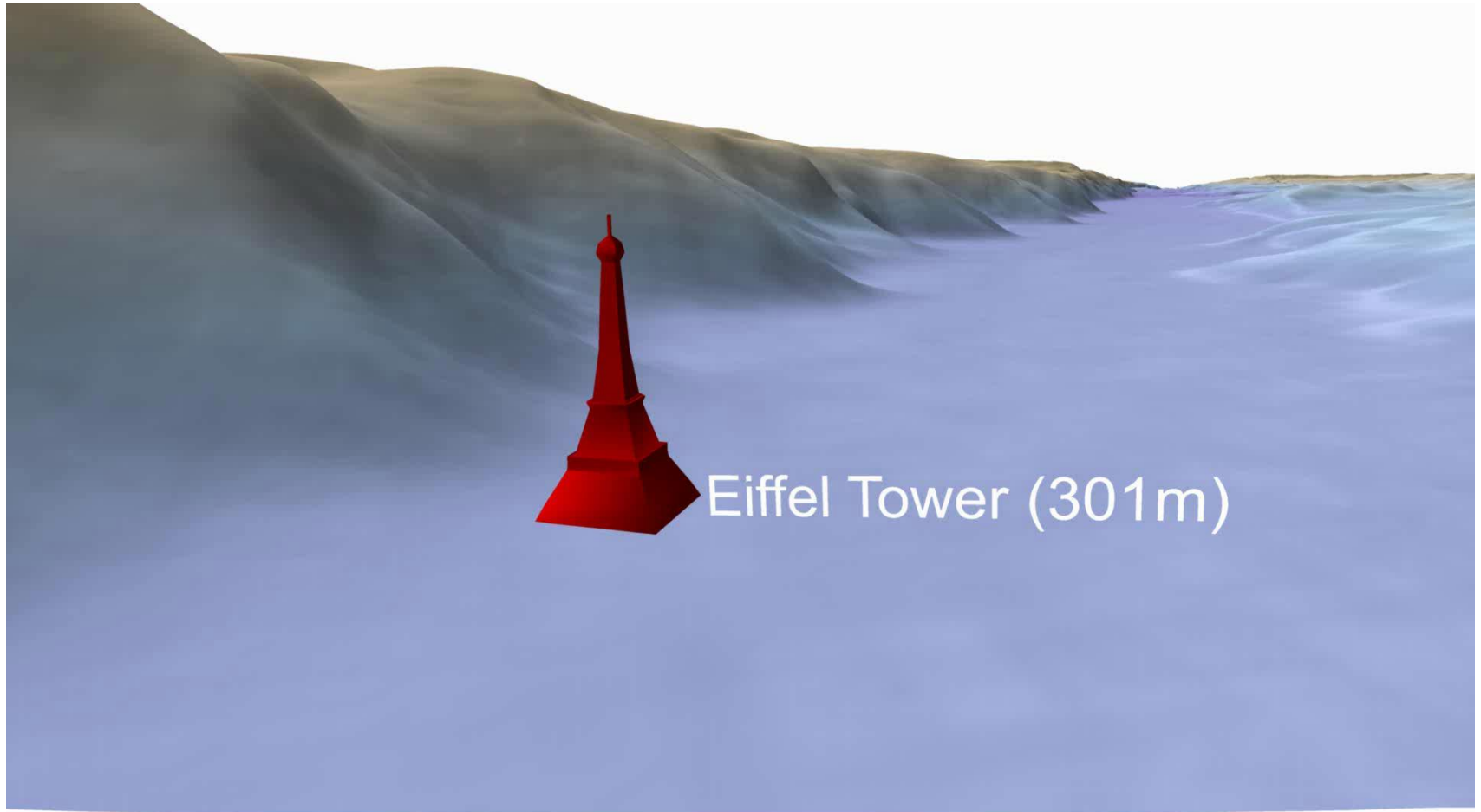
Detail kaart



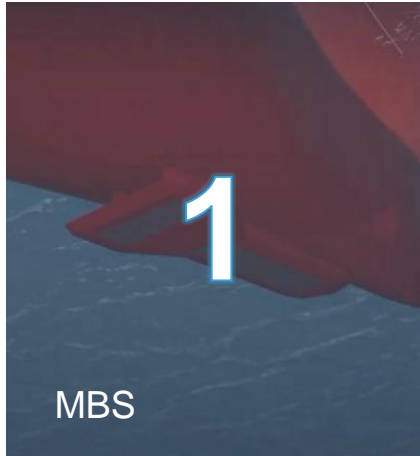
Detailkaart



De Geelvink fracture zone in 3D



Het zoekplan – Vier stappen



Deepwater Multi Beam Sonar

Dekkingsgraad:
1200 km²/dag

Onderscheidend
vermogen : 104 m

Detail kaart



Deep Tow

Dekkingsgraad:
133 km²/dag

Onderscheidend
vermogen : 0.7 m

Zoektocht



Autonomous Underwater Vehicle

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Onderscheidend
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Edtail



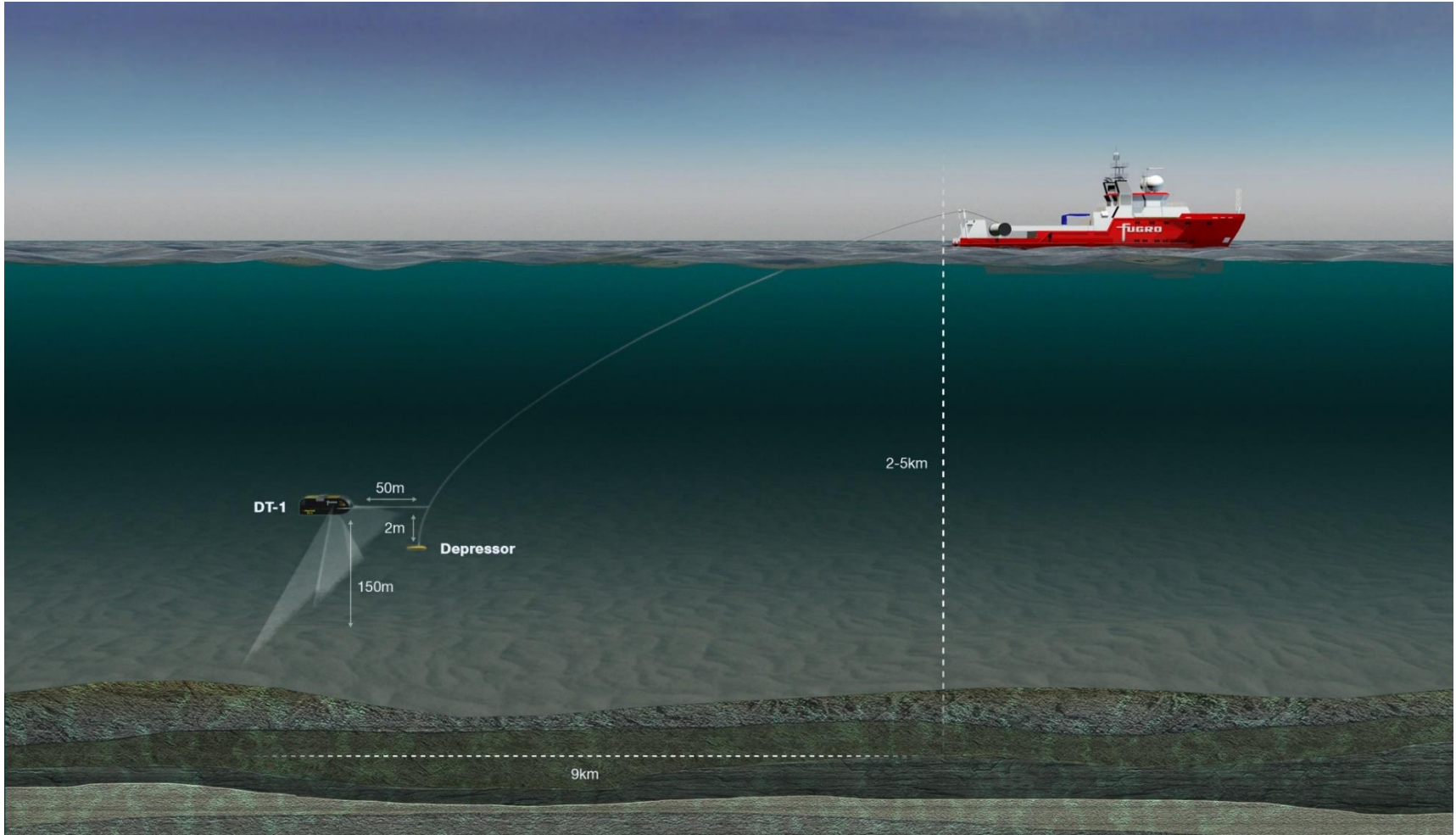
Remote Operated Vehicle

Dekkingsgraad :
24 km²/day

Onderscheidend
vermogen : 0.1 m

Berging

Deep tow zoektocht



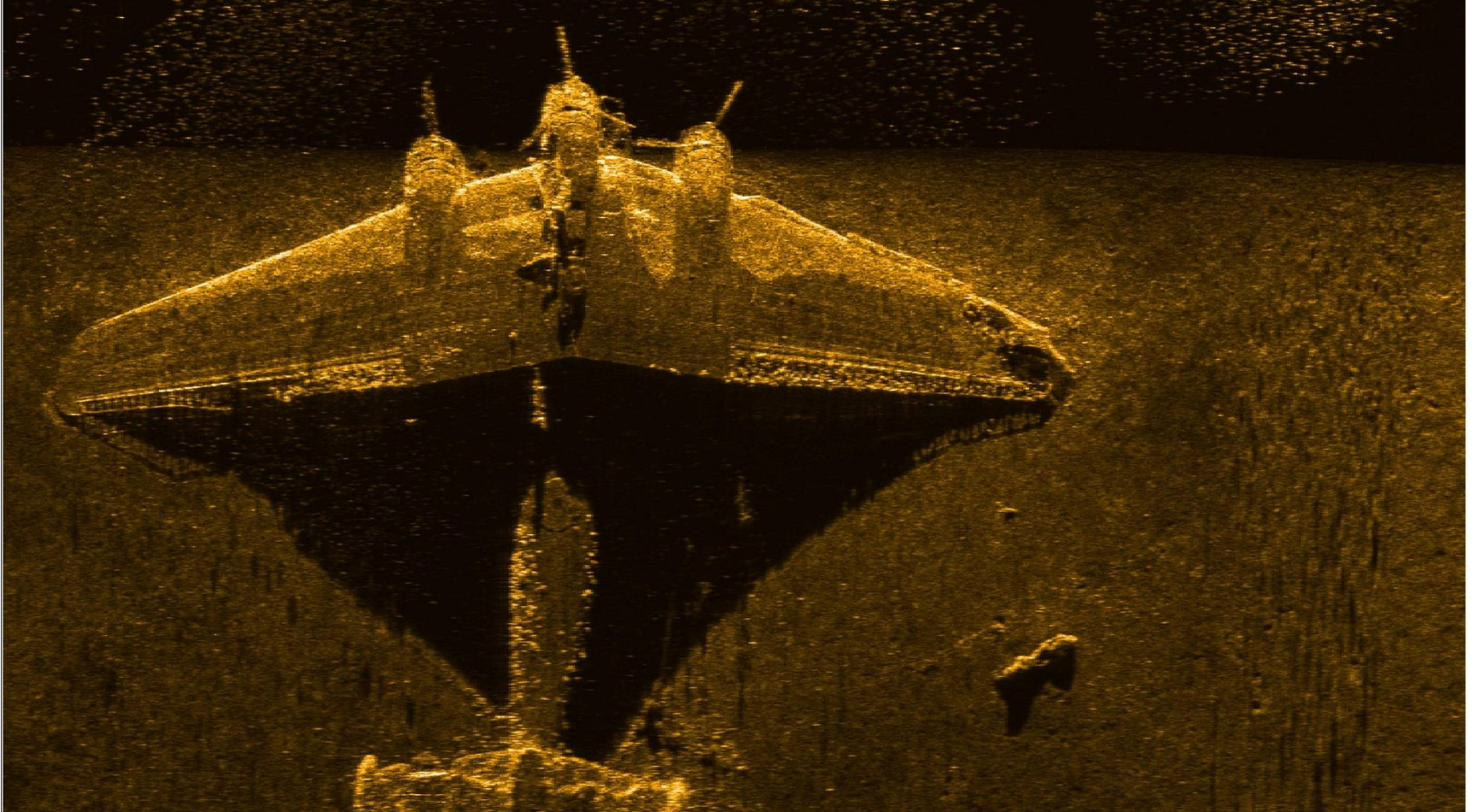
Deep Tow survey system



Deep tow



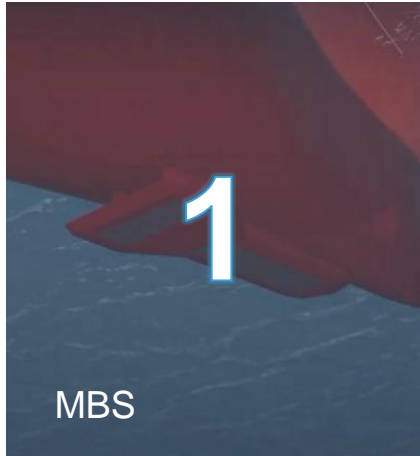
Een vliegtuigwrak in ondiep water



Het wrak van Air France 447 in de Atlantische Oceaan



Het zoekplan – Vier stappen



MBS

Deepwater Multi
Beam Sonar

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Onderscheidend
vermogen : 104 m

Detail kaart



Deep Tow

Deep Tow

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Zoektocht



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Detail onderzoek



ROV

Remote Operated Vehicle

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24 km²/day

Onderscheidend
vermogen : 0.1 m

Berging

AUV detail onderzoek



Unmanned Survey Vessels



Remote Services



Remote Services



In 2017, na 120.000 km², schort ATSB de zoektocht op



Conclusie



Conclusie – Kerngetallen

Offshore statistics for search for MH370 up to 20 Jan 2017

	As of 20 Jan 2017
Nationalities working offshore	20
No. of people who have worked offshore	~300
Vessel days	1,916
Man Hours (for 12 hour days)	659,280
Exposure Man Hours (for 24 hour days)	1,318,560
Distance travelled in Transit	209,790
Distance travelled on MBES Recon, DT & AUV surveys	144,092
TB of data transferred ashore	116
Cyclones affecting search area	4
Largest recorded wave	23 m
Strongest recorded wind	78 knots (~150 km/hour)
Emergency port calls due to illness (not injury)	2

120,000 km² of the 120,000 km² search area now complete

Note the above figure represents 104,500 km² covered by the 4 Fugro vessels and 15,500 km² covered by non-Fugro vessels (Go Phoenix and DJ101)

Inzet van Fugro schepen

- Fugro Equator MBS reconnaissance survey (5 swings),
- Fugro Equator DT survey (15 swings),
- Fugro Discovery DT survey (16 swings),
- Fugro Supporter AUV survey (3 swings),
- Havila Harmony AUV survey (2 swings).
- Fugro Equator AUV survey (2 swings)