

# HOW “ONE OF THOSE DAYS” DEVELOPED - INDONESIAN ARCHIPELAGIC SEA LANES AND THE CHARTING ISSUES

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NB The thoughts and views expressed in this paper are those of the author, and should not be considered to reflect the views of the United Kingdom Hydrographic Office

**Introduction** This paper explores how details contained in the minutes of International Maritime Organization’s 76<sup>th</sup> Maritime Safety Committee meeting impacted on a 12-month programme of a chart branch within the UKHO. It looks at how the UKHO managed the process of informing chart users about the introduction of the Indonesian Archipelagic Sea Lanes (ASL) including the following:

- The History of the Indonesian ASL
- The 10% Rule
- Symbology
- Effects on Navigational Charts and Publications
- Correcting the Navigational Charts
- “Closed” areas
- Areas of conflict
- Summary

## 1. The History of the Indonesian ASL

1.1. ASLs were first introduced to the International Maritime Organization (IMO) in 1996 and adopted at the at the 69<sup>th</sup> Maritime Safety Committee (MSC) meeting in 1998. Resolution MSC 71(69) was adopted and promulgated in Safety of Navigation Circular 199 (SN/Circ. 199). The resolution detailed how ASLs work, how they should be charted and recommended wording on a cautionary note to be shown. The symbology and wording was developed by the Chart Standardization Committee of The International Hydrographic Organization (IHO).

1.2. In May 1998, the IMO issued SN/Circ. 200 giving details of the adoption of the partial ASL system to be established in Indonesian waters six months after its announcement by the Indonesian Government. SN/Circ. 200 gave details of the lanes as follows, see Diagram 1:

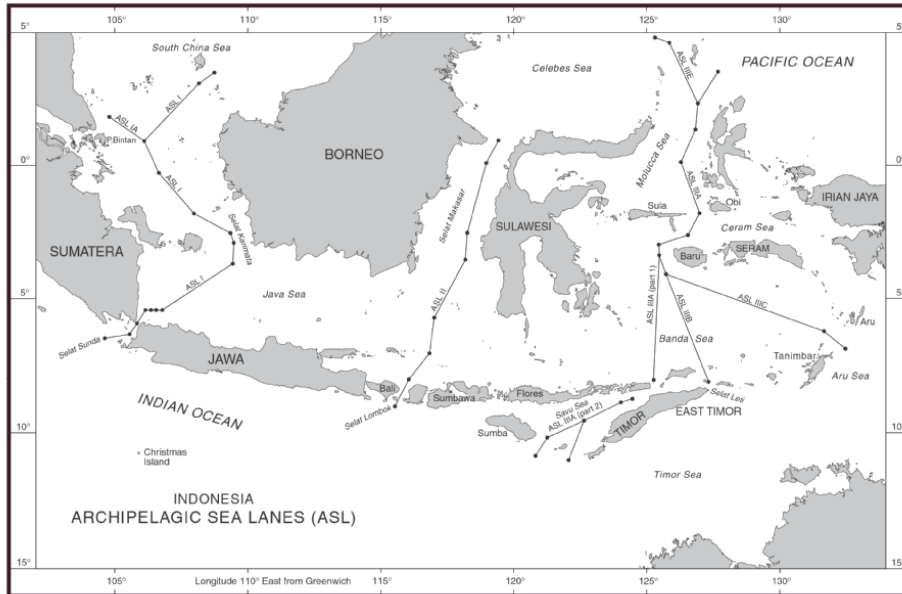


Diagram 1.

1.3. ASL I passes through Selat Sunda into the western Java Sea, through Selat Karimata, to the Natuna Sea before dividing towards the Singapore Strait and the South China Sea.

1.4. ASL II, (used by deep draught vessels unable to navigate the Malacca Strait or ASL I) passes through Selat Lombok, into the eastern part of the Java Sea and northwards to Selat Makasar, terminating in the Celebes Sea.

1.5. ASL III is somewhat complex, particularly in the vicinity of East Timor. The three main branches to this route are: from the Indian Ocean via the Savu Sea, from the Timor Sea and the Arafura Sea. These routes converge in the Banda Sea then deviate around Buru and Sula into the Molucca Sea, before diverging into the Celebes Sea and Pacific Ocean.

1.6. IMO's SN/Circ. 206, issued in January 1999, provided guidance for shipping transiting archipelagic waters and included an explanation and diagrammatic representation of the 10% Rule. (see Section 2).

1.7. At the Maritime Safety Committee meeting of 16<sup>th</sup> December 2002, Indonesia reported that its Government had promulgated Regulation No 37 on 28<sup>th</sup> June that year concerning the "Rights and Obligations of Foreign Ships and Aircraft in Conducting Rights of Archipelagic Passage". ASLs would therefore come into force six months later. Indonesia also reported that portions of ASL III in the region of East Timor would not be enforced.

1.8. A copy of the minutes of this meeting were received in UKHO on 20<sup>th</sup> January 2003 and immediately assessed for charting implications.

## 2. The 10% Rule

2.1. Before we could consider how to chart the ASLs we had to interpret and understand the 10% Rule. The definition of where and how it should be applied was imperative as there were different implications shown in SN/Circ. 206 to the principles understood by the Head of Law of the Sea<sup>1</sup> Branch (UKHO) who was privy to original discussions when ASL principles were established.

<sup>1</sup> Commander Chris Carleton, Head of UKHO's Law of the Sea Branch.

2.2. SN/Circ.206 states that “Where an island borders the sea lane, ships in ASL Passage may not navigate closer to the coast than 10% of the distance between the nearest point on the island and the axis line of the sea lane”. The diagram in the annex to the circular shows that the distance of the 10% Rule at the nearest point of land to the Axis Line is maintained along the whole of its coast where it falls within the lane. The discussions mentioned earlier in 2.1, established that the 10% Rule would be applied to the distance from the Axis Line to the adjacent coast, thus the 10% distance varied and gave greater safety margins further from the axis lines. SN/Circ.206 did not specify how an island falling wholly within the lanes, which could be passed by either side, should be treated. Another problem manifested where parts of an island fell beyond the 25 miles limit but when the 10% Rule was applied, the resultant distance impinged on the lanes. All of these factors needed to be resolved before deciding how to chart the ASL and identifying how many charts would be affected.

2.3. The three ASLs were plotted on a small scale chart covering the archipelago. Detail of the Axis Line, related 25 miles limits, 27.8 mile limits (the effect of which is described below) and the limits of navigational charts were plotted so that the full impact could be seen immediately.

2.4. Diagram 2 demonstrates the reasoning behind the extended lane widths. It will be seen that when the 10% Rule is applied to an island falling beyond the 25 miles boundary, but within 27.8 miles, it impinges on the outer limit of the ASL.

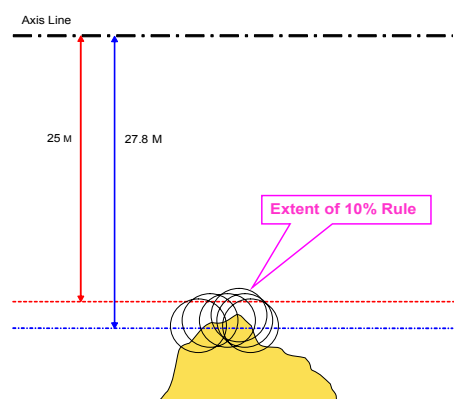


Diagram 2.

### 3. Symbology

3.1. Consideration then turned to the proposed IMO symbology for ASLs.

3.2. The symbology as defined in SN/Circ. 199 shows the Axis Line as a series of pecks alternating long and short; with large pecks radiating in both directions from turning points. The latter is difficult to achieve on charts containing more than one turn point.

3.3. The proposed symbology of the outer limit of the ASL was a series of three magenta “bowler hat” symbols at the closest part of an island to the Axis Line.

3.4. The charting of an Axis Line was perceived to present a problem. If incorrectly interpreted and used for fixing Way Points, the risk of collision increases. Depiction in full strength magenta further emphasised this line and thus increased the risk. A further issue related to magenta Axis Line and where it clashed with black and magenta text and symbols whereby the density of magenta ink when used in red lighting conditions obscures the black

image. Breaking magenta detail as a solution, could degrade the line so that the Axis Line pecks become various lengths and the symbol no longer recognisable.

3.5. Similarly the magenta “bowler hat” symbols could also clash and would need to be broken for black and magenta text and other symbols, especially as these symbols are quite large and could obscure much information. This would be particularly significant where islands fall close to the Axis Line and thus the 10% distance is quite small; where charted detail is usually more complex and dense; and on small scale charts. There were misgivings as to the use of the short sections of “bowler hat” symbols. Would they define the true extent of the 10% Rule around islands, including the far side of islands?

3.6. How would the mariner know how far to stay off the coast without getting his compasses out, measuring the distance, dividing it by ten and then plotting the distance himself?

3.7. The 10% Rule could also serve to “close off” navigational passages currently used by vessels, some of which are very important for reducing the length of a voyage. With the limited lengths of the symbols envisaged by IMO/IHO there was limited scope to clearly convey this to the mariner. It was considered that it is within our “Duty of Care” responsibility to the user of our products to provide them with the best information available. This is an area in which the UKHO takes great pride and aims to achieve the best results possible.

3.8. A meeting was arranged between all interested parties within the UKHO, including Law of the Sea, UKHO’s IMO/IHO co-ordinator, Charting Standards Branch, Head of Foreign Charting, Director of Operations and myself. The initial decisions taken were:

3.8.1. To show the Axis Line in full strength magenta. However, when proof copies were shown to master mariners they, almost unanimously, said that they would probably set their course along the line, even though the note states that it is not a route, etc. Nothing could be worse than someone heading north meeting someone coming south on a reciprocal bearing! Given this possible misinterpretation it was decided to reduce the Axis Line to a fine 30% magenta stipple. This had the effect of reducing the prominence of the Axis Line thus lessening the risk of it being used as a route. Furthermore the stipple line can be printed over existing charted detail without obscuring it, even in red lighting conditions.

3.8.2. To show the full outer limits, but once again in the same reduced strength magenta. This gives the mariner the fullest picture possible and negates the need for him to have to calculate his own 10% distances. It clearly indicates which passages are now “closed” to them if in ASL Passage. It also gives a complete picture, especially where the Axis Line or adjacent coastline is not shown on the chart they are using.

3.8.3. To show the 10% limit around islands that fall within the lanes so that, once again, the fullest picture is given. There had to be no margin of error or possible doubt for users of our charts and publications that could lead to their possible prosecution by the host nation. A little extra time spent at this stage could save a lot for others in the future. It should also be noted that when Electronic Navigational Charts (ENCs) are produced for these areas that the full limits are required in order to close the polygons for the lanes.

3.9. The symbols have not yet been included in INT 1<sup>2</sup> and therefore a Notice to Mariners Block correction<sup>3</sup> to include the new symbology would need to be issued. IHB were consulted for the correct number (IM17) to be used.

3.9.1. And finally there was a need to modify the IMO/IHO note to reflect these changes.

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<sup>2</sup> INT 1 Symbols and Abbreviations used on charts, published by IHO. UKHO version published as chart 5011.

<sup>3</sup> A Notice to Mariners Block correction is a pictorial representation that can be stuck onto charts correcting an area that would be too complex to describe in text.

#### **4. Effects on Navigational Charts and Publications**

4.1. There were 58 Admiralty charts affected. This represents 20% of the charts for which my Chart Branch has responsibility. 33 would require Limited Urgent New Editions and additional work would be required to 5 small scale planning chart New Editions already in hand.

4.2. A further 19 charts would need corrections by Notices to Mariners (NM). As the note could not be produced in our NM system, because the symbol needed to be embodied in the text, we decided to produce NM Block corrections, for nearly all of these charts and produced 6 further NM Blocks where the changes in the outer limit were complex and could not easily be conveyed in a textual NM.

4.3. Another chart affected was 5126, a Routeing Chart with 12 versions, one for each month.

4.4. Once the numbers of the affected charts were identified a Preliminary NM was issued immediately. This gave textual details and a graphic of the Axis Lines, see Diagram 1. This provided worldwide dissemination of the ASL details and would be followed by other nations who chart these waters.

4.5. In advance of updating the charts it was also essential to provide guidance and additional textual information into NP100, The Mariner's Handbook, and the Admiralty Sailing Directions, or "Pilots" as many mariners refer to them. Corrections were made to these publications by Section IV corrections in the weekly NMs. Eventually, changes will also be included in Ocean Passages of The World, which is currently being revised.

4.6. ASL details also affect an adopted Australian chart and we rely on their Hydrographic Office to initiate any correction.

#### **5. Correcting the Navigational Charts.**

5.1. One of the first priorities was to devise a method to calculate the 10% Rule. Initially, a manual method was tried by digitally capturing the Axis Line and any coastline that fell within the 27.8 miles corridor. A line was constructed at right angles to the Axis Line to the coast, the 10% distance calculated, then a circle drawn centred on the coast with radius of the calculated 10% figure. That provided one position but in all likelihood, thousands would be needed on each chart and the "far sides" of islands needed to be calculated separately.

5.2. In order to make this complex routine easy for the compiler and those checking the work, a macro was developed that would automatically construct a grid, at any interval specified by the compiler, at right angles from the axis line to the coast, break the line at the 10% point, delete the remaining 90% and construct the circle, see Diagram 3 below. As stated, the grid could be adjusted to ensure that it would coincide with islets and headlands to ensure that the 10% limit was as accurate as possible. Man-made features were not included as coastline; for example jetties, and on lumps of concrete placed on submerged reefs so that navigational beacons could be built.

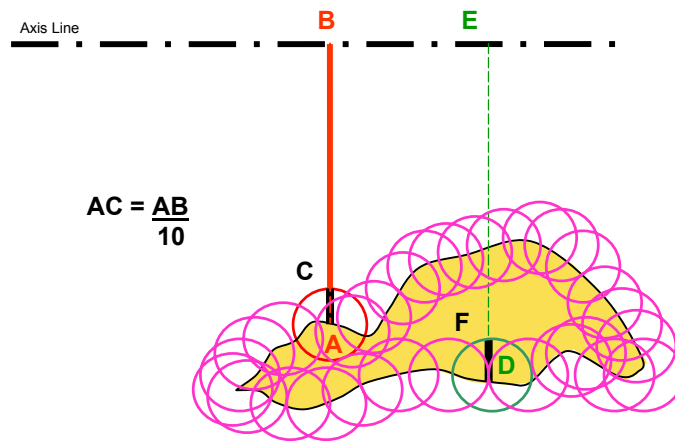


Diagram 3.

5.3. If an island or piece of coast fell close to an Axis Line intersection, we ensured that the 10% Rule was not exaggerated by an incorrect measurement from the wrong segment of the Axis Line. Also at intersections the outer limit was curved, radius 25 miles, to maintain the correct distance from the Axis Line.

5.4. Once the circles were constructed, a line was drawn around the limit and feature code changed to the ASL Outer Limit.

5.5. When compared with the IMO/IHO depiction, see Diagram 4 below, there is no chance for error or confusion. The mariner is now fully aware of where the ASL boundary lies and thus where they can and cannot navigate when in ASL Passage.

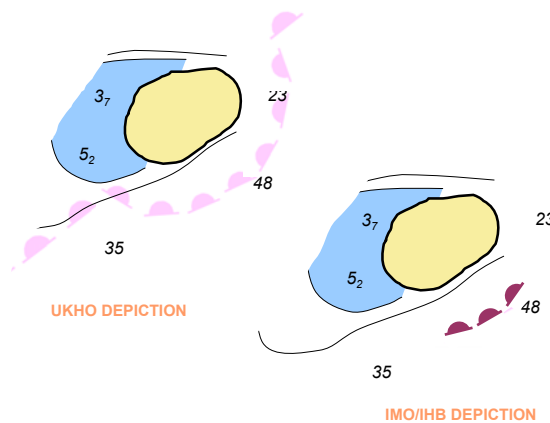


Diagram 4.

## 6. “Closed” areas

6.1. Once a full scheme of ASL is established to the satisfaction of IMO, the effect will be to restrict ASL Passage to the designated ASL. Many current routes will therefore be effectively “closed”. At present, the wording of Indonesian Government Regulation No 37 implies that ASL Passage in Indonesian Waters is *already* restricted to the three designated ASL.

6.2. By showing the full outer limit we have been able to show those areas that are now “closed” areas to vessels in ASL Passage. Within ASL I there are two areas in particular, Selat Panaitan and the various passages through the islands formed by Krakatoa. Selat

Panaitan is used by vessels approaching Selat Sunda from the southeast and the passages through Krakatoa by vessels from the west. (see Diagram 5)

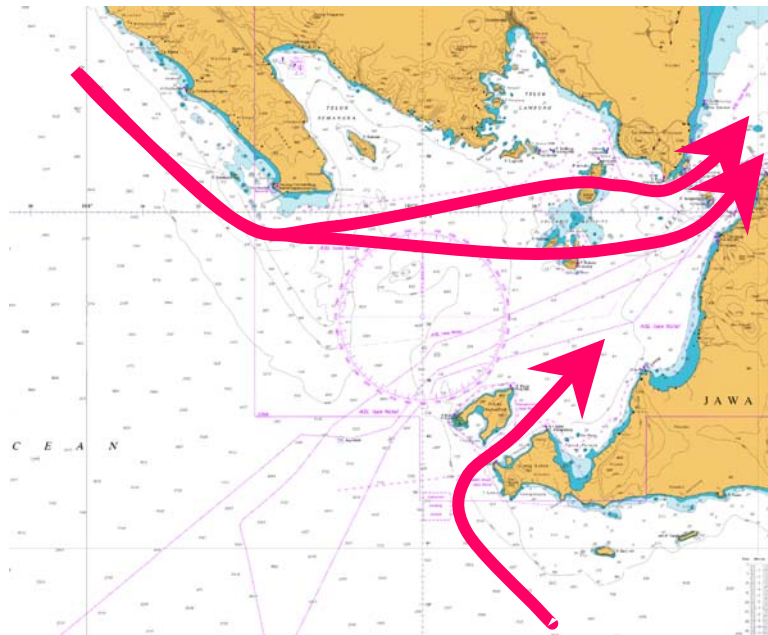


Diagram 5.

6.3. Diagram 5 shows that Selat Panaitan was a very useful short cut, particularly included on the larger scale chart 2056 for this purpose. It is now “closed” to those in ASL Passage, forcing vessels to the north of Pulau Panaitan, as shown on Diagram 6.

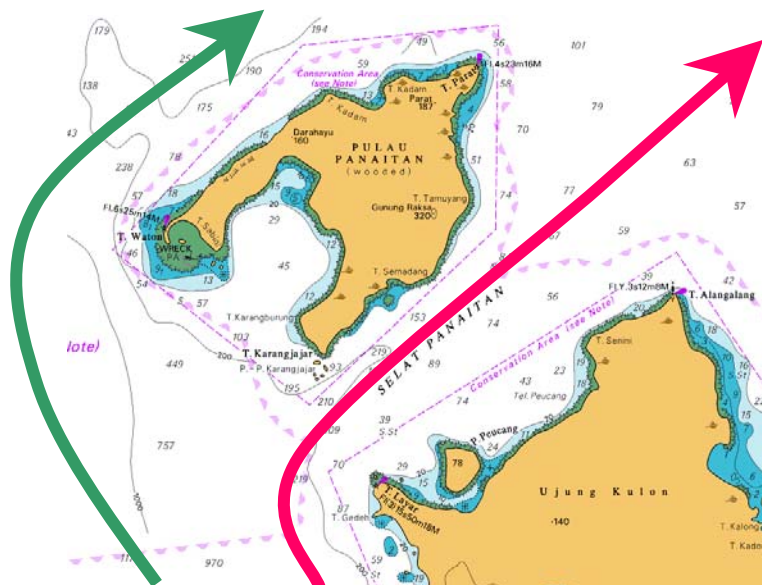


Diagram 6.

6.4. The routes through Krakatoa are now “closed” to those in ASL Passage, forcing traffic to the south of the island group. Though the central passage is theoretically available, the area is still prone to volcanic activity and shallower depths may exist, see Diagram 7.

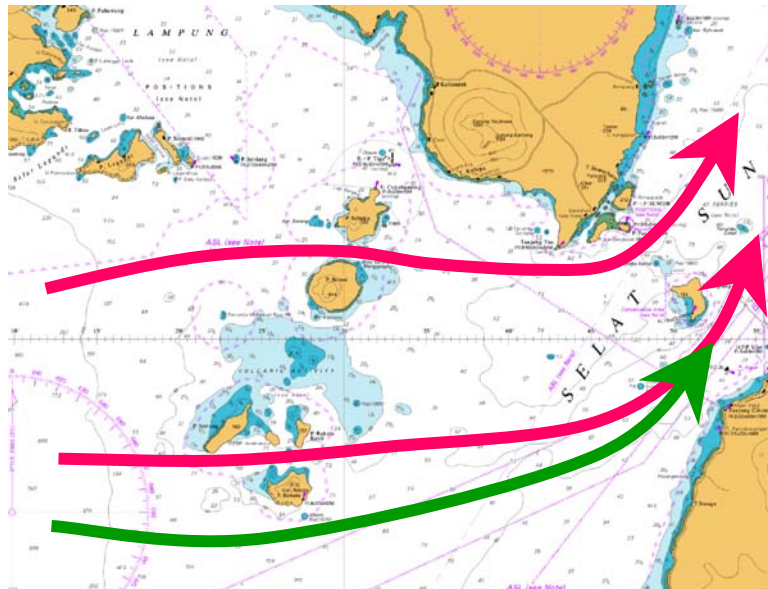


Diagram 7.

6.5. These “closures” seem relatively minor when compared to routes no longer available for vessels in ASL Passage. In particular Selat Gelasa, between Pulau Belitung and Pulau Bangka, and the route to the west of Pulau Bangka northwards through the Riau Islands to Singapore, see Diagram 8 below. The saving in mileage and time for vessels using these routes is considerable.

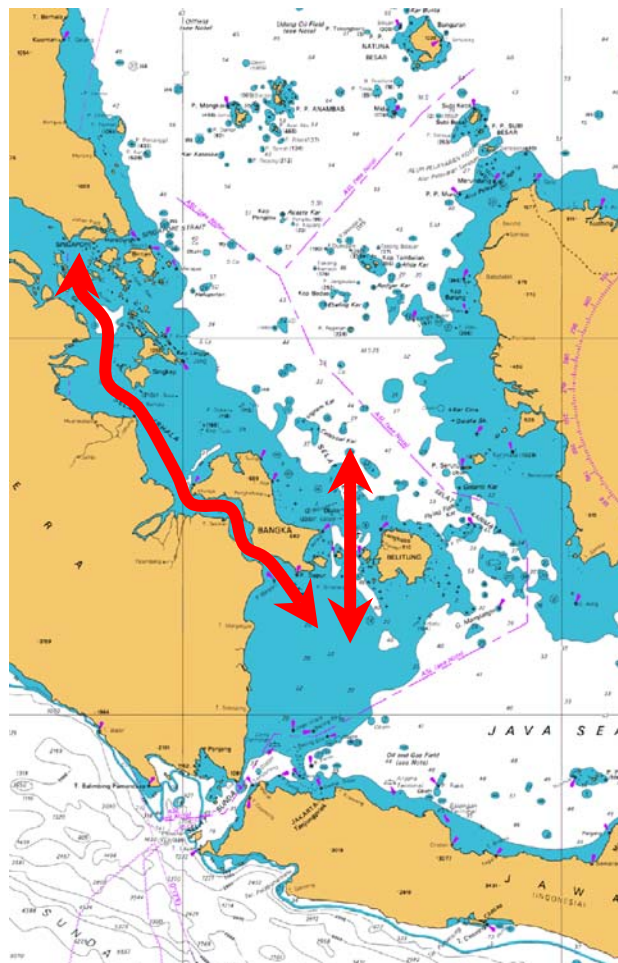


Diagram 8.



## 7. Areas of conflict

7.1. There are five main areas: Selat Sunda; South-western Java Sea; Selat Lombok; Eastern Java Sea and Selat Makasar. These areas are brought into possible conflict by the charting of the Axis Line and the inference that this is the centre line of the channel, which is not the case as vessels in ASL Passage have freedom of movement within the lanes. This is shown on the diagrams below where the Axis Line has been enhanced and the inferred direction of flow is shown by arrows.

7.2. Selat Sunda is a narrow shipping route with large volumes of traffic from the Middle East, Southern Africa and Australia, and is also crossed by ferries between Sumatera and Java.

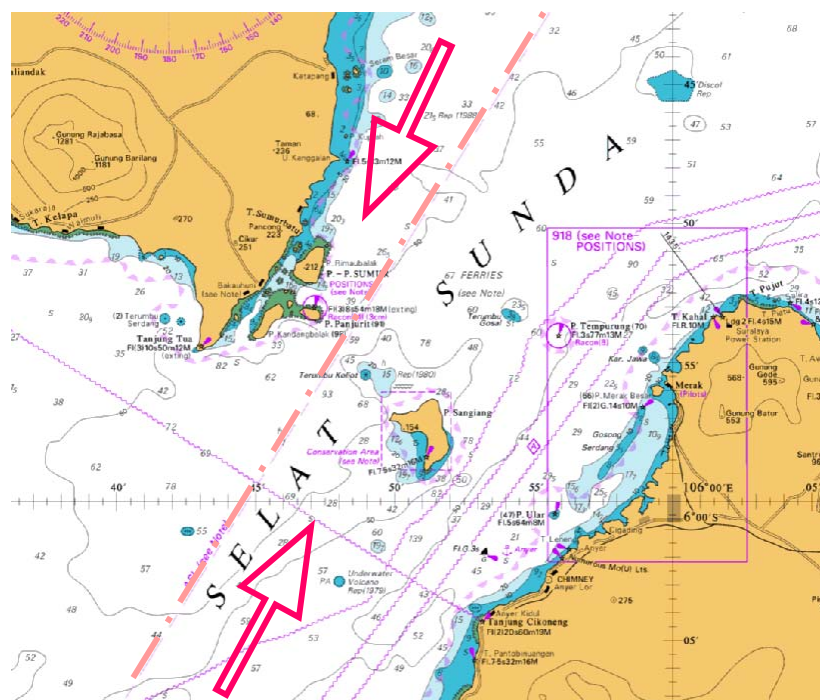


Diagram 9.

7.2.1. Diagram 9 illustrates how the Axis Line passes through the channel between Sumatera and Pulau Sangiang - a distance of less than four miles, but greatly reduced to under two miles when Terumbu Koliot, a drying rock, and the surrounding shoal area are considered. This, however, is not the major factor; the recommended passage for all vessels is to the east of Pulau Sangiang and the Java coast.

7.2.2. My personal view is that it would be worth looking at the possibility of routing measures. For example; introduce a traffic separation scheme with southbound vessels passing to the west of Pulau Sangiang and northbound to the east. The separation zone would cover the shallow ground around Sangiang, Terumbu Koliot and the areas covered by the 10% Rule. Outer limits of the TSS Lanes are governed by the 10% Rule and shallower waters, see Diagram 10.

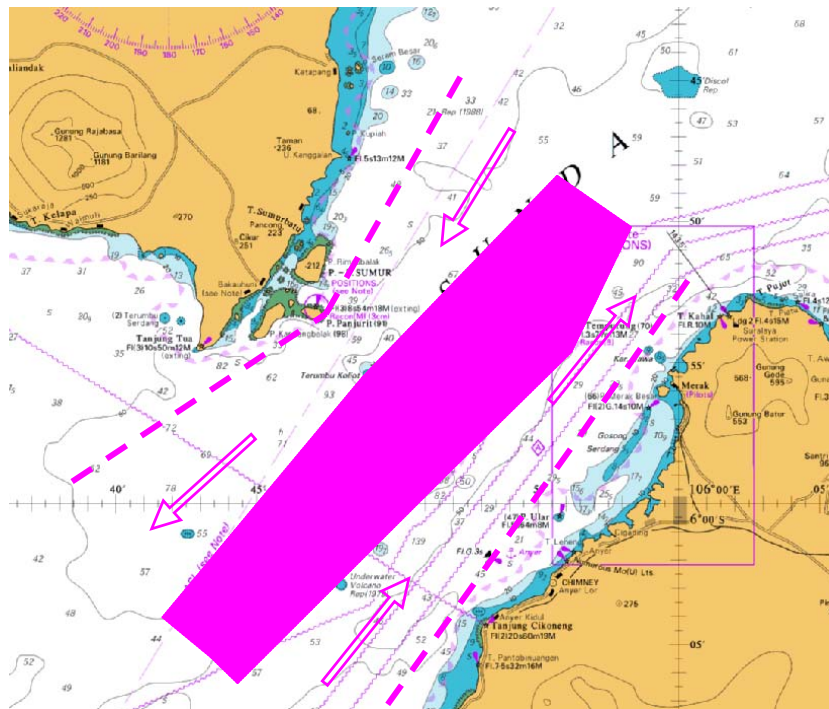


Diagram 10.

7.2.3. Additional navigational aids would be required; a light beacon marking Terumbu Keliot, and the dangerous wreck situated in the southbound lane would need to be removed or disproved. It is unlikely this would prove problematic since the wreck may have been defined in the survey conducted by the Norwegian company Blom several years ago. The results of this survey have yet to appear in the public domain.

7.3. The second area is in the south-western Java Sea, see Diagram 11. This is an area encumbered with offshore developments which greatly reduces the navigable waters. There are four main developments, off-lying platforms and several problematic wrecks. Once again safe navigation is seriously restricted.

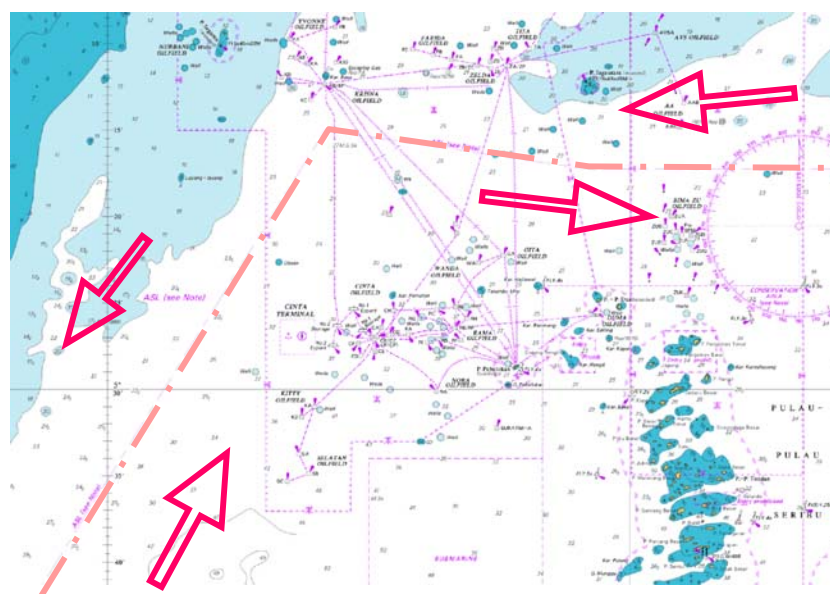


Diagram 11.

7.4. As in all of these areas of conflict, my personal recommendation would be to introduce a traffic separation scheme (TSS). It's unlikely that additional navigational aids would be required, although there are platforms which could be used in this event.

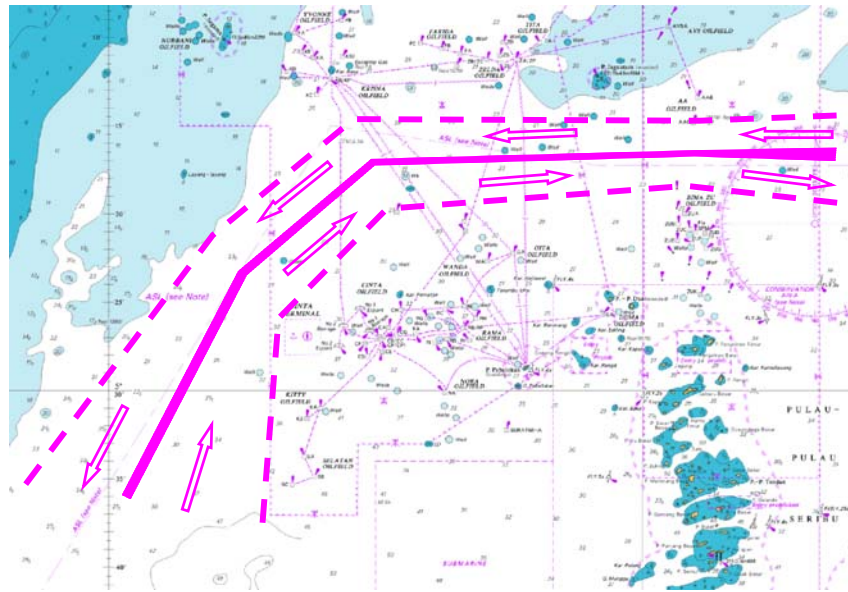


Diagram 12.

7.5. The third area of conflict, Selat Lombok, is used by many, deep-draught vessels, unable to transit the Malacca and Singapore Straits or ASL I. The Axis Line closes the island of Nusapenida, and to the north-west the 10% Rule narrows the passage used by smaller vessels seeking the lee of Bali.

7.5.1. To the east of Nusapenida, the inferred navigable channel width for southbound vessels reduces to less than 3 miles. Vessels with limited manoeuvrability, due to size and draught, approaching the area from the west could encounter southbound vessels in “restricted” passage through potential misinterpretation caused by the charting of the Axis Line and the inferred routes associated with it, see Diagram 13.

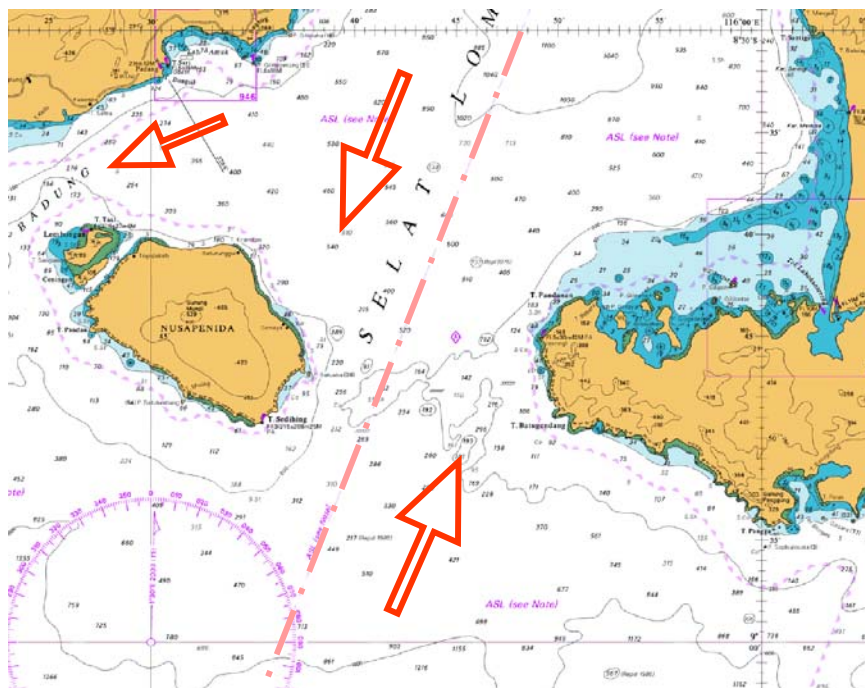


Diagram 13.

7.5.2. The solution would be straightforward with a TSS for the main channel to the east of Nusapenida and an Inshore Traffic Zone to the west. This TSS should be extended through the whole of Selat Lombok, north of that depicted here in diagram 14.

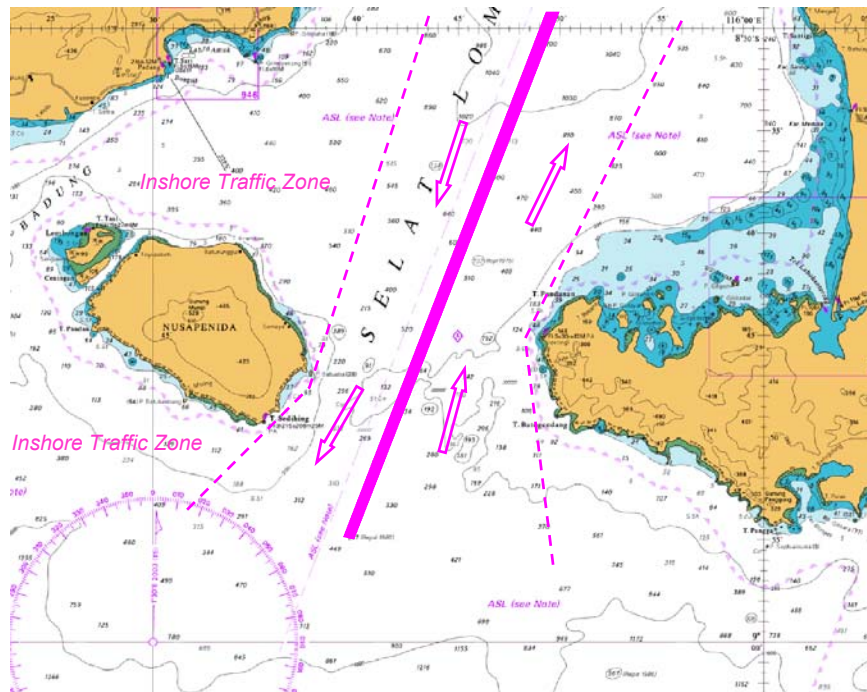


Diagram 14.

7.6. The fourth area lies in the eastern portion of the Java Sea and the southern approaches to Selat Makasar. This region, particularly Gosong Sibalds (an 8.5 metre shoal that was at one time marked by a light beacon that has now collapsed) is encumbered with shoals and islands that restrict the lane width. To the south-east, another shoal of 9.6 metres exists, and to north-westwards there is a reported depth of 10.6 metres beyond the 200 metre contour, see Diagram 15.

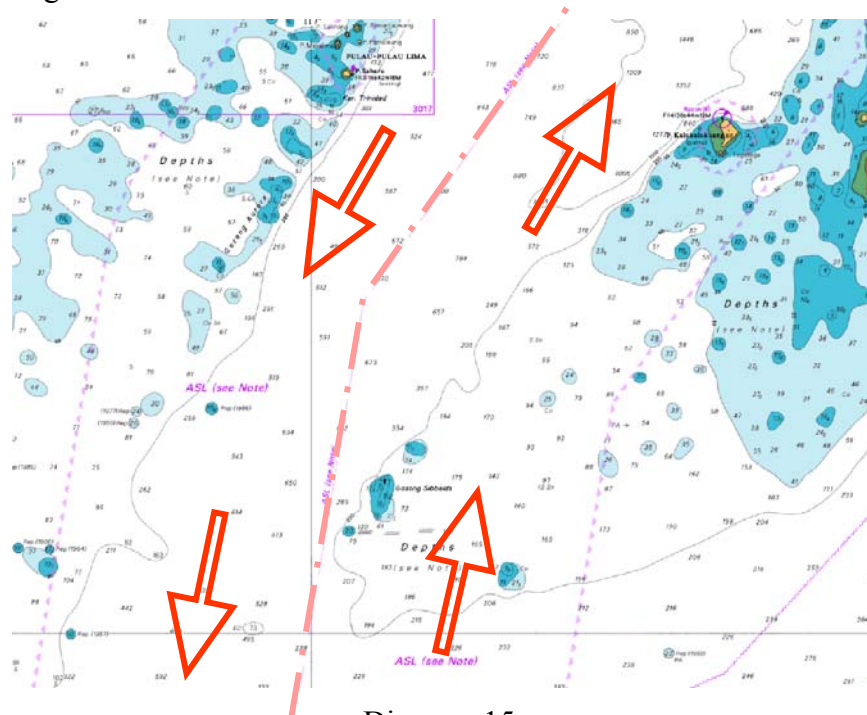


Diagram 15.

7.6.1. Looking at the broader picture the lanes are narrowed by shallow areas to the north and south and therefore the suggested TSS, see diagram 16, would direct all vessels to safe water.

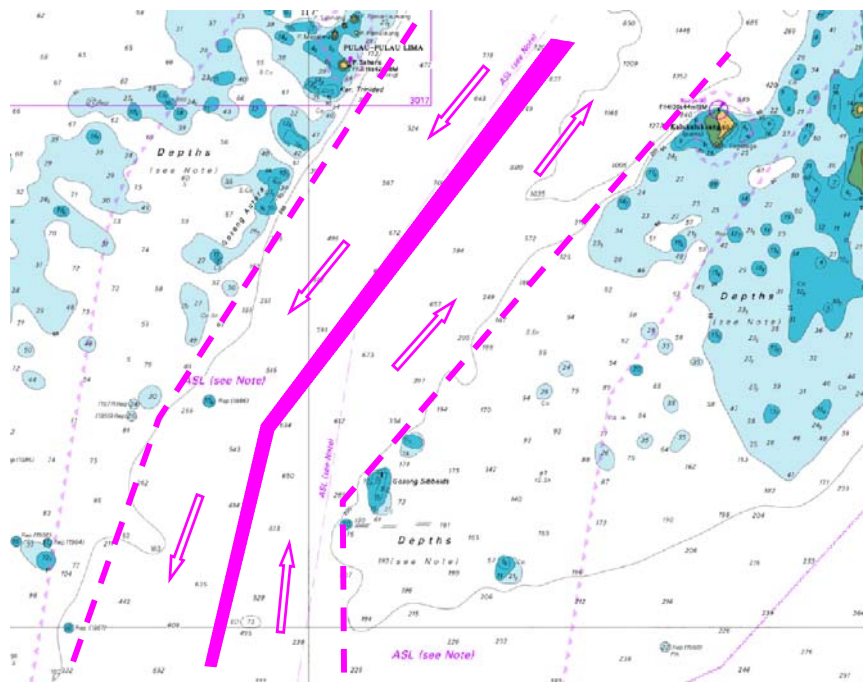


Diagram 16.

7.7. The final area of conflict is in the southern part of Selat Makasar, between Kalimantan (Borneo) and Sulawesi. Here extensive offshore flats spread from the coast of Kalimantan with a ridge of shallower water before dropping off into a deep trench. The Axis Line passes across this ridge giving the illusion that southbound vessels are forced over it. Gosong Semarang at 6 metres is the shoalest depth in the area but other dangerous shoals exist, see Diagram 17.

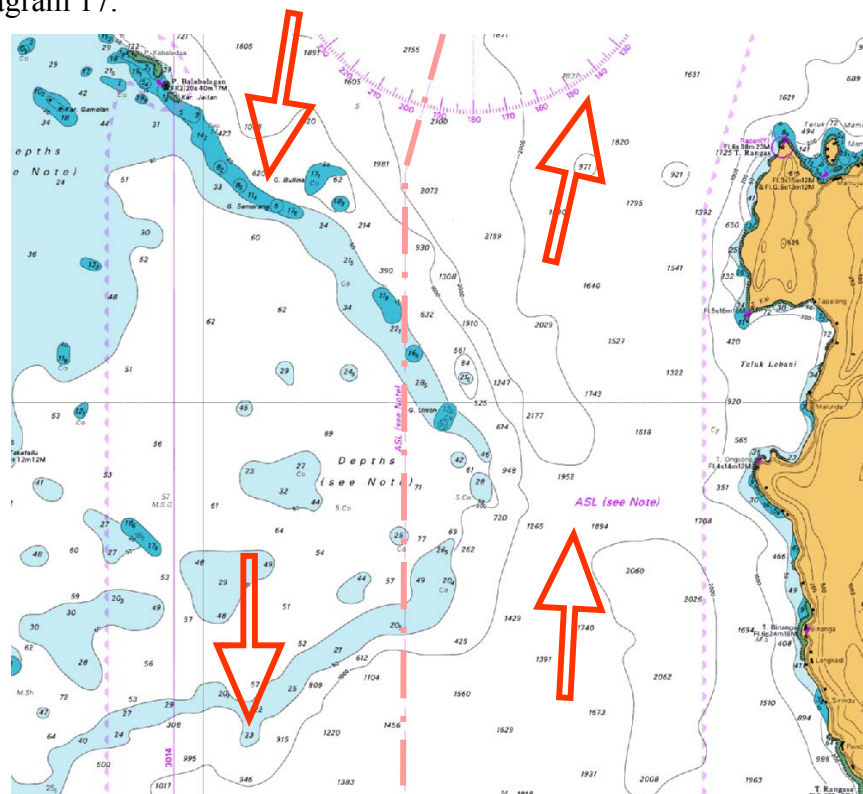


Diagram 17.

7.7.1. The inclusion of a TSS where there is deep water adjacent to the coast of Sulawesi, where all vessels currently transit, would enhance navigational safety in this region, see Diagram 18.

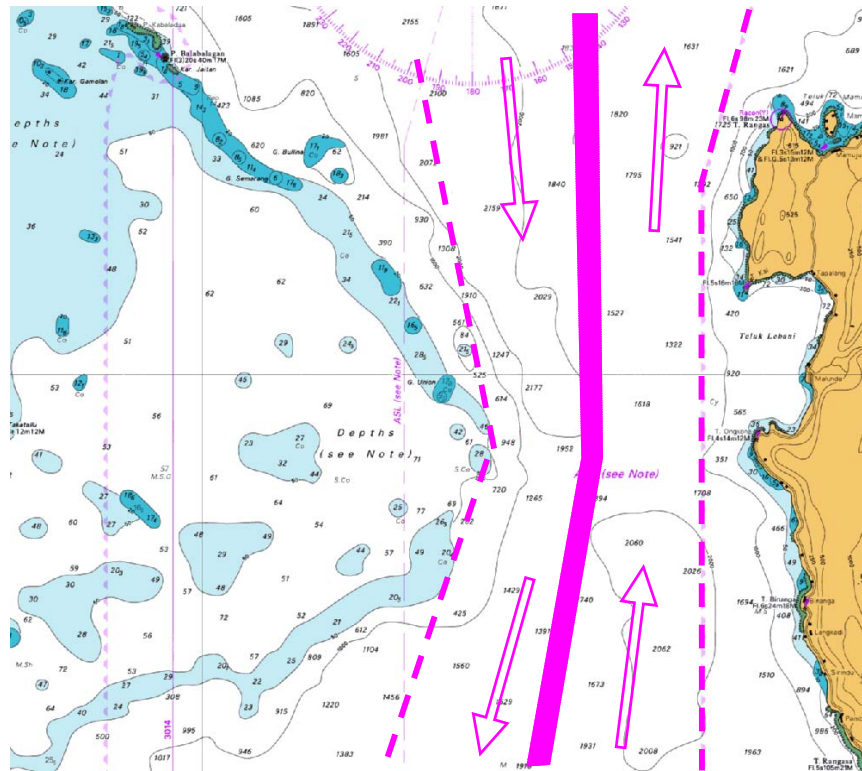


Diagram 18.

7.8. However, a simple and obvious solution to potential conflict issues, given that the full width of the ASL is depicted on charts, could be the complete removal of the Axis Line from them. This would immediately imply a greater freedom of movement for shipping plying these routes. Removal of the Axis Line would, however, require the agreement of IMO and IHO.

## 8. Summary

8.1. The 10% Rule macro, developed in house, has been proved simple to use and delivers excellent, accurate and consistent output. To have undertaken the 10% calculations manually would have been very time consuming and complex, possibly not as accurate or consistent, and very difficult and complex to verify.

8.2. The symbology, again developed in house, has worked well and fully satisfied our precise requirements.

8.3. Though not as envisaged by IMO, or the Chart Standardization Committee of IHO, the charting of the full outer lane limit on Admiralty charts conveys a precise and clear limit to the user.

8.4. The need to give as much unambiguous information to the mariner on the face of the chart and in publications has been achieved.

8.5. The reduced strength magenta (30% stipple) Axis Line has lessened the inference that it should be rigidly followed, thus reducing the risk of putting vessels into areas of conflict.

8.6. The use of reduced strength magenta (30% stipple) symbol for the lanes' outer limits has meant that the full limit can be shown without obscuring existing black and magenta detail. Areas which are prohibited to vessels in ASL Passage are clearly indicated by the charting of the full outer limit.

8.7. In circumstances where the full width of an ASL can be charted, Axis Line removal may be possible but would require agreement of IMO and IHO.

### **Biography:**

Adrian Halliwell joined the United Kingdom Hydrographic Office in December 1965 when the office was in Cricklewood, NW London, before moving to Taunton in April 1968. He has been involved in various disciplines within the UKHO, largely involved in navigational charting, including Home Waters, S America, Antarctica, Africa, Mediterranean, Middle East, Indian Subcontinent, SE Asia, Pacific Ocean islands, Australia and New Zealand, and also miscellaneous and specialist charting for various Royal Navy requirements. He held responsibility for production and maintenance of the UKHO's folio of charts covering the Persian Gulf and Red Sea before taking over South East Asia in July 1999.

Adrian is married to Anne and they have two children.