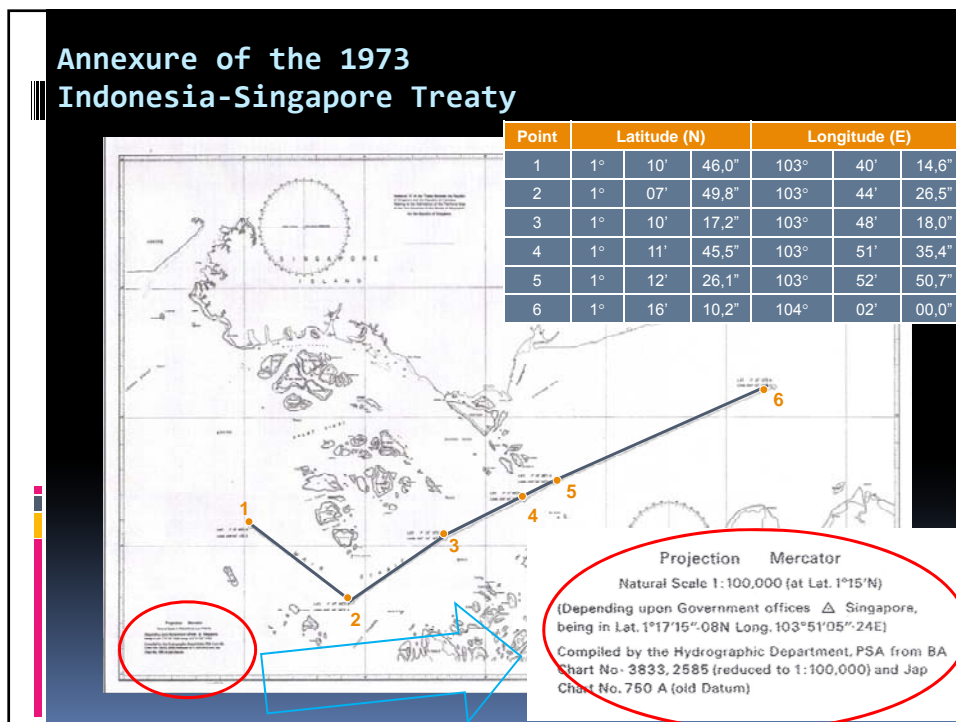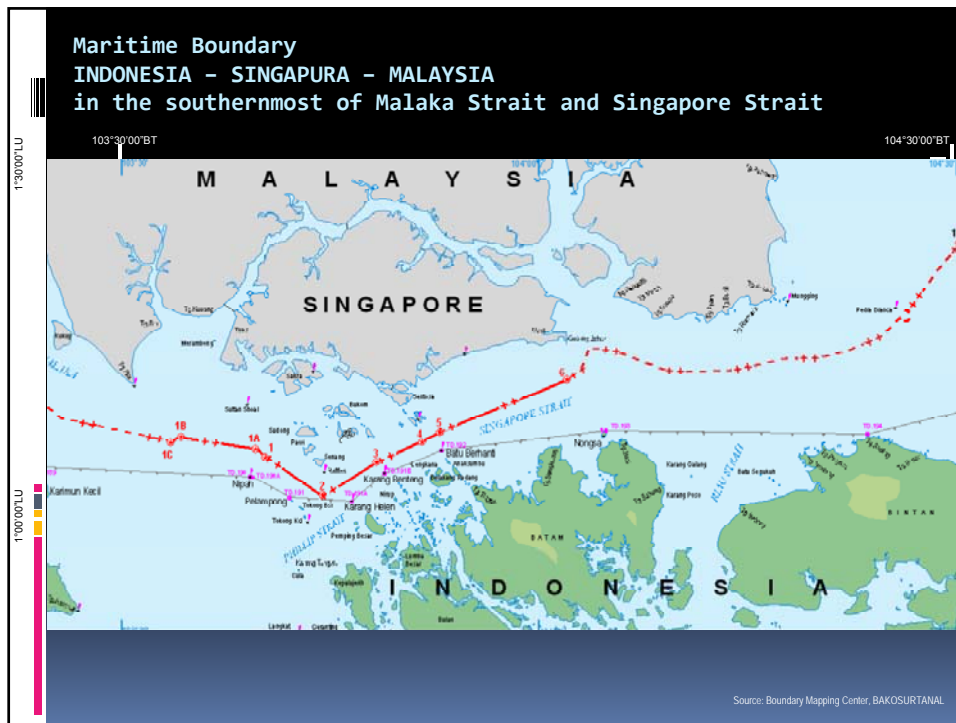# The Geodetic Datum Problems of the Territorial Sea Boundary Between the Republic of Indonesia and the Republic of Singapore

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TS 1I – Administration of Marine Spaces
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OUTLINE

- *Background*

- *Objectives*

- *Research Method*

- *Result*

- *Conclusion*

Maritime Boundary
INDONESIA – SINGAPURA – MALAYSIA
in the southernmost of Malaka Strait and Singapore Strait

Source: Boundary Mapping Center, BAKOSURTANAL

Annexure of the 1973 Indonesia-Singapore Treaty

Point	Latitude (N)			Longitude (E)		
1	1°	10'	46,0"	103°	40'	14,6"
2	1°	07'	49,8"	103°	44'	26,5"
3	1°	10'	17,2"	103°	48'	18,0"
4	1°	11'	45,5"	103°	51'	35,4"
5	1°	12'	26,1"	103°	52'	50,7"
6	1°	16'	10,2"	104°	02'	00,0"

Projection   Mercator
Natural Scale 1:100,000 (at Lat. 1°15'N)
(Depending upon Government offices △ Singapore, being in Lat. 1°17'15"-08N Long. 103°51'05"-24E)
Compiled by the Hydrographic Department, PSA from BA Chart No. 3833, 2585 (reduced to 1:100,000) and Jap Chart No. 750 A (old Datum)

Objective

Examine several available methods to transform the 1973 boundary coordinates to the WGS84

Data & Research Method

- **Data:** *British Admiralty Chart* (BAC) 3833 of 1967 and 2005, the physical characteristic of the Indonesia-Singapore maritime boundary *(the Geographer, 1974)*, Boundary Coordinates of the 1973 Treaty, Datum transformation Parameter

- **Research Method**: Processing data using transformation datum and chart-fitting method.

Result:
Datum Transformation Method

Point	Kertau 1948 to WGS84		Kertau 1968 to WGS84	
	Latitude (N)	Longitude (E)	Latitude (N)	Longitude (E)
1	1° 10′ 45.85″	103° 40′ 08.44″	1° 10′ 45.82″	103° 40′ 08.52″
2	1° 07′ 49.17″	103° 44′ 20.31″	1° 07′ 49.13″	103° 44′ 20.39″
3	1° 10′ 17.05″	103° 48′ 11.78″	1° 10′ 17.02″	103° 48′ 11.86″
4	1° 11′ 45.35″	103° 51′ 29.15″	1° 11′ 45.32″	103° 51′ 29.23″
5	1° 12′ 25.95″	103° 52′ 44.44″	1° 12′ 25.91″	103° 52′ 44.52″
6	1° 16′ 10.03″	104° 01′ 53.67″	1° 16′ 10.00″	104° 01′ 53.75″

Point	Genuk to WGS84		South Asia to WGS84	
	Latitude (N)	Longitude (E)	Latitude (N)	Longitude (E)
1	1° 10′ 43.96″	103° 40′ 21.24″	1° 10′ 45.16″	103° 40′ 14.46″
2	1° 07′ 47.28″	103° 44′ 33.11″	1° 07′ 48.46″	103° 44′ 26.36″
3	1° 10′ 15.16″	103° 48′ 24.59″	1° 10′ 16.36″	103° 48′ 17.86″
4	1° 11′ 43.45″	103° 51′ 41.96″	1° 11′ 44.67″	103° 51′ 35.26″
5	1° 12′ 24.05″	103° 52′ 57.25″	1° 12′ 25.27″	103° 52′ 50.56″
6	1° 16′ 08.13″	104° 01′ 06.49″	1° 16′ 09.37″	104° 01′ 59.86″

Source: Z. A., Hasanuddin, 2005

Result:
Datum Transformation Method

Point	Coordinates of KERTAU 1948 reduced by its coordinates in WGS'84			Coordinates of KERTAU 1968 reduced by its coordinates in WGS'84		
	$d\varphi$	$d\lambda$	d (m)	$d\varphi$	$D\lambda$	d (m)
1	0".15	6".16	190.5	0".18	6".08	188.0
2	0".13	6".19	191.4	0".17	6".11	189.0
3	0".15	6".22	192.4	0".18	6".14	189.9
4	0".15	6".25	193.3	0".18	6".17	190.8
5	0".15	6".26	193.6	0".19	6".18	191.1
6	0".17	6".33	195.8	0".20	6".25	193.3

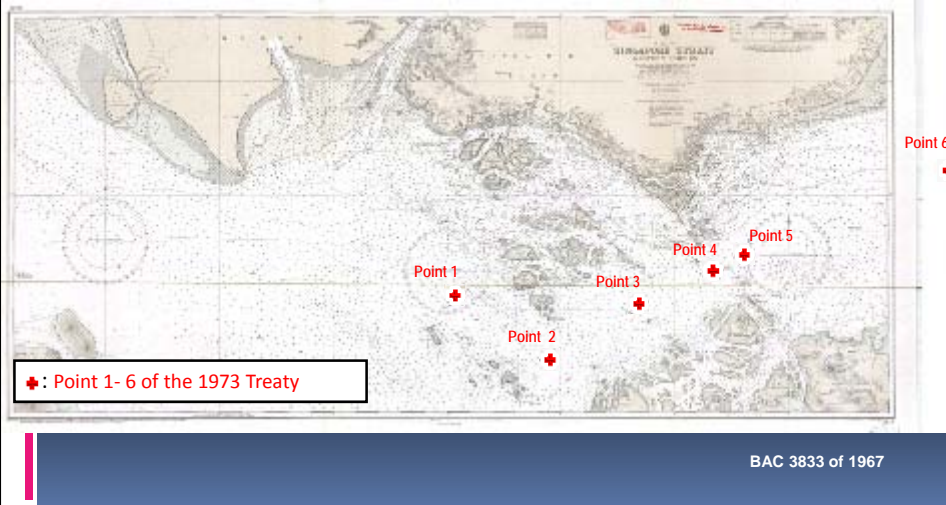| Point	Coordinates of GENUK reduced by its coordinates in WGS'84			Coordinates of reduced by its coordinates in WGS'84		
	$d\varphi$	$d\lambda$	d (m)	$d\varphi$	$D\lambda$	d (m)
1	2".04	-6".64	214.7	0".84	0".14	26.02
2	2".02	-6".61	213.7	0".84	0".14	26.03
3	2".04	-6".59	213.0	0".84	0".14	26.02
4	2".05	-6".56	212.4	0".83	0".14	26.01
5	2".05	-6".55	212.2	0".83	0".14	26.00
6	2".07	-6".49	210.5	0".83	0".14	25.98

Source: Z. A., Hasanuddin, 2005

Result:
Datum Transformation Method

Point	Coordinates of 1973 Treaty to WGS84 Coordinates of the Calculation of Singapore	
	Latitude (N)	Longitude (E)
1	1° 10′ 46.184″	103° 40′ 14.133″
2	1° 07′ 49.504″	103° 44′ 26.005″
3	1° 10′ 17.399″	103° 48′ 17.471″
4	1° 11′ 45.698″	103° 51′ 34.842″
5	1° 12′ 26.297″	103° 52′ 50.131″
6	1° 16′ 10.395″	104° 01′ 59.354″

Source: The Singaporean Maritime Port of Authority

Result:
Chart-fitting method

Point 6

Point 4 Point 5

Point 1 Point 3

Point 2

✚ : Point 1- 6 of the 1973 Treaty

BAC 3833 of 1967

Result: Chart-fitting method

Common Points:
1. Iyu Kecil
2. Sultan Shoal
3. Nipa
4. Sinki
5. Raffles
6. Mount Faber
7. Takong Kecil
8. Sebarok
9. Buffalo Rock
10. Sakijang Petepah
11. Batu Berhanti
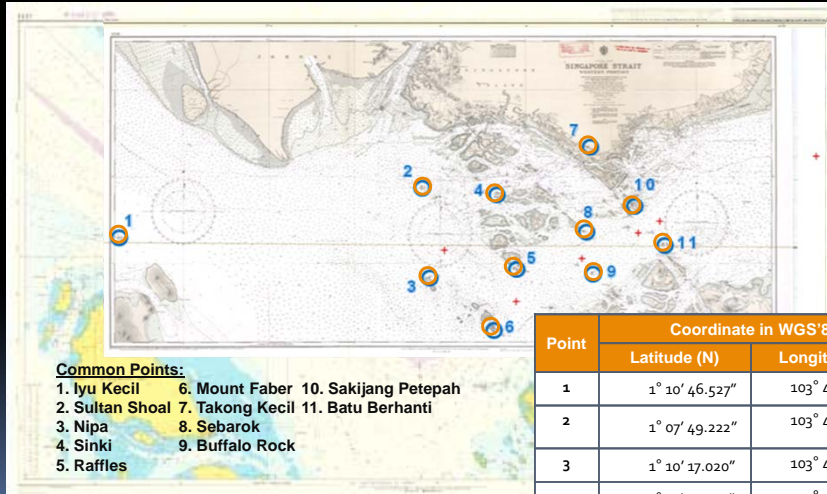
Point	Coordinate in WGS'84	
	Latitude (N)	Longitude (E)
1	1° 10′ 46.527″	103° 40′ 14.791
2	1° 07′ 49.222″	103° 44′ 26.54
3	1° 10′ 17.020″	103° 48′ 17.205
4	1° 11′ 45.537″	103° 51′ 34.997
5	1° 12′ 26.339″	103° 52′ 50.313

Source: Boundary Mapping Center, BAKOSURTANAL, 2009

Result:

Point	South Asia to WGS84 using transformation method		Coordinates of 1973 Treaty to WGS84 Coordinates of the Singapore's Calculation		Coordinates of 1973 Treaty to WGS84 Coordinates using chart-fitting method	
	Latitude (N)	Longitude (E)	Latitude (N)	Longitude (E)	Latitude (N)	Longitude (E)
1	1° 10' 45.16"	103° 40' 14.46"	1° 10' 46.184"	103° 40' 14.133"	1° 10' 46.527"	103° 40' 14.791"
2	1° 07' 48.46"	103° 44' 26.36"	1° 07' 49.504"	103° 44' 26.005"	1° 07' 49.222"	103° 44' 26.544"
3	1° 10' 16.36"	103° 48' 17.86"	1° 10' 17.399"	103° 48' 17.471"	1° 10' 17.020"	103° 48' 17.205"
4	1° 11' 44.67"	103° 51' 35.26"	1° 11' 45.698"	103° 51' 34.842"	1° 11' 45.537"	103° 51' 34.997"
5	1° 12' 25.27"	103° 52' 50.56"	1° 12' 26.297"	103° 52' 50.131"	1° 12' 26.339"	103° 52' 50.313"
6	1° 16' 09.37"	104° 01' 59.86"	1° 16' 10.395"	104° 01' 59.354"	1° 16' 10.111"	104° 02' 00.471"

Conclusion

- *The chart fitting method, arguably is the most suitable and acceptable method to obtain the coordinates of 1973 Treaty in the WGS'84*

- *The dissemination of the treaty and its "new-technically" coordinates is needed for operational purposes*

THANK YOU