THE COMPLETION OF AN UNCLOS ARTICLE 76 DESKTOP STUDY USING CURRENTLY AVAILABLE DATA SOURCES

THIRD BIENNIAL CONFERENCE OF ABLOS -

ADDRESSING DIFFICULT ISSUES IN THE LAW OF THE SEA

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CARIS

ARTICLE 76 :
Law of the Sea

OUTLINE

1. Background
2. Overview of the Procedures in Completing the Article 76 submission
3. What is a Desktop Study?
4. Why Every Coastal State should complete a DeskTop Study;
5. The Coastal States' Test of Appurtenance
6. Some useful Available Data Sources
7. The Selected Region for the Desktop Study
8. Overview of the Procedures in Completing the Desktop Study
9. Sequential Procedures to complete a Desktop Study:
   An *Academic* example from South-Western Africa
10. Conclusions

BACKGROUND

- To Date, 141 Nations plus 1 International Organization (EU) have ratified the United Nations Convention of the Law of the Sea (UNCLOS)
- This is International law with respect to all Marine Limits and Boundaries
- UNCLOS Article 76 : Specifically addresses how a Coastal State can extend their territorial rights to the Continental Shelf beyond the current 200M(EEZ)
- Ratified States have 10 years to plan and prepare a legal claim to the United Nations under Article 76 (Now extended until 2009)
- Once a Coastal State successfully establishes an accepted new outer limit, any area outside the 200M boundary that is not claimed will automatically become part of "The Area" which is the tract of seabed set aside for the common heritage of mankind

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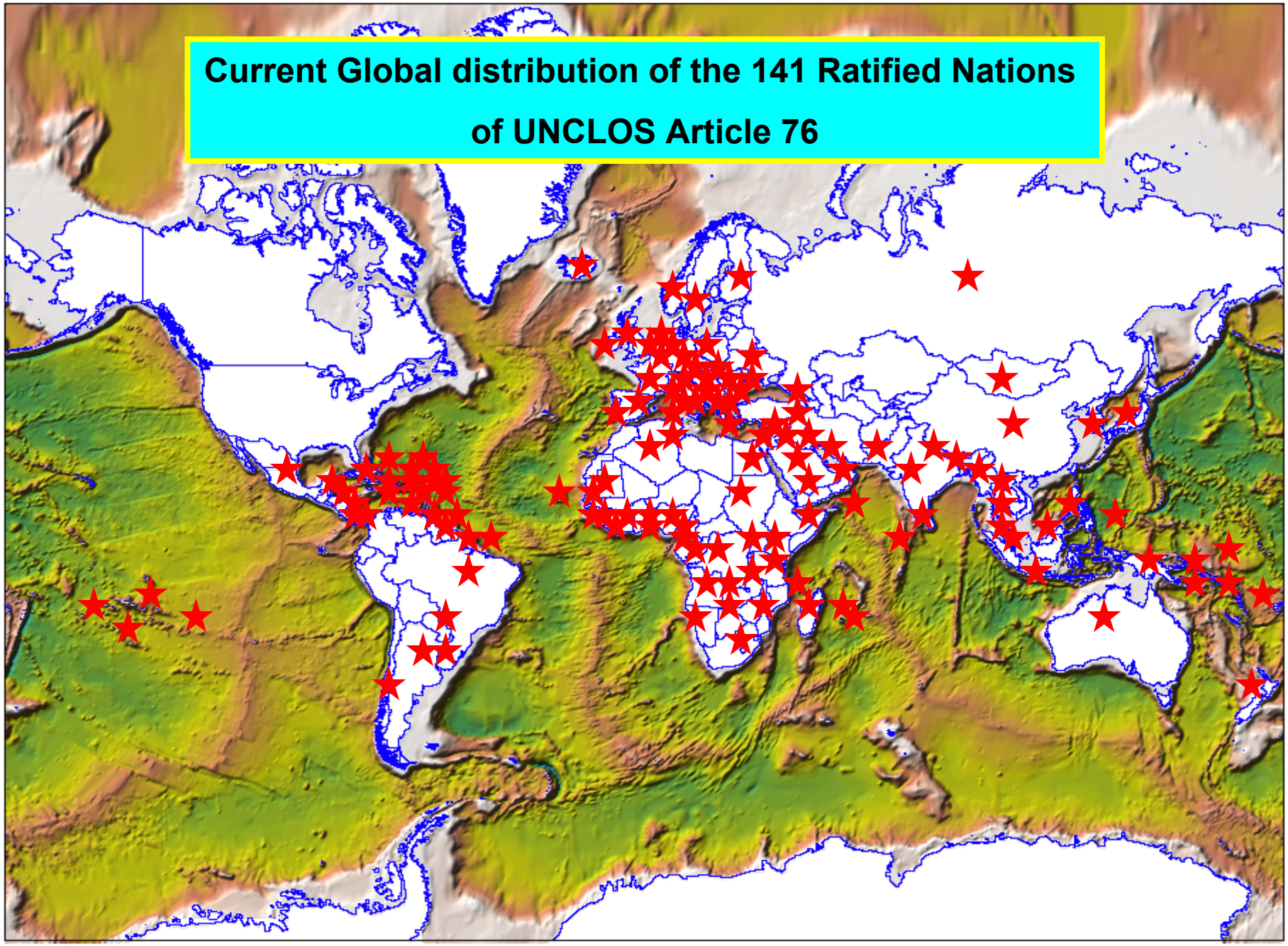
Current Global distribution of the 141 Ratified Nations of UNCLOS Article 76



GENERAL OVERVIEW OF THE REQUIRED PROCEDURES TO BE FOLLOWED IN COMPLETING THE ARTICLE 76 APPLICATION

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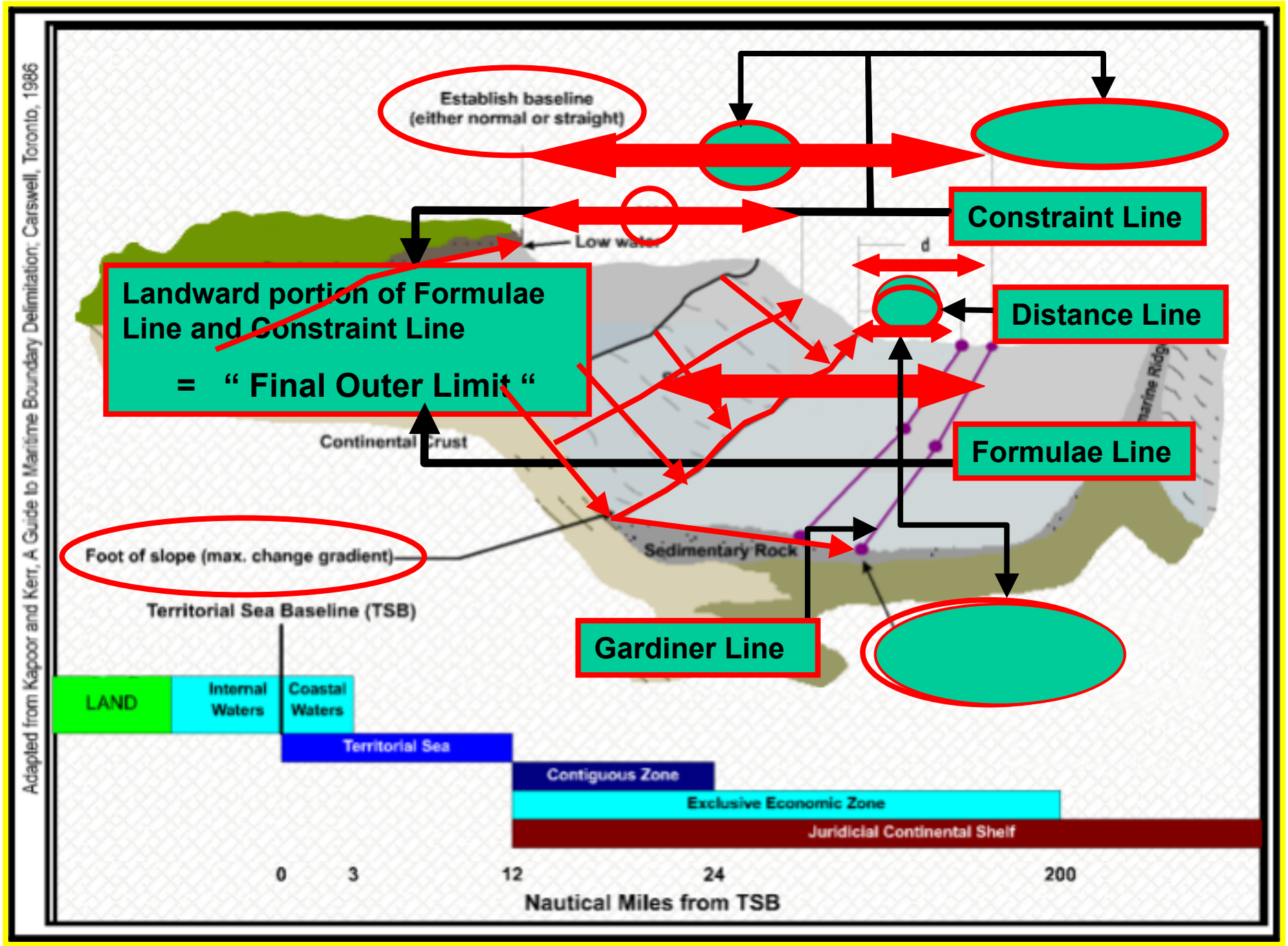
Adapted from Kapoor and Kerr, A Guide to Maritime Boundary Delimitation; Carswell, Toronto, 1986
Establish baseline
(either normal or straight)
Constraint Line
Low water
d
Distance Line
Landward portion of Formulae
Line and Constraint Line
= " Final Outer Limit "
Continental Crust
Formulae Line
Foot of slope (max. change gradient)
Sedimentary Rock
Territorial Sea Baseline (TSB)
Gardiner Line
LAND
Internal Waters
Coastal Waters
Territorial Sea
Contiguous Zone
Exclusive Economic Zone
Juridicial Continental Shelf
0
3
12
24
200
Nautical Miles from TSB

What is a DeskTop Study?

- ***A Coastal State's DeskTop Study includes the operations (computations, analyses, interpretations) that will be carried out using computer software specifically designed to produce the required mathematical results from the use of existing public-domain datasets. These are primarily specific existing data sources for (bathymetry, geology, morphology), and, through a series of specific tasks and procedures, as outlined under the CLCS Technical Guidelines of the United Nations, a qualitative "first-look" will be produced for the Coastal States Article 76 application. These produced results will give the Coastal State a preliminary indication of what the new Final Outer Limit may look like once the completed Article 76 application has been implemented.*** **[van de Poll, 2002]**

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Why Every Coastal State should complete a DeskTop Study;

- **Primary role is to provide a Coastal State with a preliminary completed claim of what that State's Final Article 76 Submission may look like.**

- **The study's intent is to research, collect, analyze, assemble, compute, and conclude what data sources are currently available to the Coastal State, and more importantly where and what type of further data sources still needs to be collected in order to meet the requirements outlined in the *CLCS Technical Guidelines*.**

- **Typical Coastal State will take up to 6 months to properly complete a *DeskTop Study***

- **The completion of the Study will give every Coastal State a cost-effective initial produced result that can determine whether to continue or not with the expense of surveys (Test of Appurtenance).**

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Why Every Coastal State should complete a DeskTop Study;

- **Familiarity: The same steps and procedures will be applied to the Final Submission as were followed for their completion of the DeskTop Study**

- **As collection of additional Information (Bathymetric & Seismic Surveys) could account for 85+% of overall Project costs, careful survey planning using the produced results from the completed *DeskTop Study* should ensure overall costs will be kept to an absolute minimum**

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A COASTAL STATES' TEST OF APPURTENANCE

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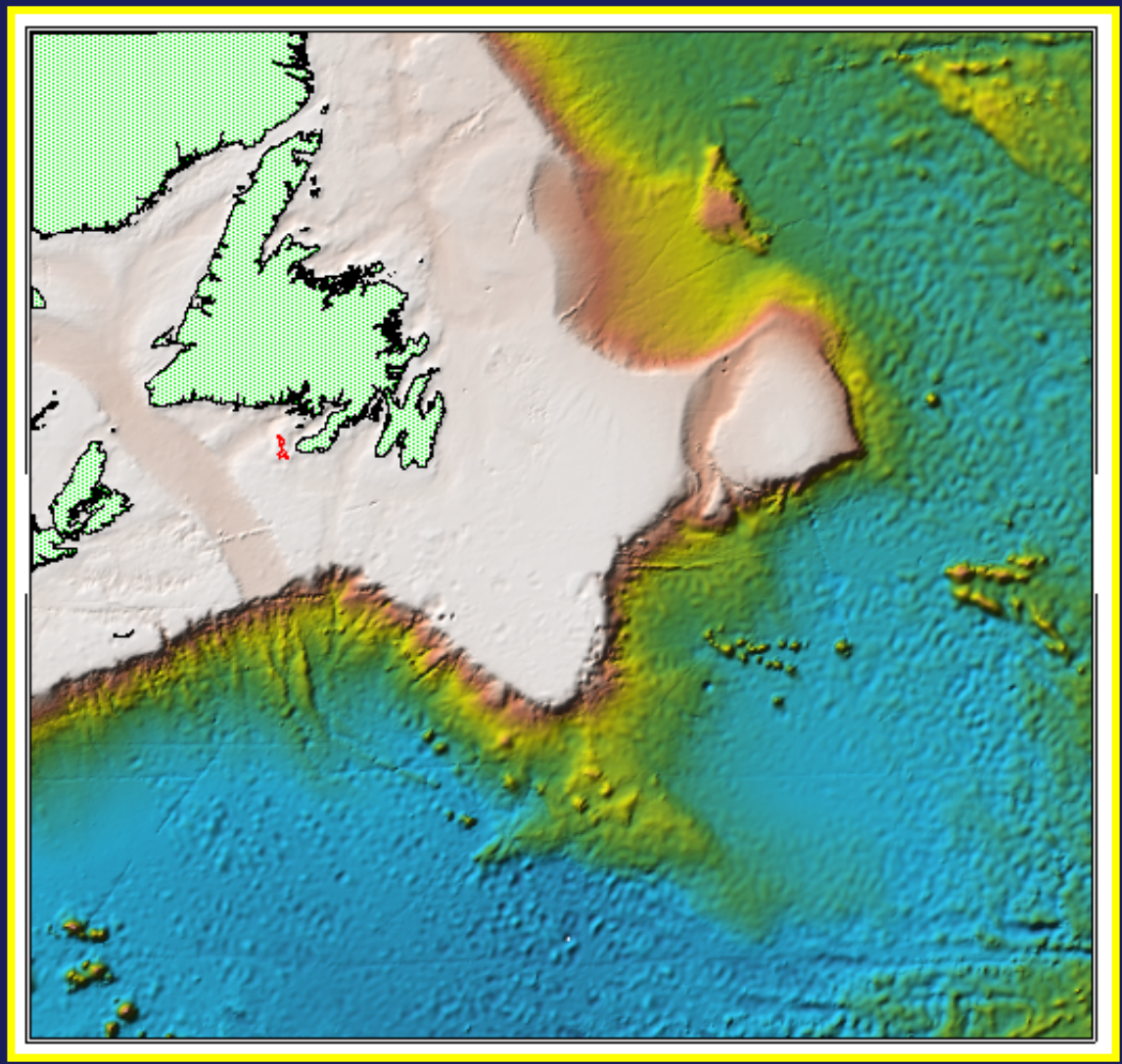
Test of Appurtenance



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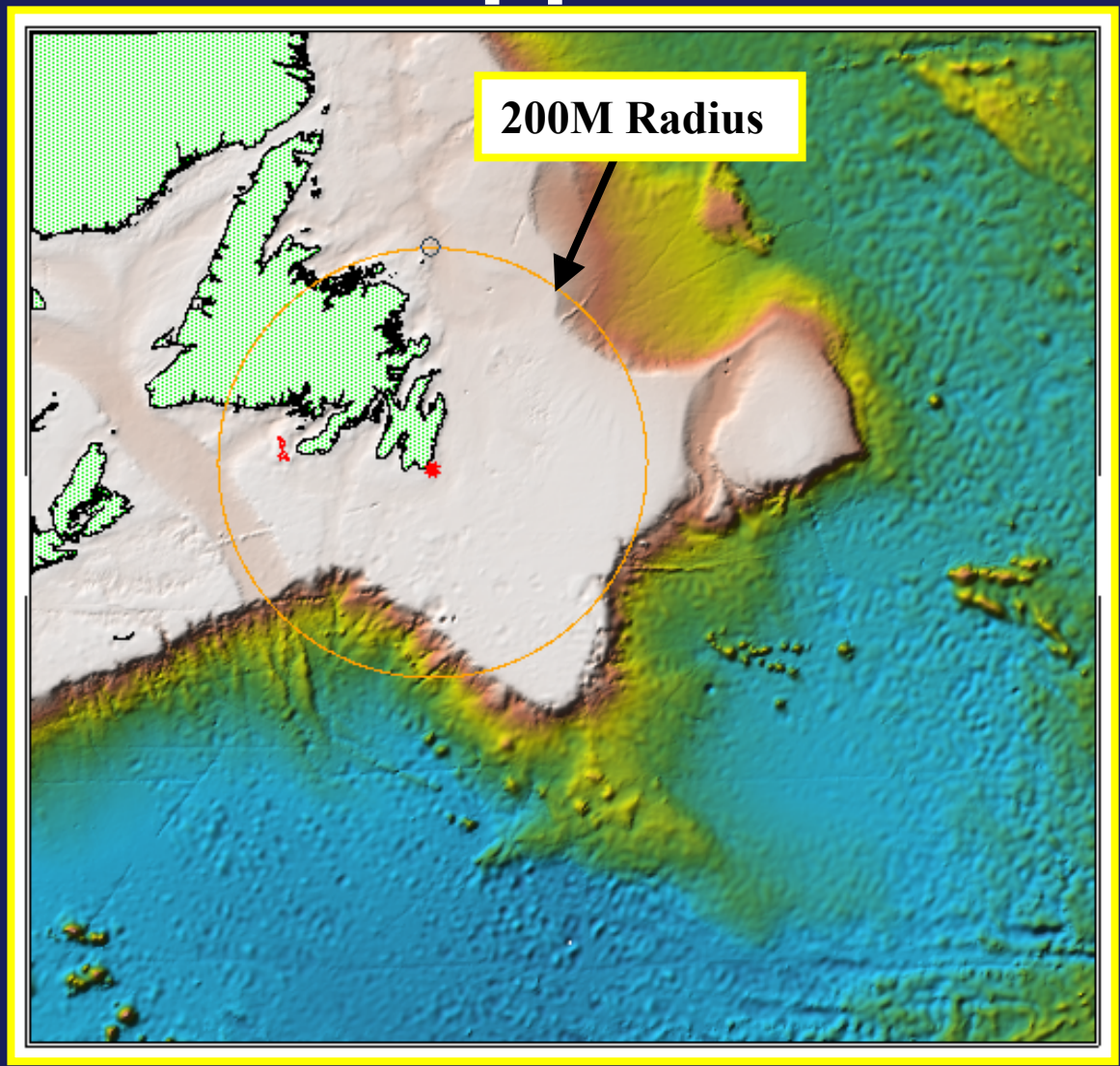
Test of Appurtenance



ARTICLE 76 :
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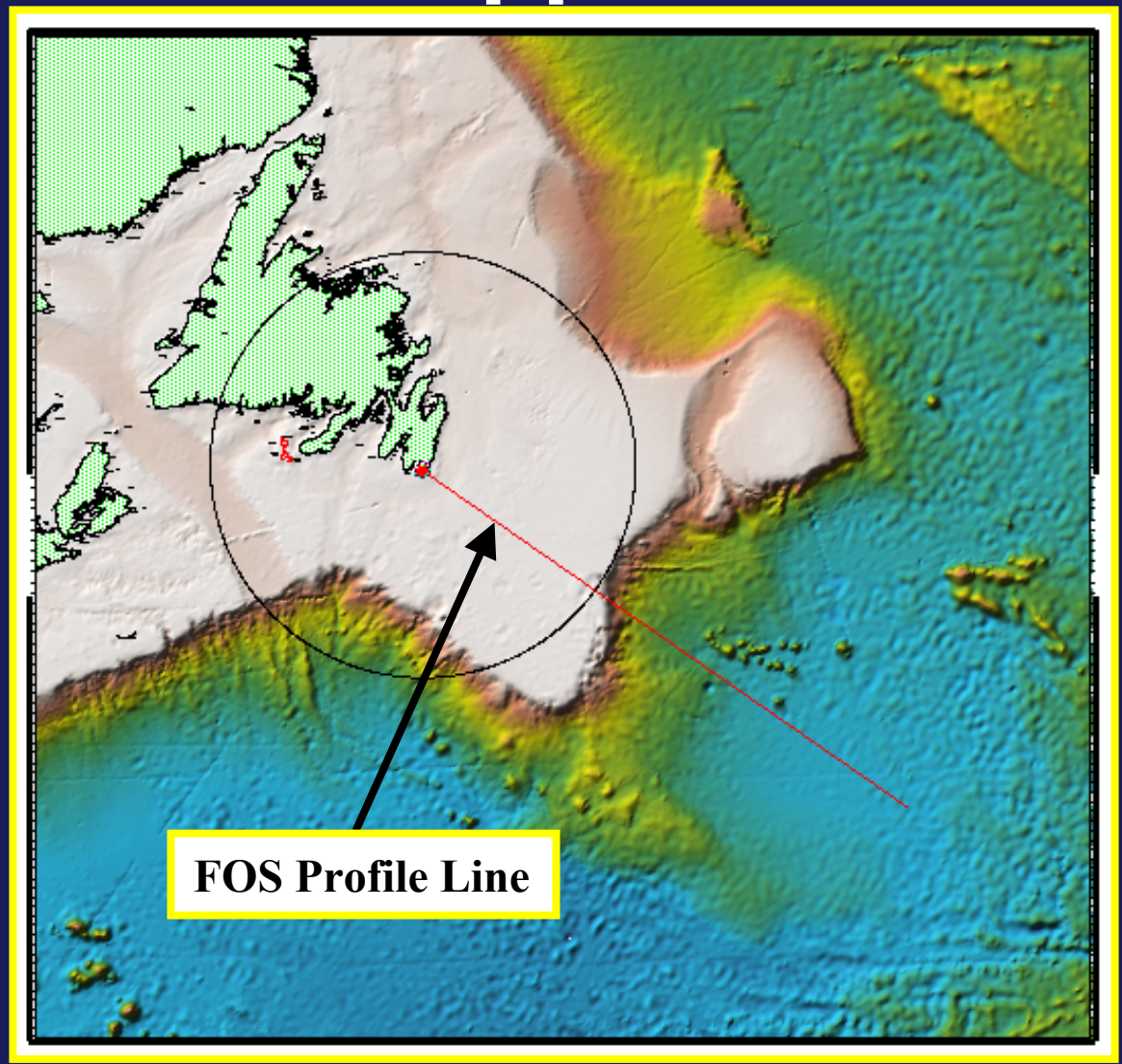
Test of Appurtenance



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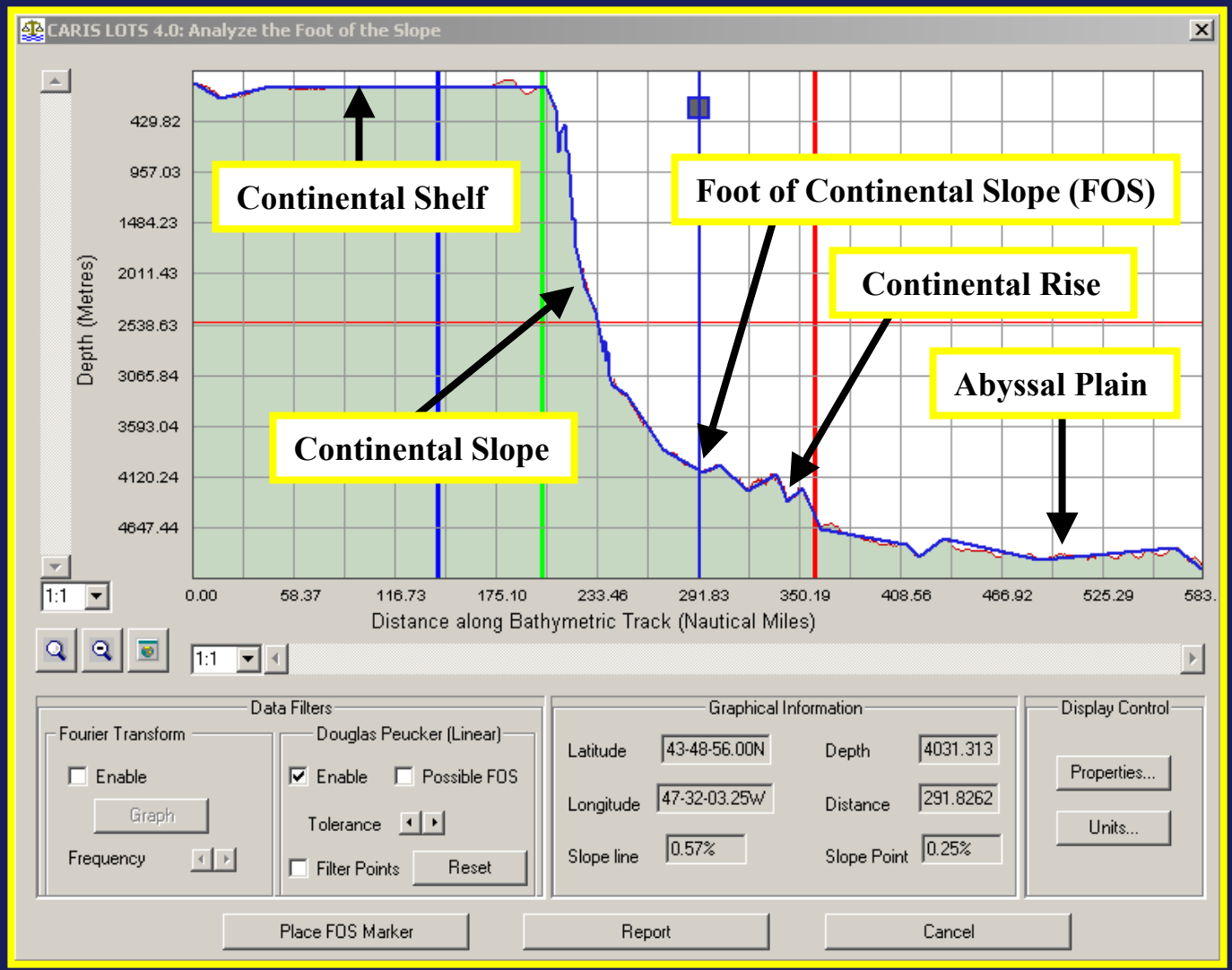
Test of Appurtenance



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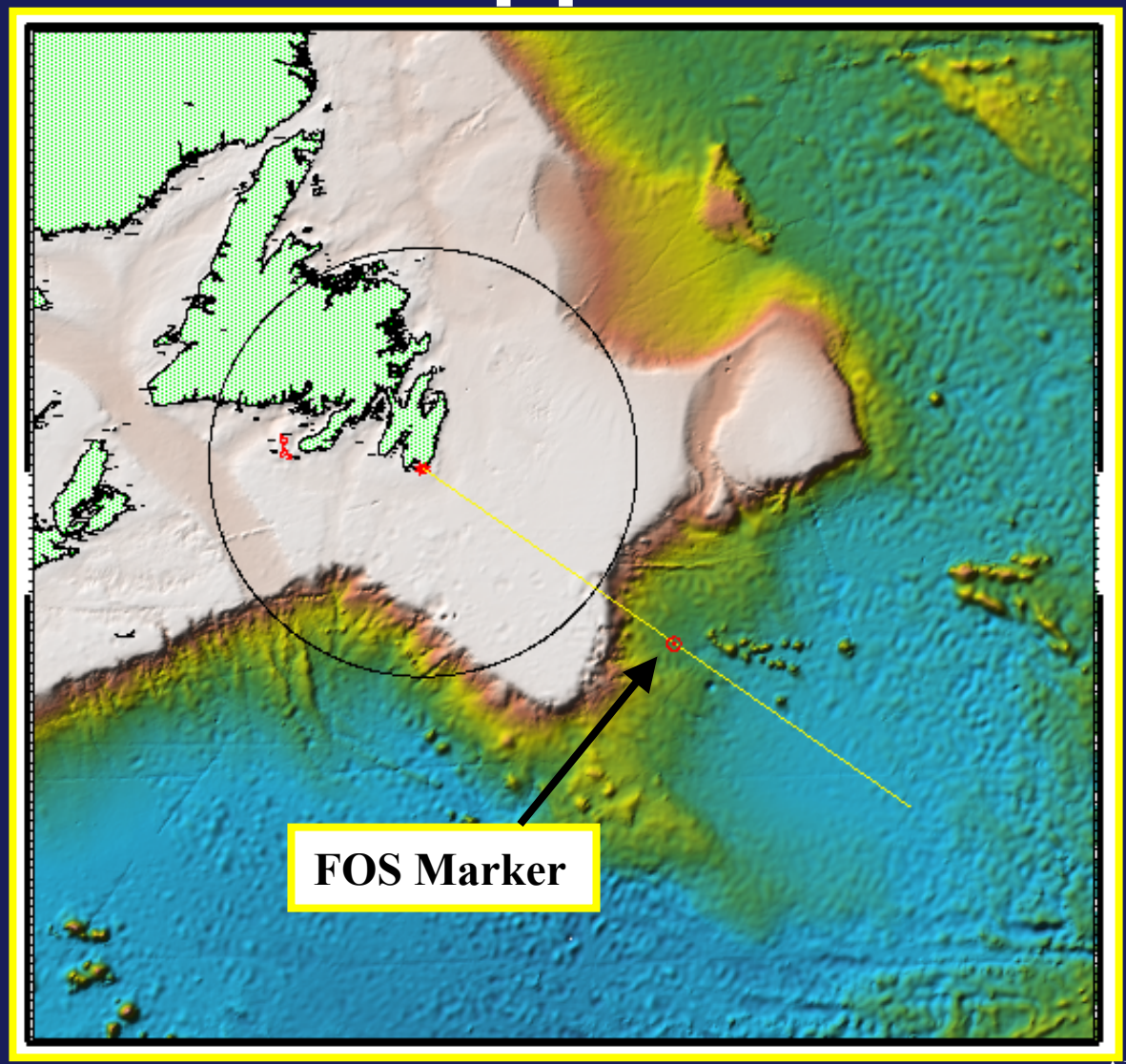
Test of Appurtenance



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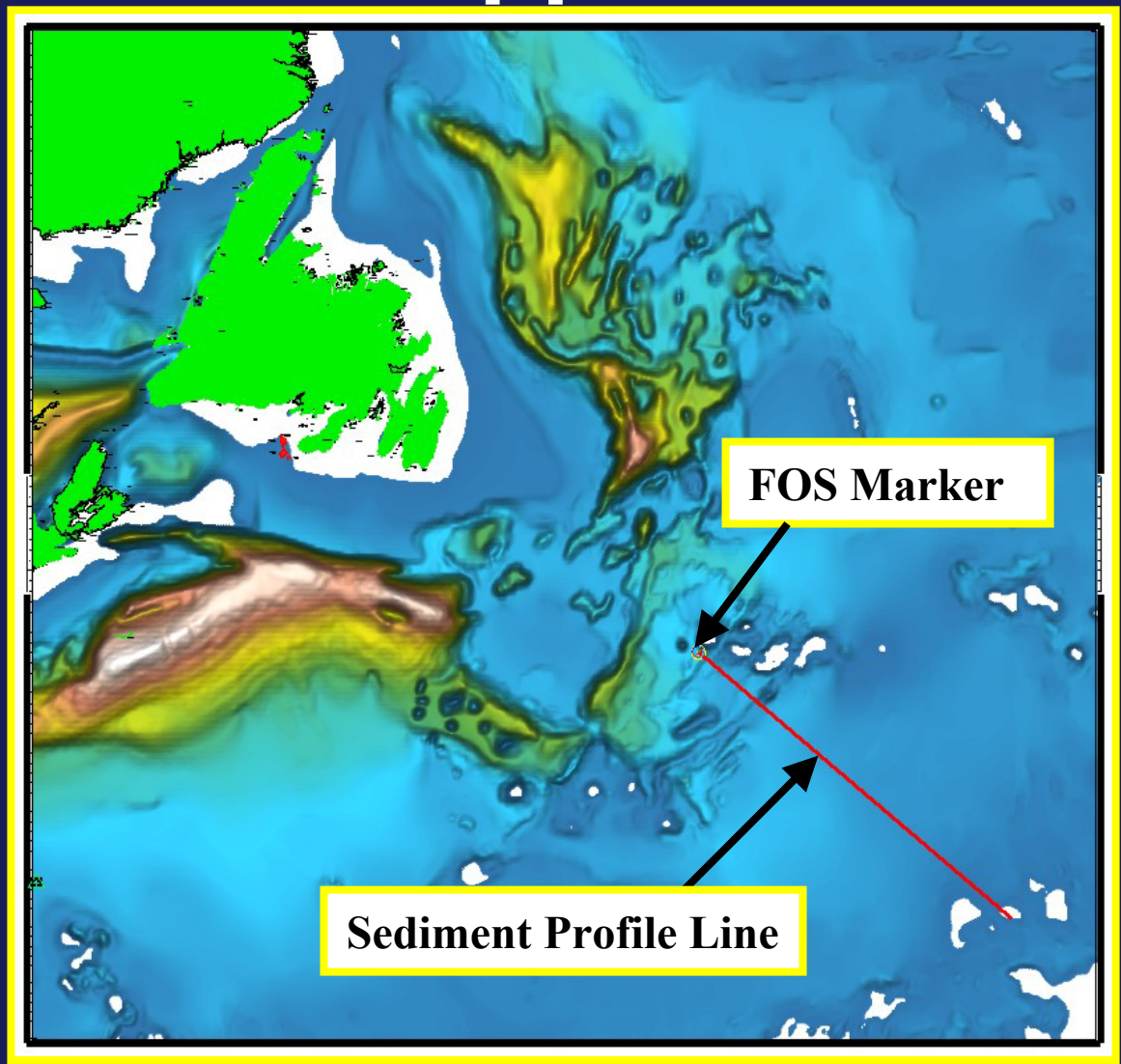
Test of Appurtenance



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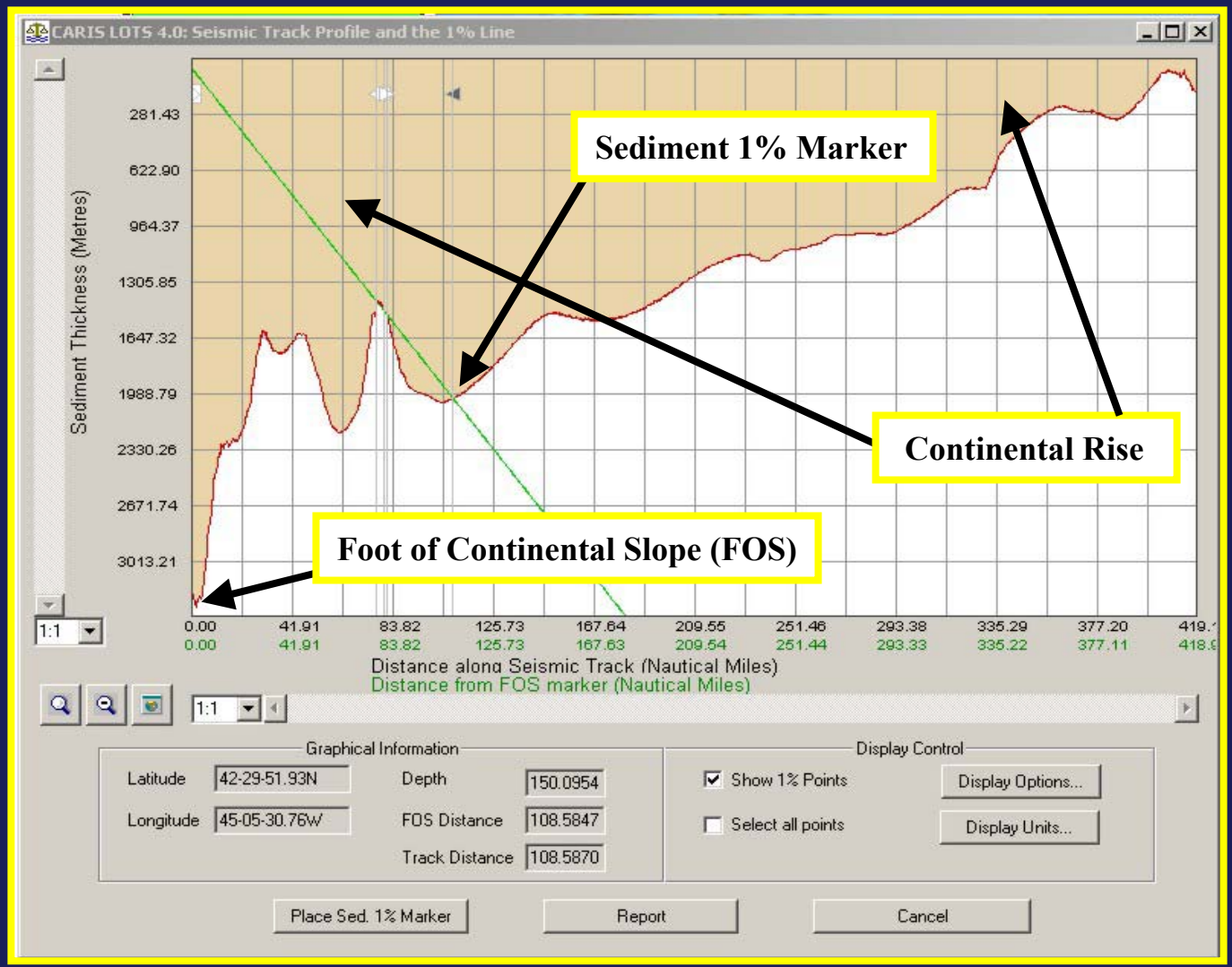
Test of Appurtenance



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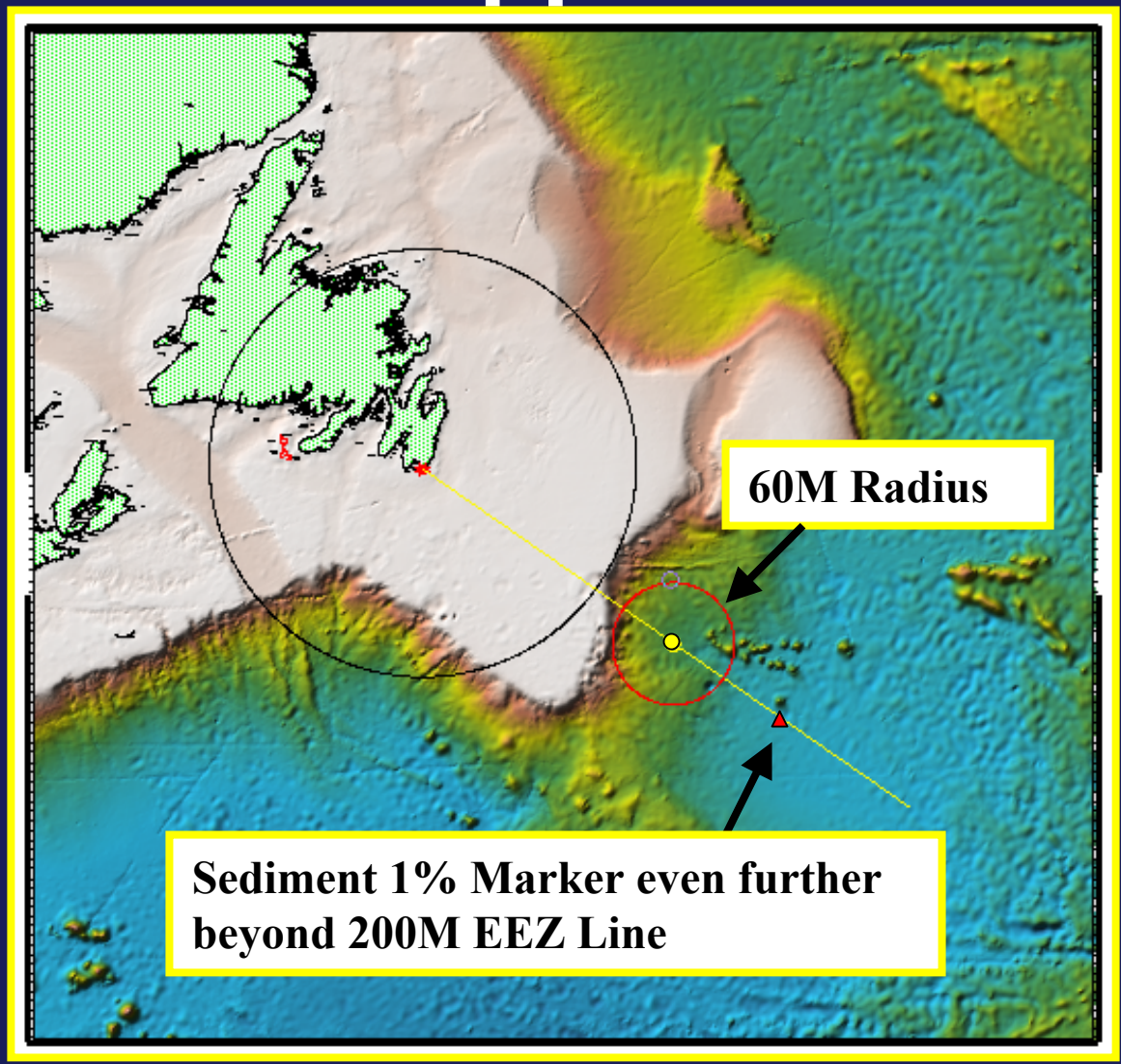

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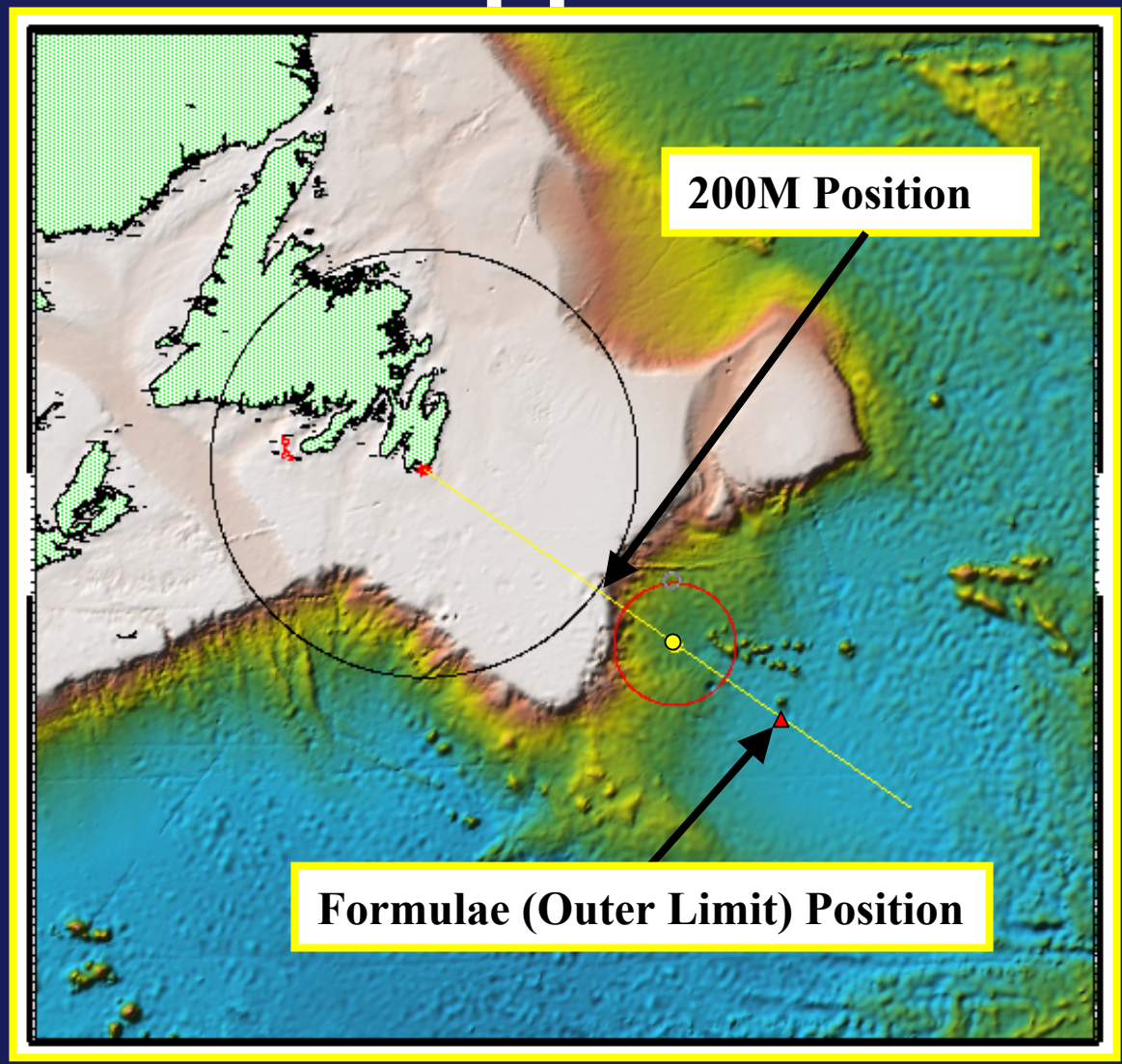

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SOME USEFUL AVAILABLE DATA SOURCES

ARTICLE 76 :
Law of the Sea

Data Source : NIMA Digital Chart of the World (DCW)

Scale : 1:1,000,000 Positional Accuracy : ~1000 meters

Data Structure : Coastlines, Rivers, Roads, Borders, Place Names ..

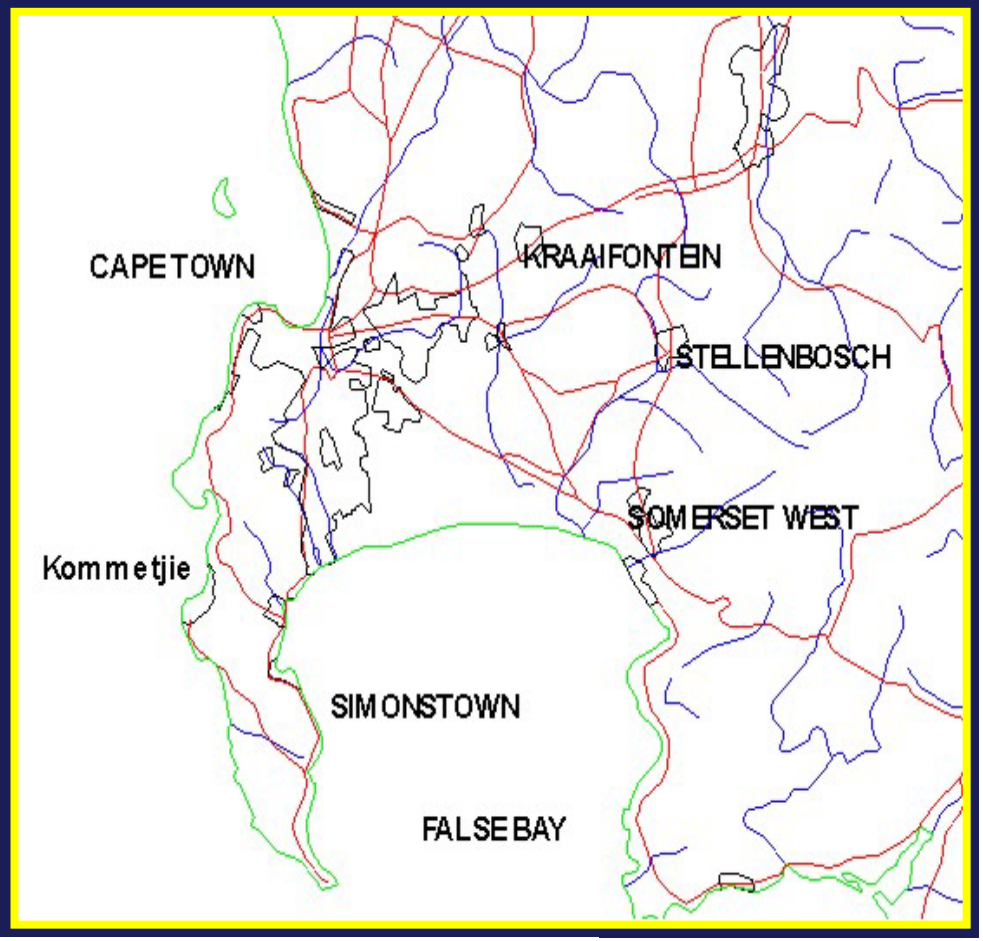
Specific DeskTop Study Applications:

i) **Territorial Sea Baseline Model**

ii) **“Hypothetical” Treaty Lines**

iii) **200M (EEZ)**

iv) **350M Limit Line**



Data Source : NIMA World Vector Shoreline (WVS)

Scale : 1:250,000 Positional Accuracy : ~500 meters

Data Structure : Coastlines

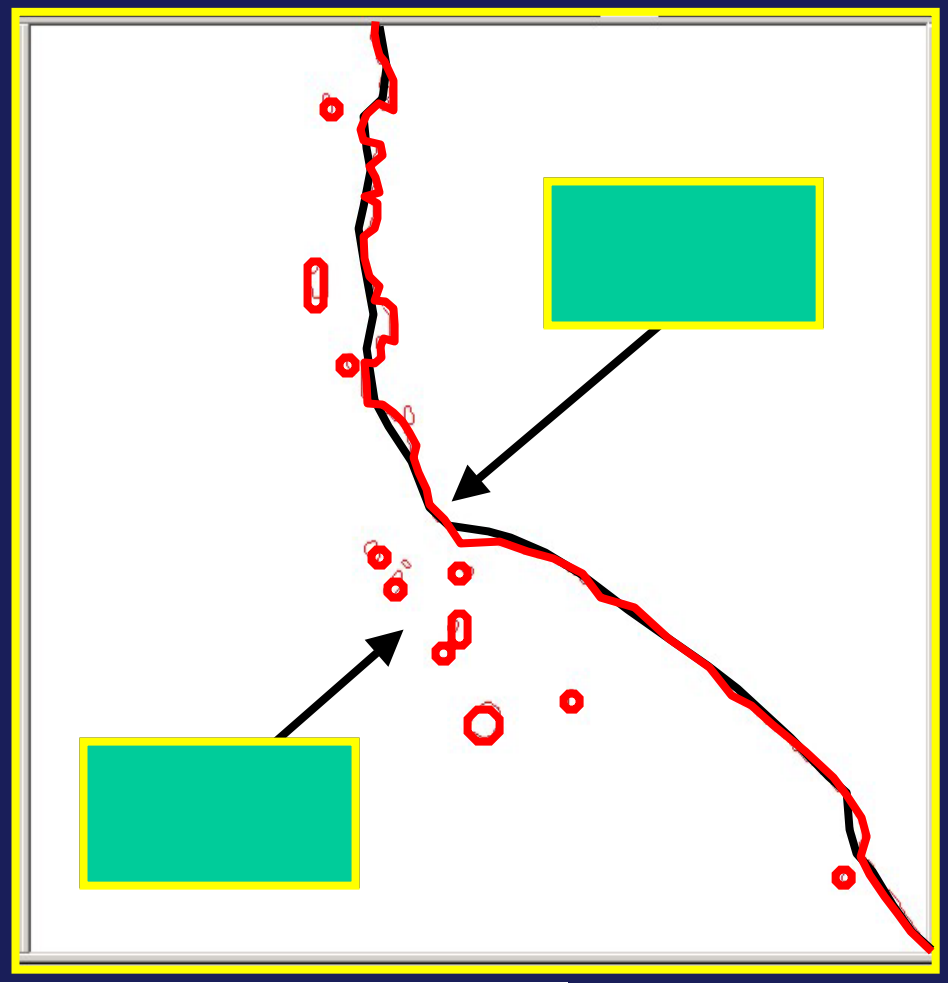
Specific DeskTop Study Applications:

i) **Territorial Sea Baseline Model**

ii) **“Hypothetical” Treaty Lines**

iii) **200M (EEZ)**

iv) **350M Limit Line**



Data Source : United Nations Treaty Boundaries

Scale : Various Positional Accuracy : Various

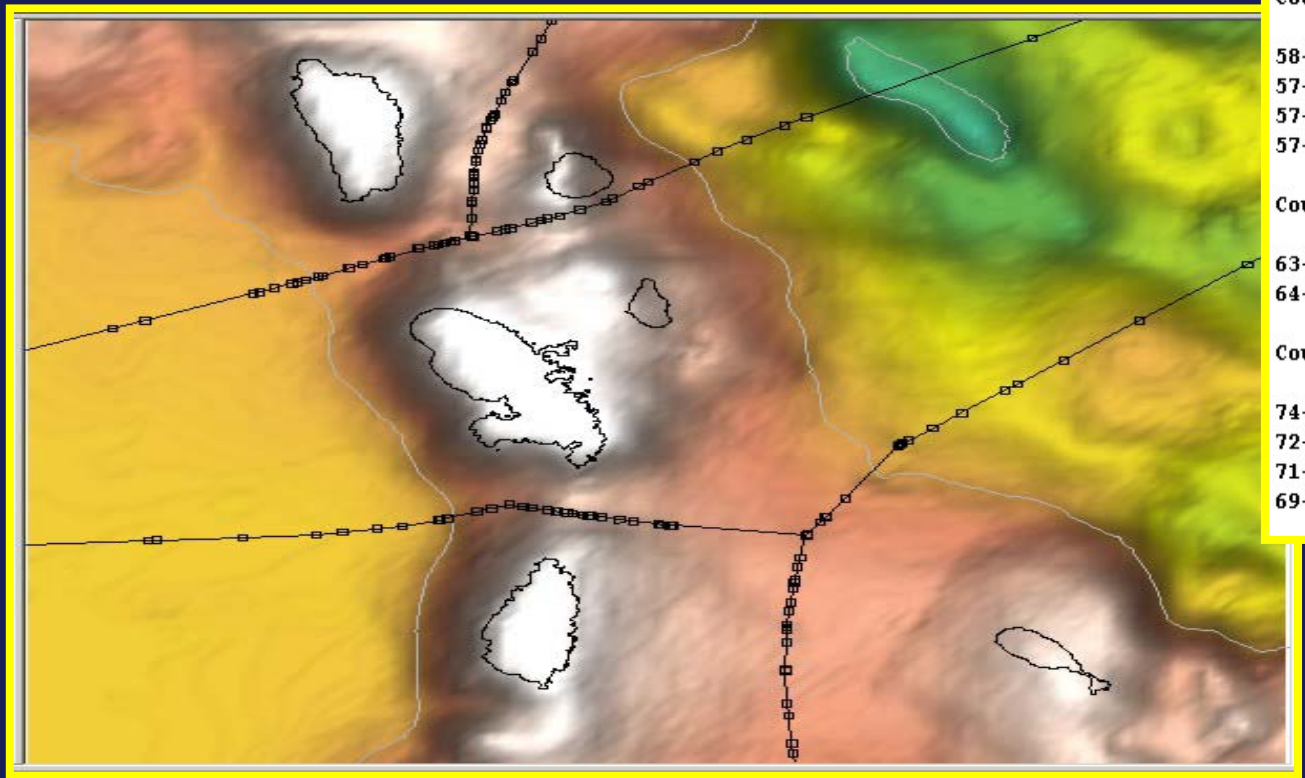
Data Structure : Geographic Coordinates for Treatied Points

Specific DeskTop Study Applications:

i) Maritime Treaty Lines

(for neighbouring and/or opposing Coastal States)

```
Country A vs. Country B

69-35.00N 13-16.00W
69-21.40N 13-33.60W
69-05.10N 15-21.30W

Country A vs. Country C

70-35.00N   6-30.00W
70-35.00N  10-30.00W
68-00.00N  10-30.00W
68-00.00N   6-30.00W

Country B vs. Country C

58-15-41.20N  10-01-48.10E
57-59-18.00N   9-23-00.00E
57-41-48.00N   8-53-18.00E
57-37-06.00N   8-27-30.00E

Country C vs. Country D

63-53-14.93N 0-29-19.55W
64-25-59.52N 0-29-12.22W

Country A vs. Country D

74-21-46.90N   05-00-27.70W
72-49-22.20N   11-28-28.70W
71-52-50.80N   12-46-01.30W
69-54-34.40N   13-37-46.40W
```



ARTICLE 76 : Law of the Sea

Data Source : ETOPO5

Scale : 1:1,000,000 Positional Accuracy : Various

Data Structure : ~10000x10000 meter (5x5 minute) gridded Bathymetry

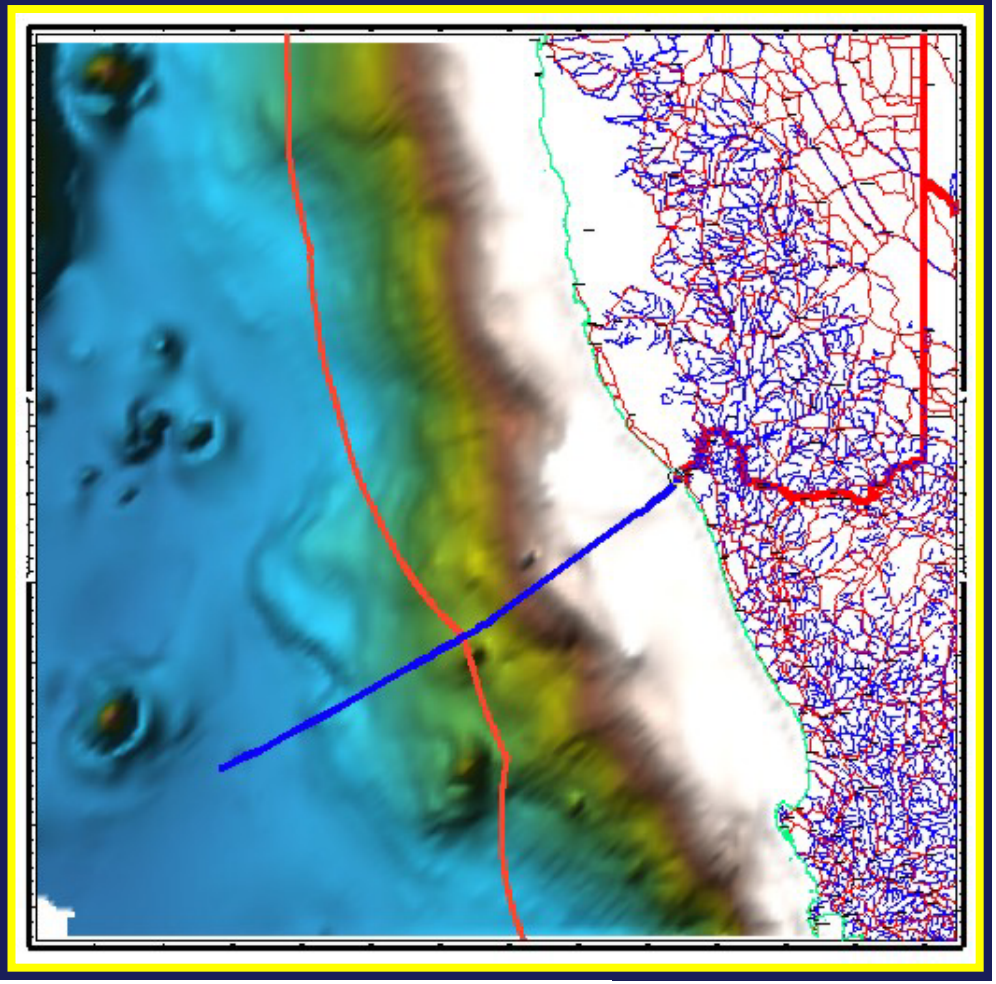
Specific DeskTop Study Applications:

i) 2500 meter Isobath

ii) 2500m plus 100M Limit Line

iii) Foot of the Continental Slope (FOS Markers)

iv) Distance Formula Line (FOS plus 60M)



Data Source : 2-Minute Altimetry-Derived

Scale : 1:1,000,000 Positional Accuracy : Various

Data Structure : ~3800x3800 meter (2x2 minute) gridded Bathymetry

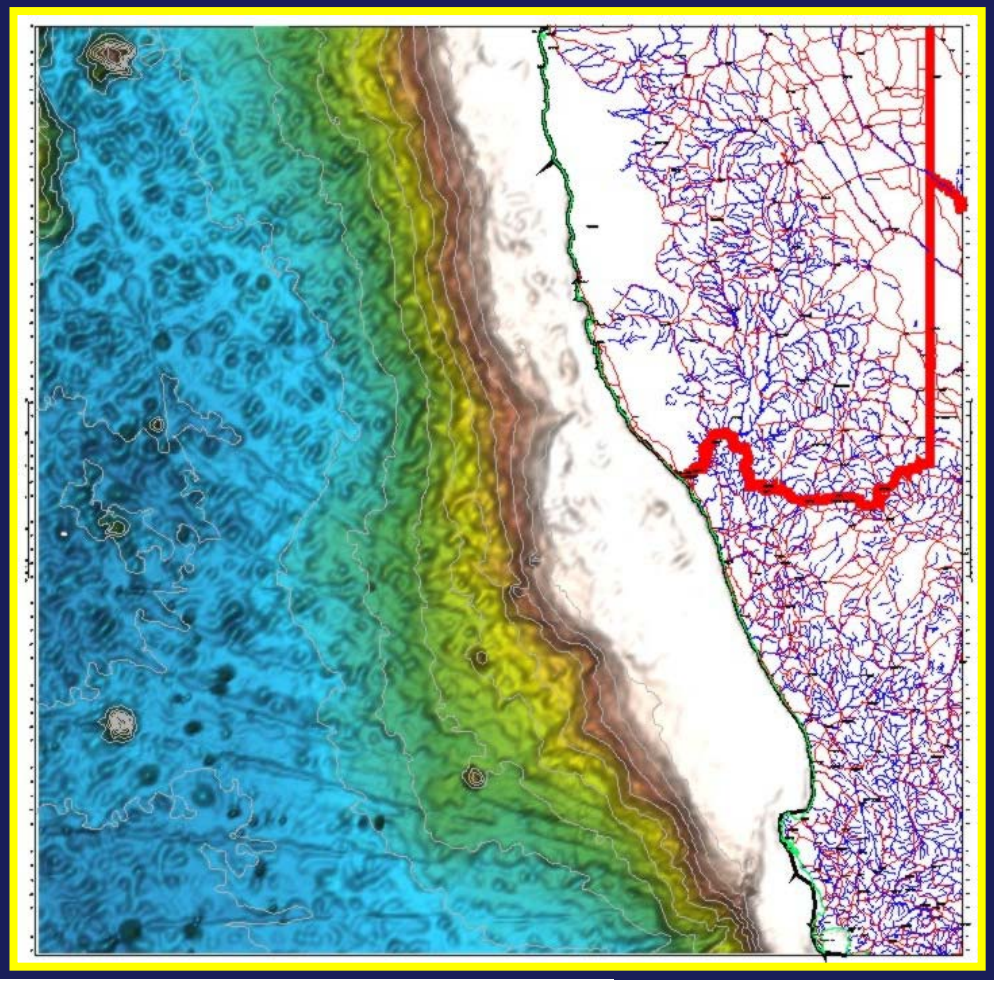
Specific DeskTop Study Applications:

i) **2500 meter Isobath**

ii) **2500m plus 100M Limit Line**

iii) **Foot of the Continental Slope (FOS Markers)**

iv) **Distance Formula Line (FOS plus 60M)**



Data Source : ETOPO2

Scale : 1:1,000,000 Positional Accuracy : Various

Data Structure : ~3800x3800 meter (2x2 minute) gridded Bathymetry

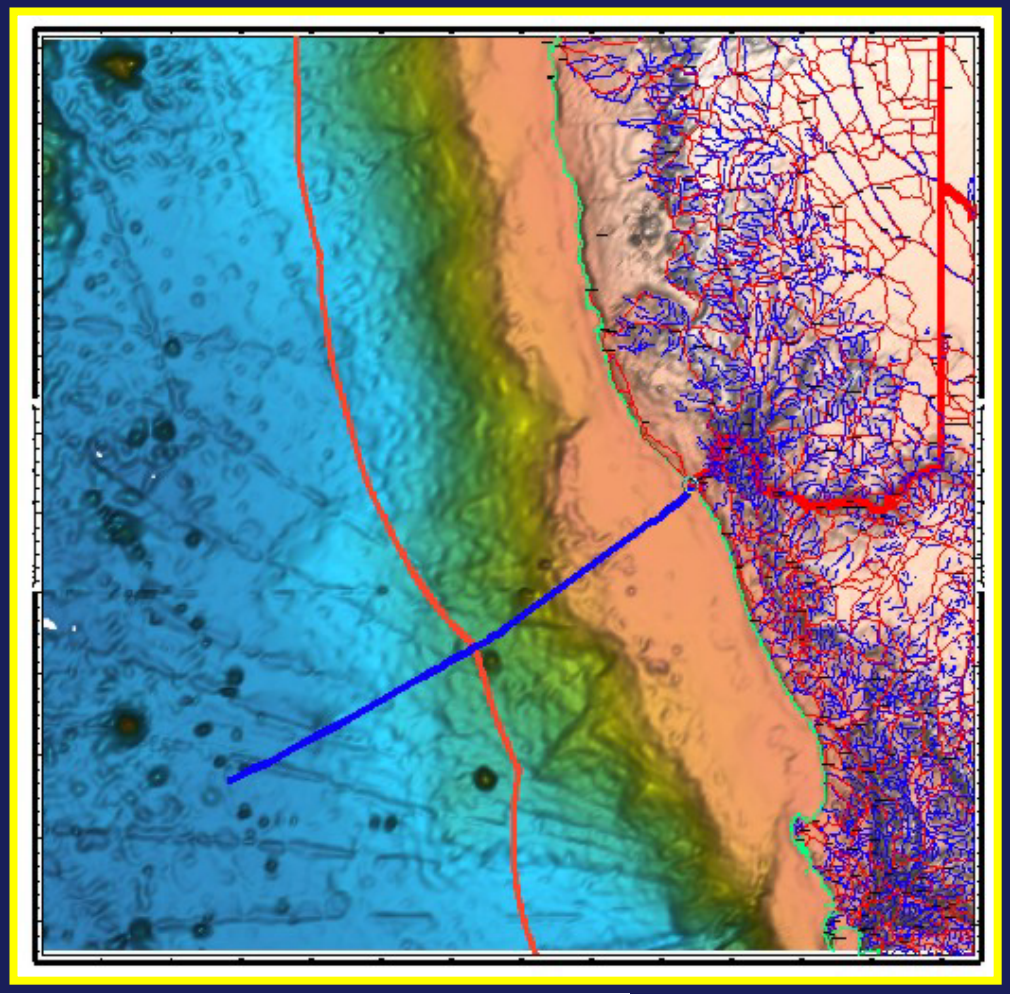
Specific DeskTop Study Applications:

i) **2500 meter Isobath**

ii) **2500m plus 100M Limit Line**

iii) **Foot of the Continental Slope (FOS Markers)**

iv) **Distance Formula Line (FOS plus 60M)**



Data Source : GEBCO1

Scale : 1:1,000,000 Positional Accuracy : Various

Data Structure : ~1900x1900 meter (1x1 minute) gridded Bathymetry

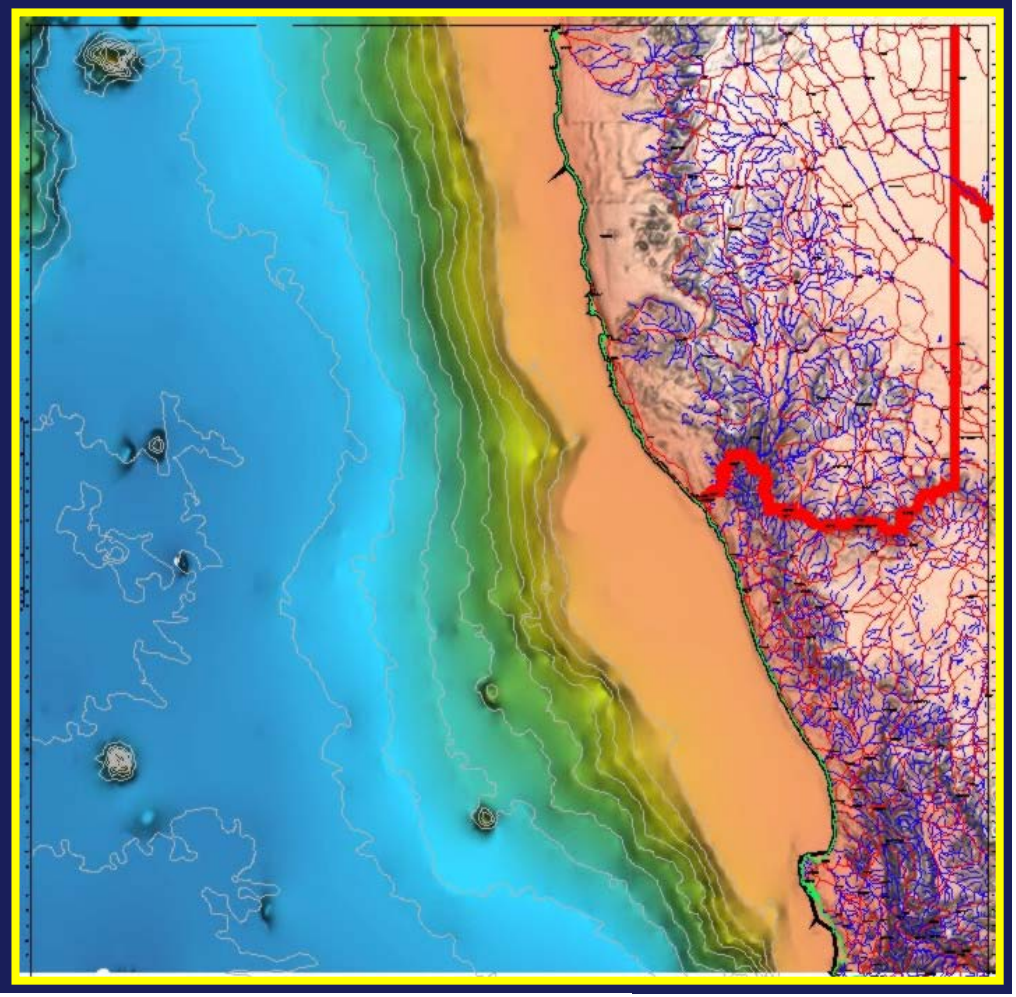
Specific DeskTop Study Applications:

i) **2500 meter Isobath**

ii) **2500m plus 100M Limit Line**

iii) **Foot of the Continental Slope (FOS Markers)**

iv) **Distance Formula Line (FOS plus 60M)**



Data Source : GEODAS / Ship Trackline Data

Scale : Various Positional Accuracy : Various

Data Structure : ASCII Original 3D ship tracks (Bathymetry / Gravity / Magnetics)

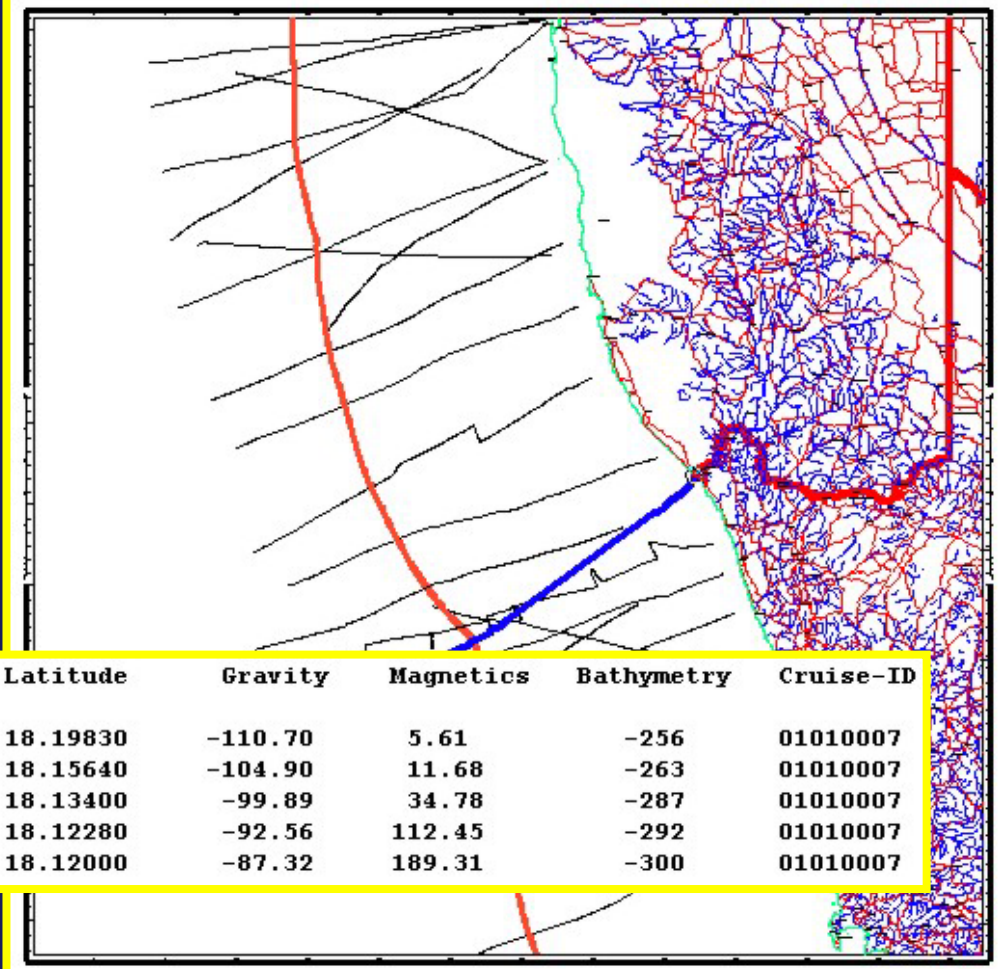
Specific DeskTop Study Applications:

i) 2500 meter Isobath

ii) 2500m plus 100M Limit Line

iii) Foot of the Continental Slope (FOS Markers)

iv) Distance Formula Line (FOS plus 60M)



Survey Date	Survey Time	Longitude	Latitude	Gravity	Magnetics	Bathymetry	Cruise-ID
1987-11-26	16:00:00	294.39330	18.19830	-110.70	5.61	-256	01010007
1987-11-26	16:15:00	294.37550	18.15640	-104.90	11.68	-263	01010007
1987-11-26	16:23:00	294.36600	18.13400	-99.89	34.78	-287	01010007
1987-11-26	16:27:00	294.36120	18.12280	-92.56	112.45	-292	01010007
1987-11-26	16:28:00	294.36000	18.12000	-87.32	189.31	-300	01010007

Data Source : NGDC Global Sediment Thickness Model

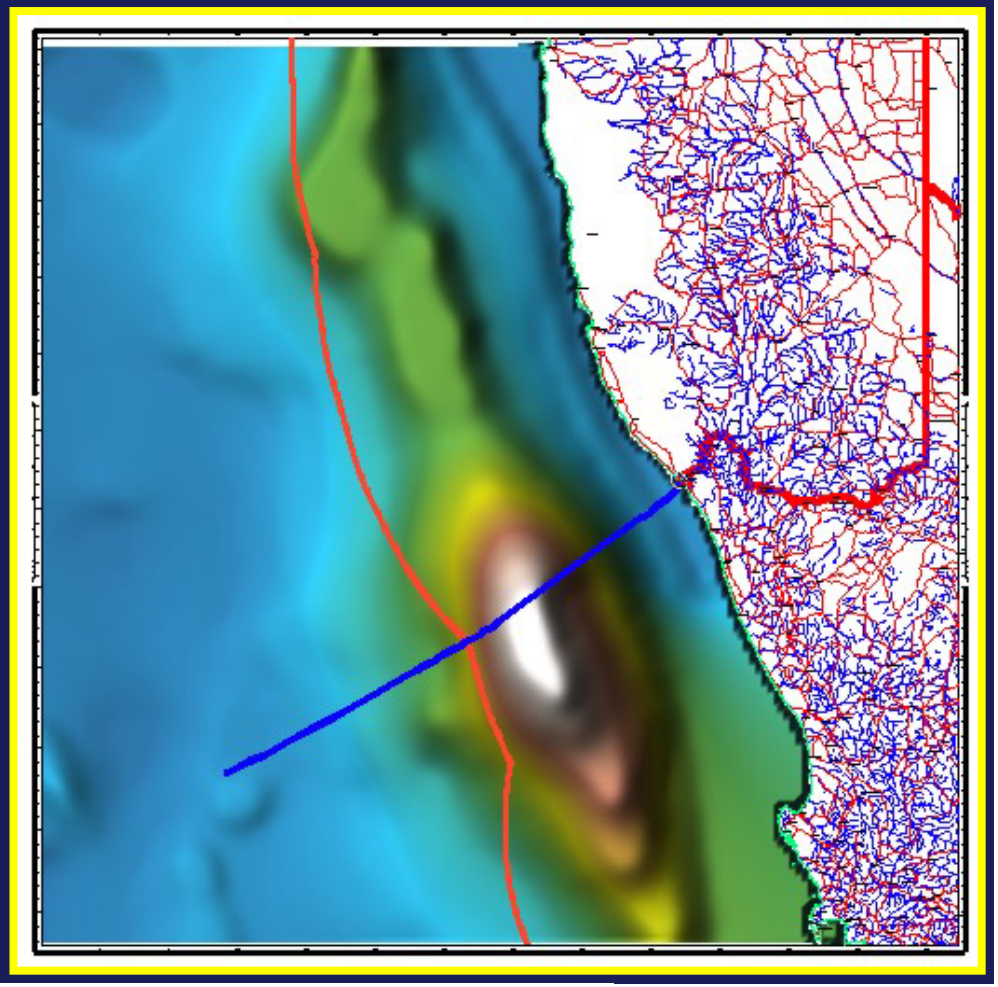
Scale : 1:1,000,000 Positional Accuracy : Various

Data Structure : ~10000x10000 meter (5x5 minute) gridded Sediment Thickness data points

Specific DeskTop Study Applications:

i) Sediment 1% Markers

ii) Gardiner Formula Line (Sediment 1% line)



Data Source : Free-Air Gravity Data

Scale : Various Positional Accuracy : Various

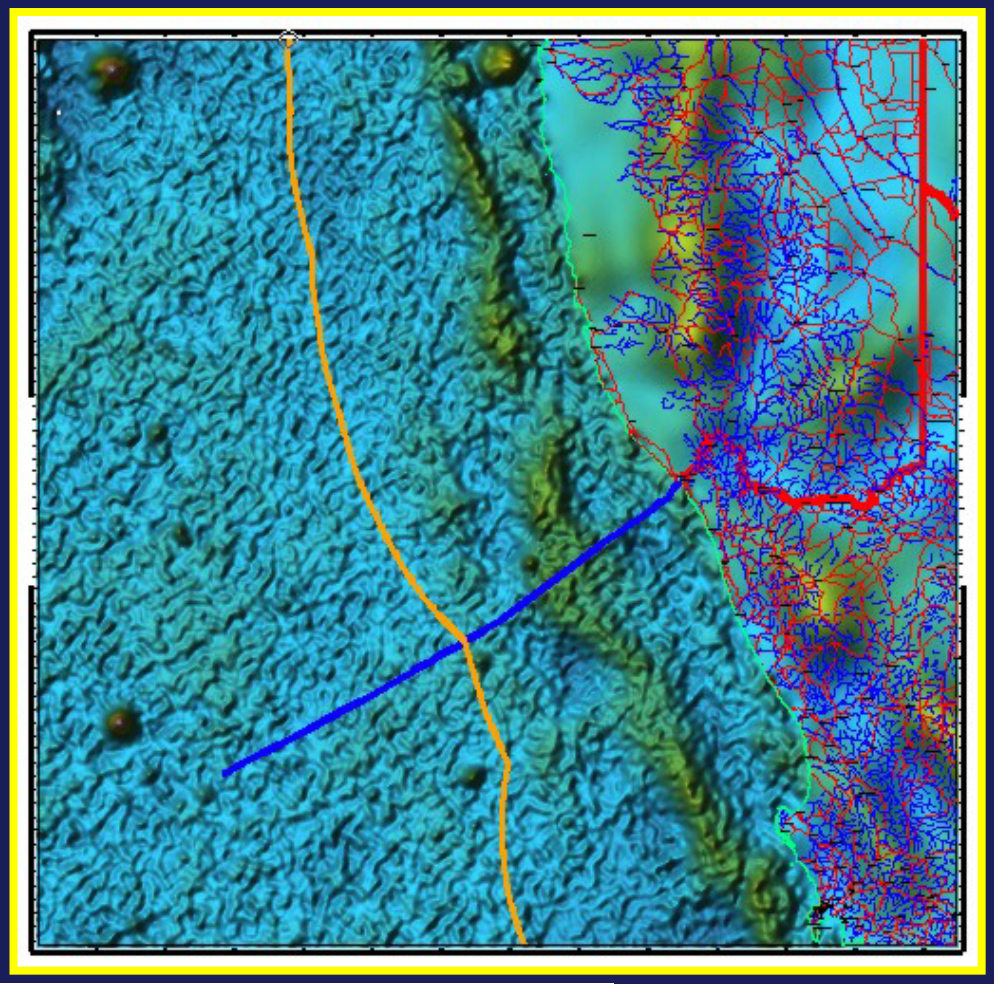
Data Structure : ~4000x4000 meter (2.5x2.5 minute) gridded Free-Air Gravity data points

Specific DeskTop Study Applications:

i) *Foot of the Continental Slope - Geological FOS Markers ("Evidence to the Contrary")

ii) Distance Formula Line (FOS plus 60M)

***(Very Preliminary requires additional Seismic data sources)**



THE DESKTOP STUDY : A TEST-CASE EXAMPLE

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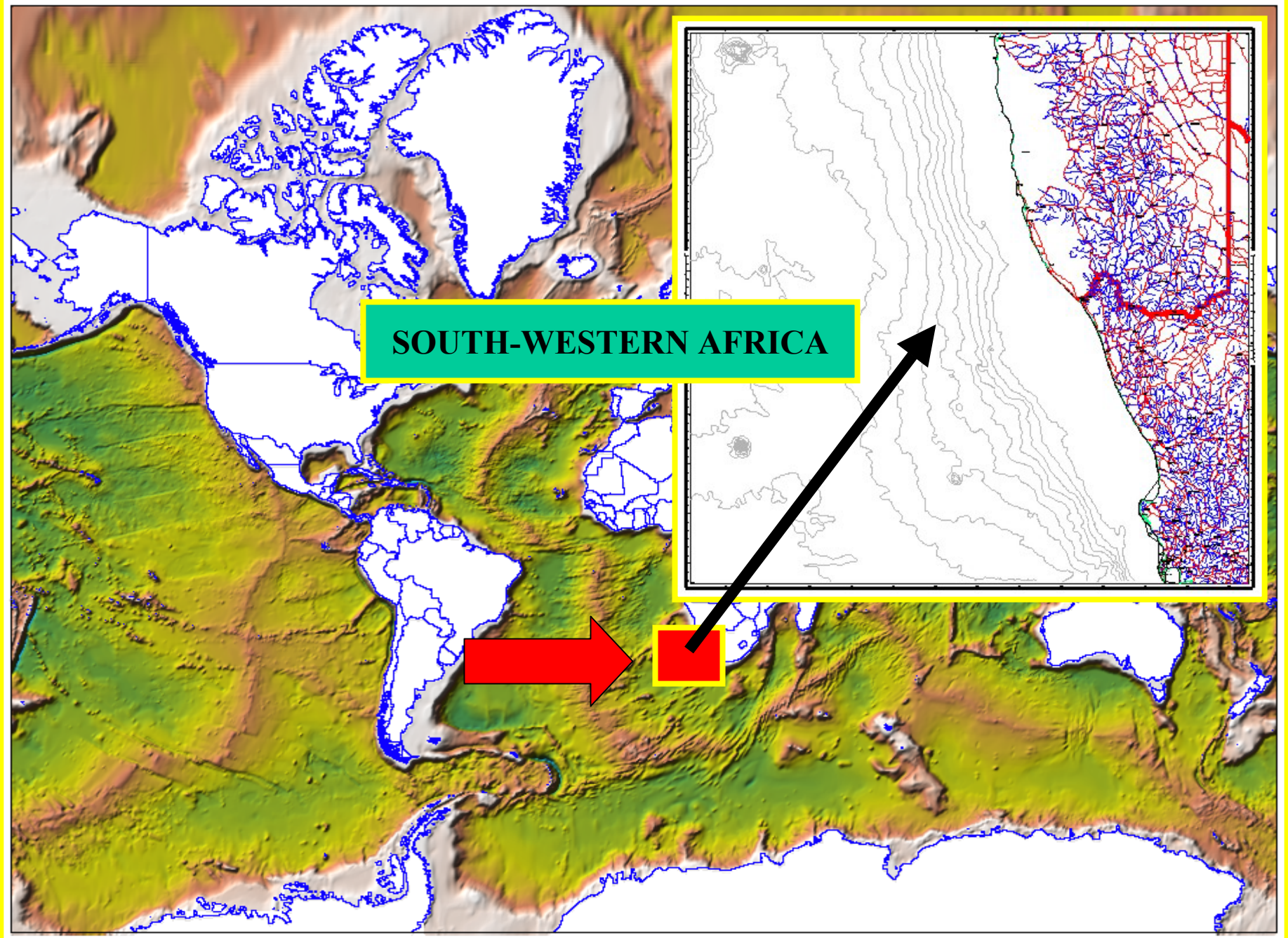
SOUTH-WESTERN AFRICA

GENERAL OVERVIEW OF THE REQUIRED PROCEDURES TO BE FOLLOWED IN COMPLETING THE DESKTOP STUDY

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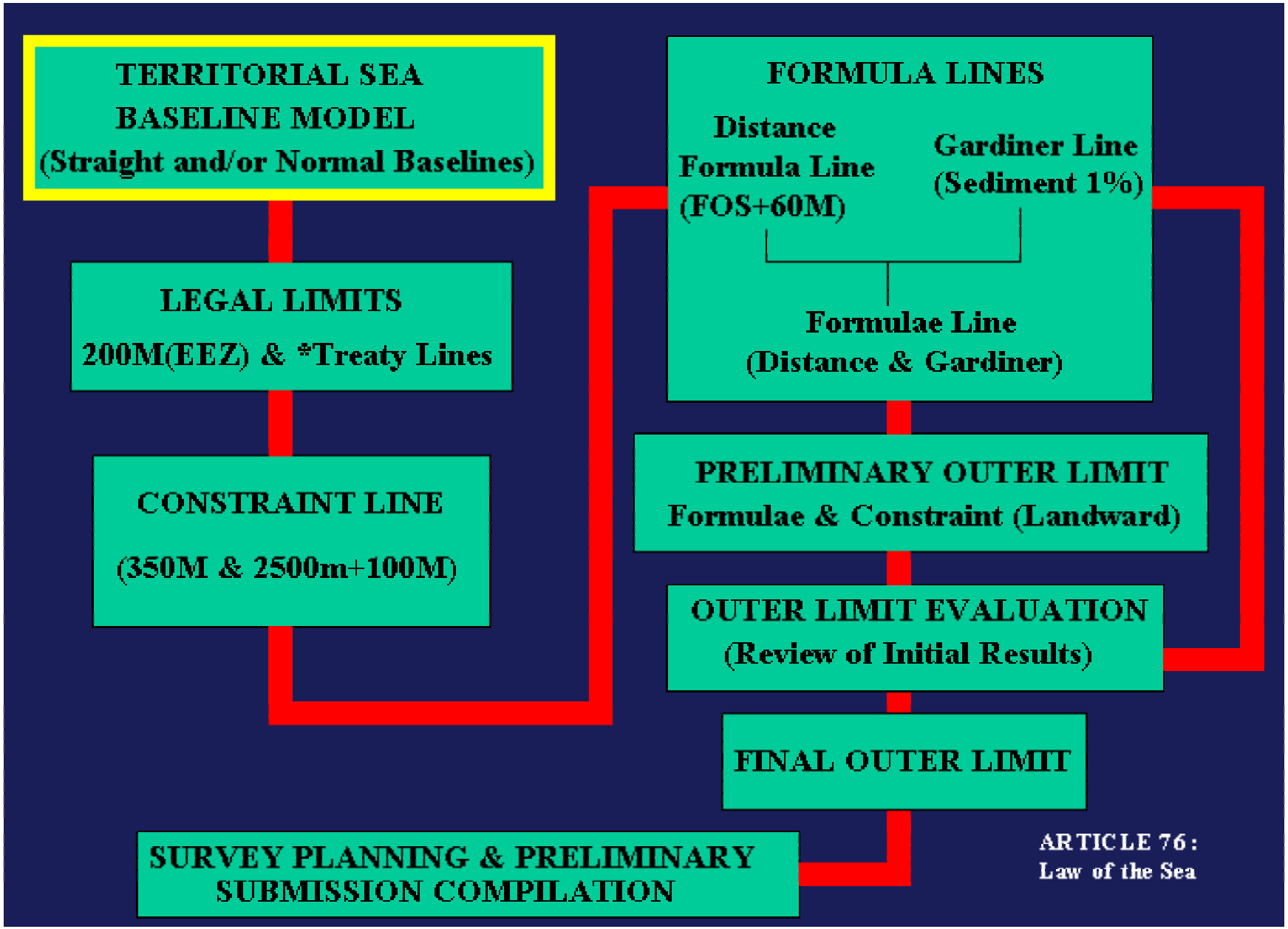
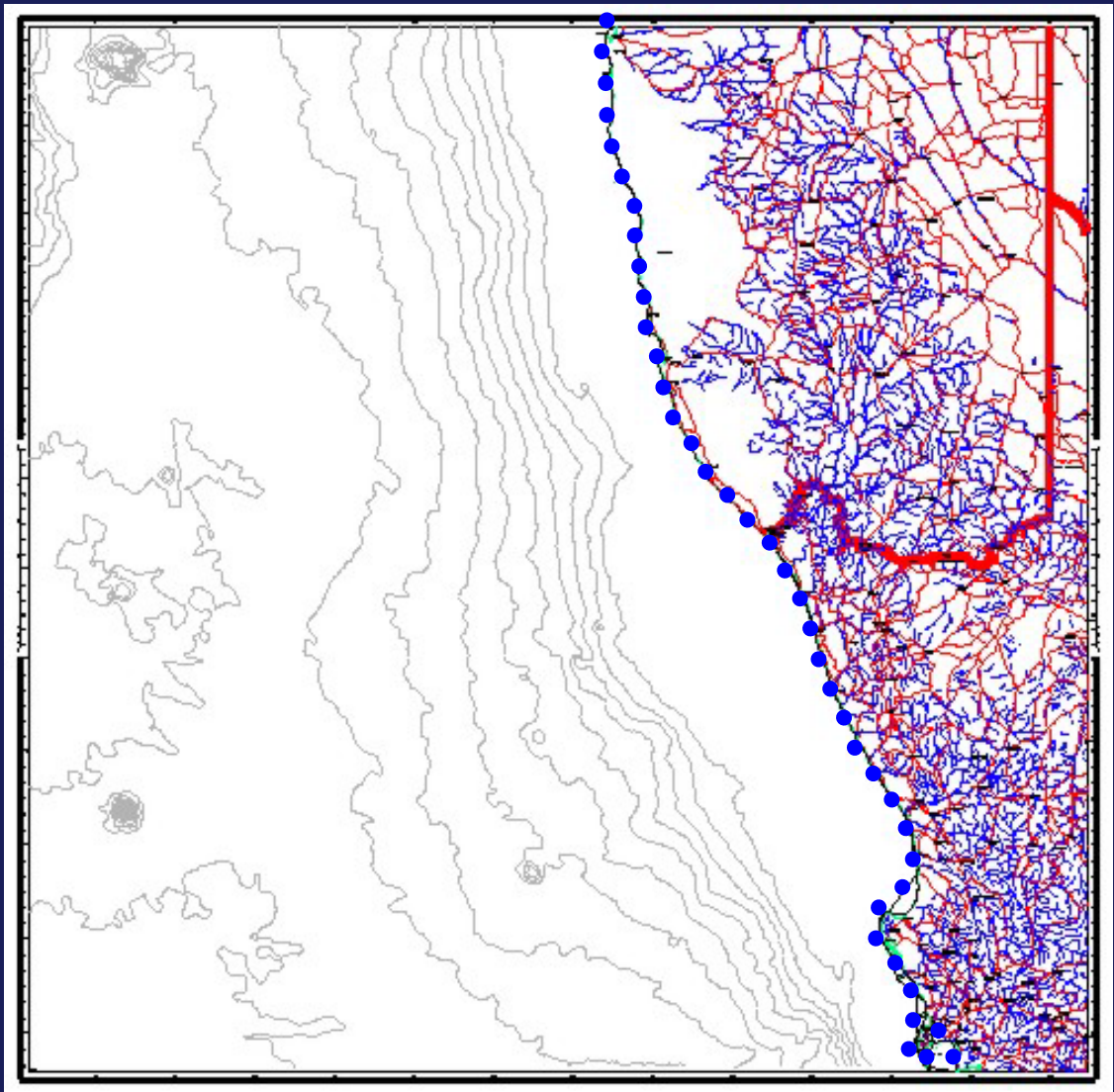

TERRITORIAL SEA
BASELINE MODEL
(Straight and/or Normal Baselines)
LEGAL LIMITS
200M(EEZ) & *Treaty Lines
CONSTRAINT LINE
(350M & 2500m+100M)
FORMULA LINES
Distance
Formula Line
(FOS+60M)
Gardiner Line
(Sediment 1%)
Formulae Line
(Distance & Gardiner)
PRELIMINARY OUTER LIMIT
Formulae & Constraint (Landward)
OUTER LIMIT EVALUATION
(Review of Initial Results)
FINAL OUTER LIMIT
SURVEY PLANNING & PRELIMINARY
SUBMISSION COMPILATION
ARTICLE 76:
Law of the Sea

TERRITORIAL SEA BASELINE MODEL



Composite of :

Normal Baselines (Low water line)

Straight Baselines (Jagged Coastlines)

Islands

Low Water Elevations (Drying Rocks / Reefs / Sandbars)

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SPECIFIC DATA SOURCES TO CONSIDER WHEN CONSTRUCTING THE TERRITORIAL SEA BASELINE MODEL

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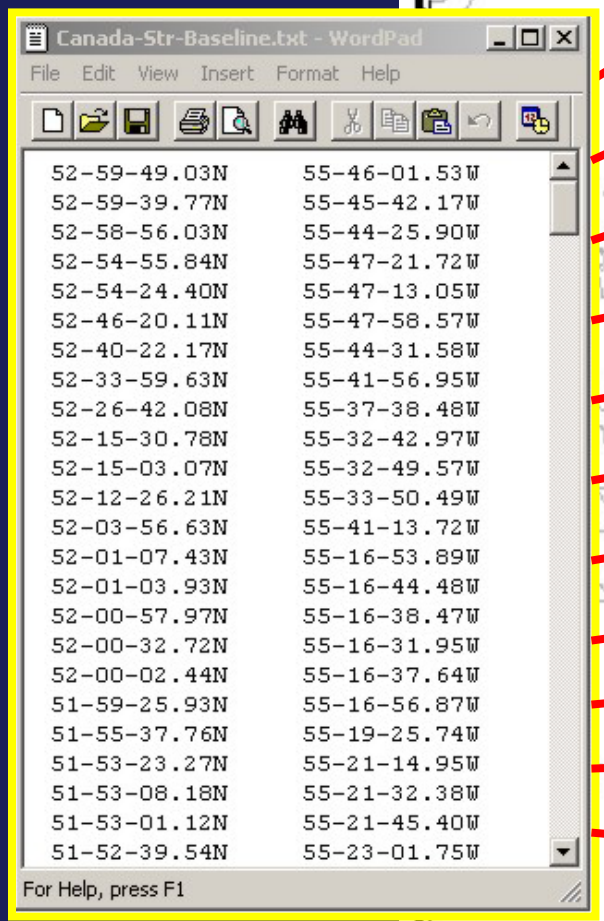
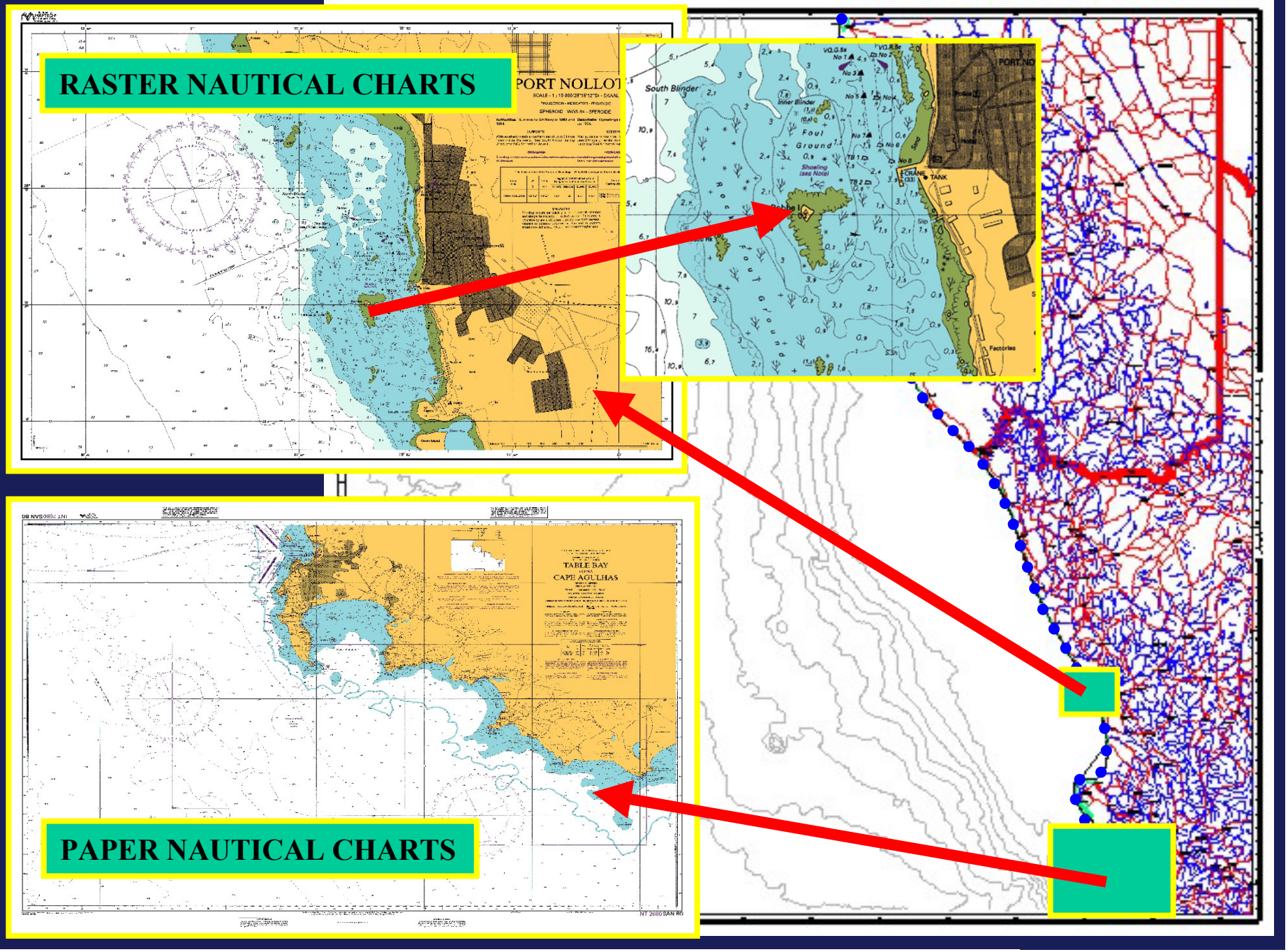
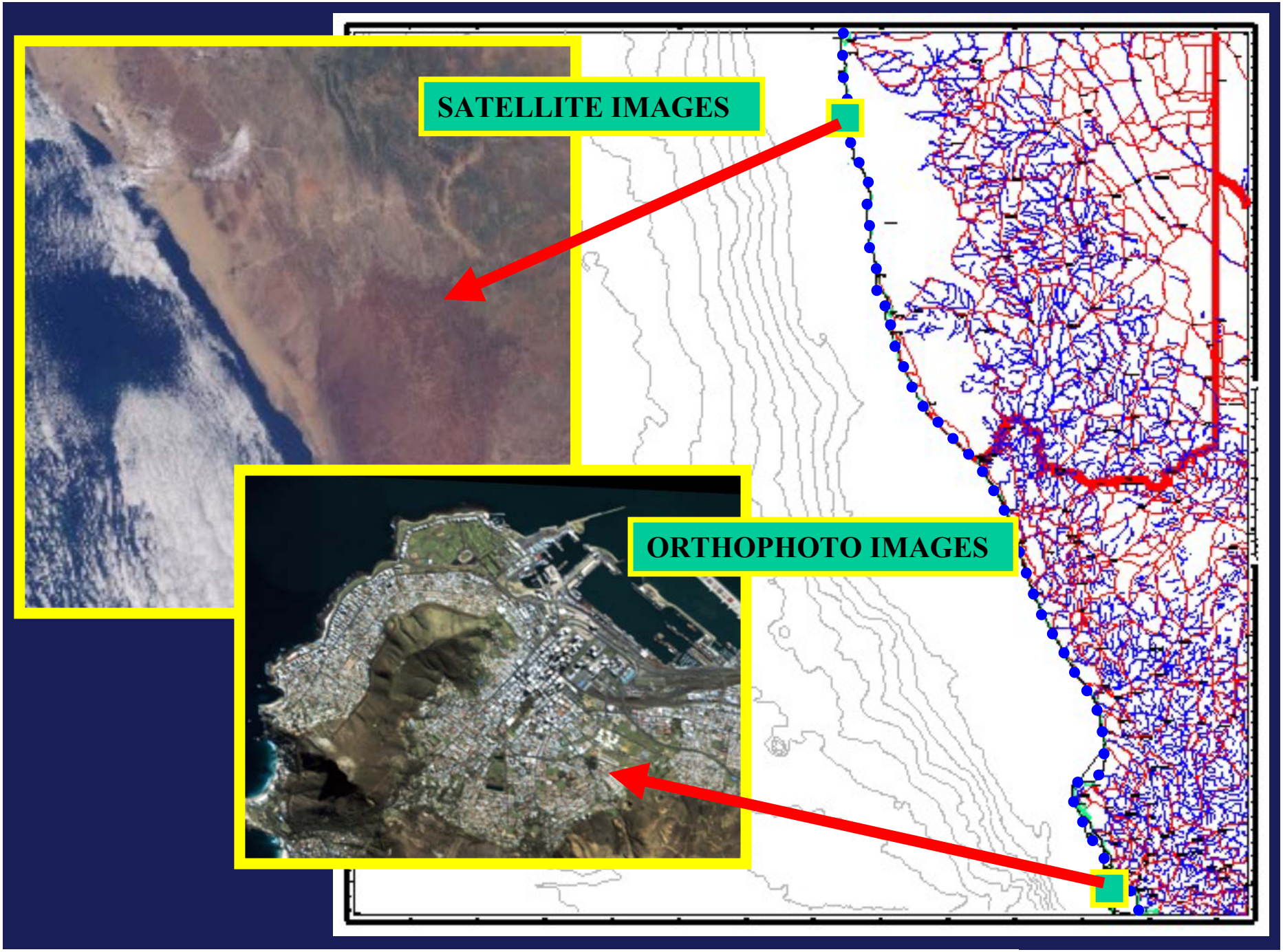
IMPORT COASTAL STATES' EXISTING ASCII DATA




RASTER NAUTICAL CHARTS
PORT NOLLOT
South Blinder
Inner Blinder
Foul Ground
Shoaling (see Note)
PORT NO
CRANE
TANK
Factories
PAPER NAUTICAL CHARTS
TABLE BAY
TO
CAPE AGULHAS


SATELLITE IMAGES
ORTHOPHOTO IMAGES

PROCEDURAL OVERVIEW : LEGAL LIMITS

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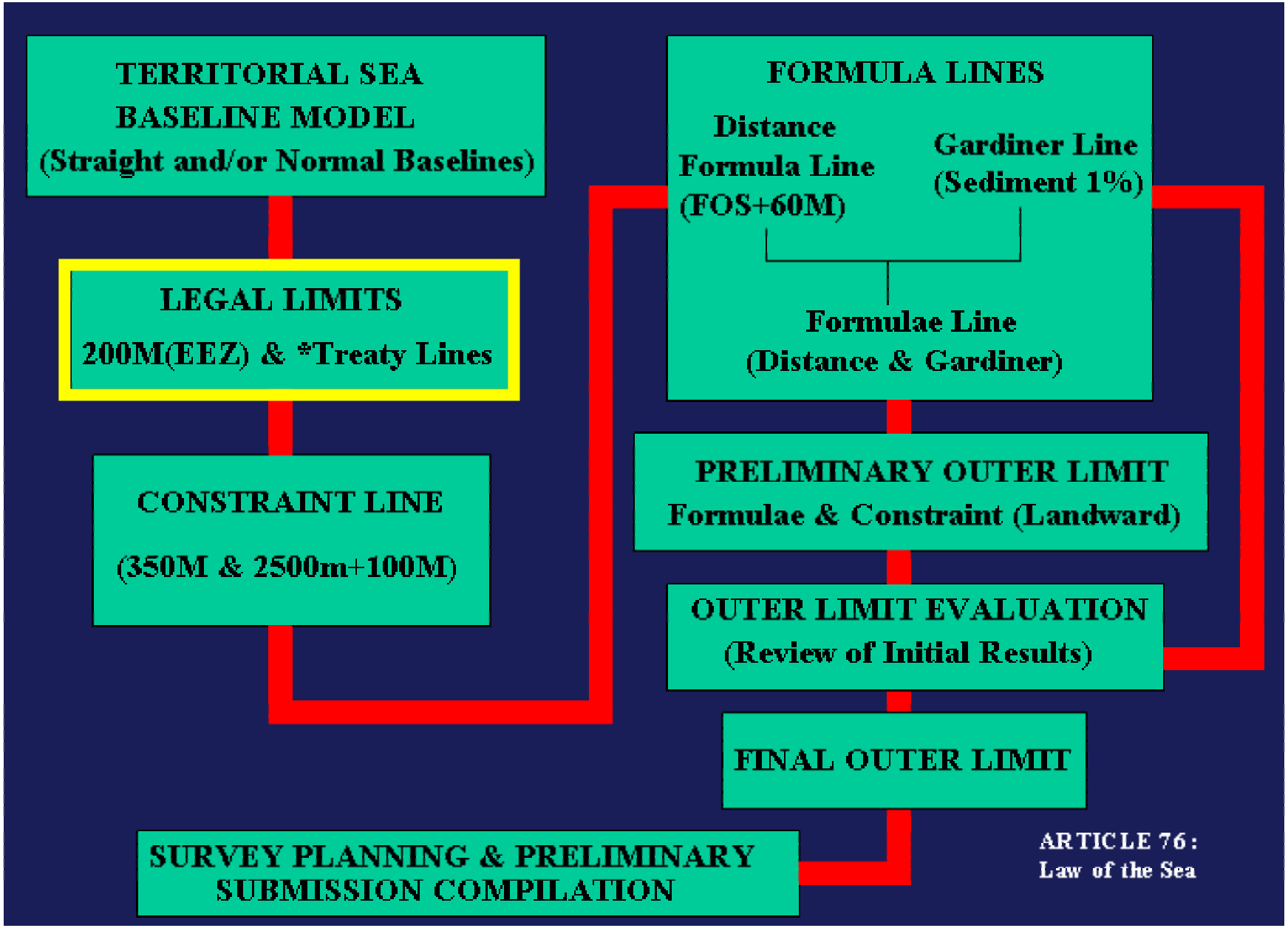
Law of the Sea


TERRITORIAL SEA
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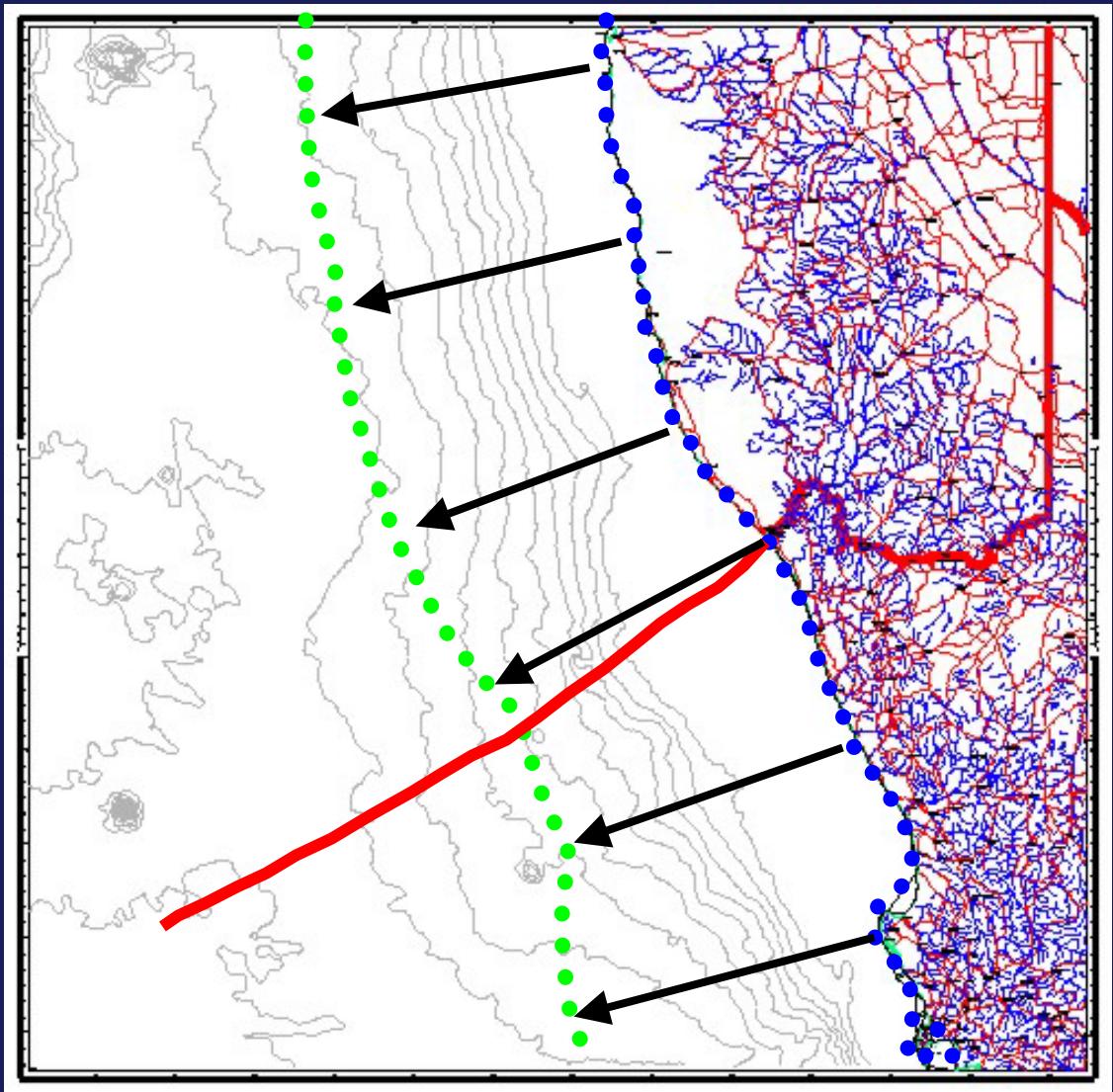
LEGAL LIMIT LINES



200M (EEZ):

(Using Territorial Sea Baseline Model)

Provisional "Hypothetical" Treaty Lines:

(Using Territorial Sea Baseline Model)

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PROCEDURAL OVERVIEW : THE CONSTRAINT LINE

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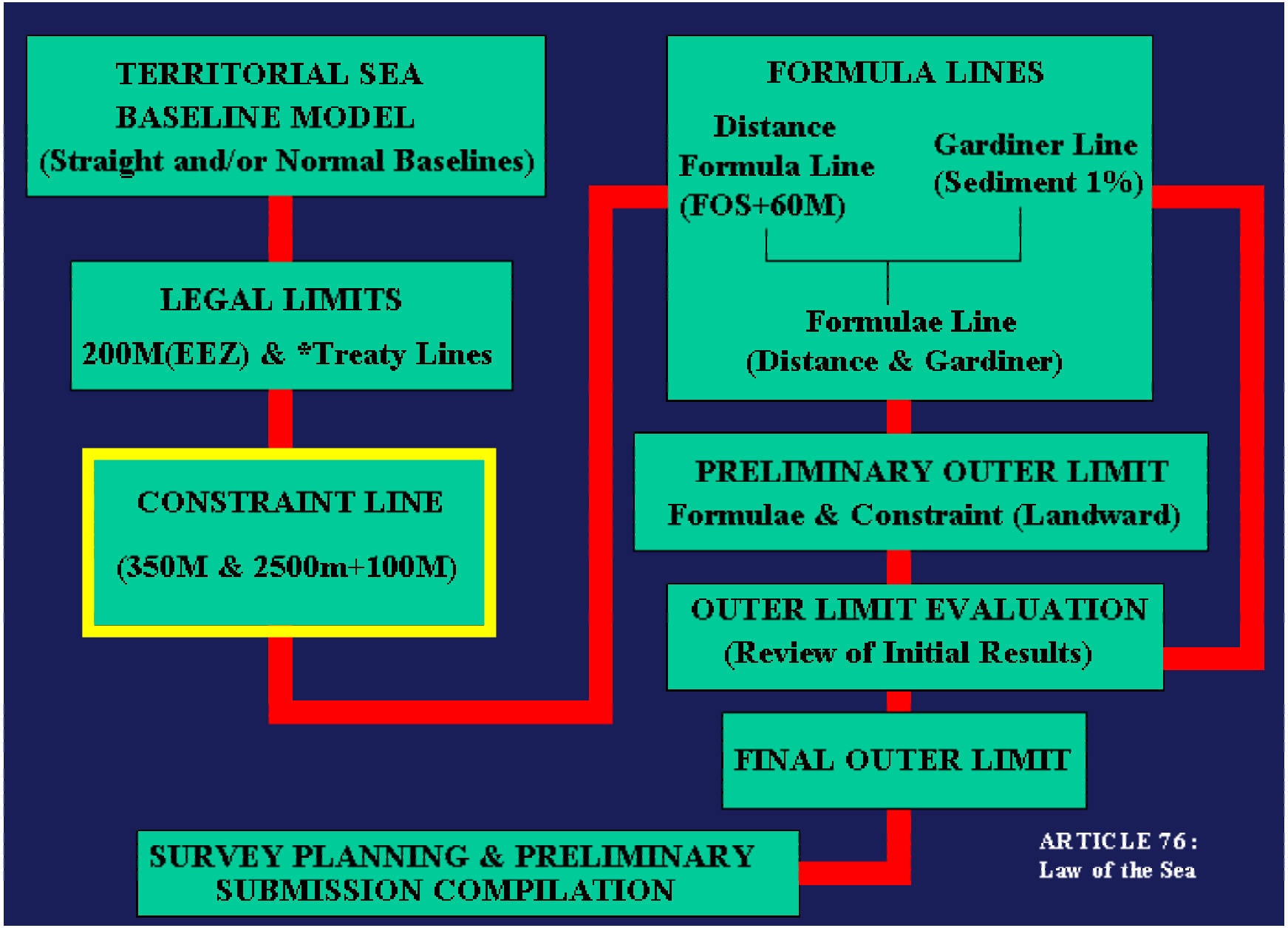
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FINAL OUTER LIMIT
SURVEY PLANNING & PRELIMINARY
SUBMISSION COMPILATION
ARTICLE 76:
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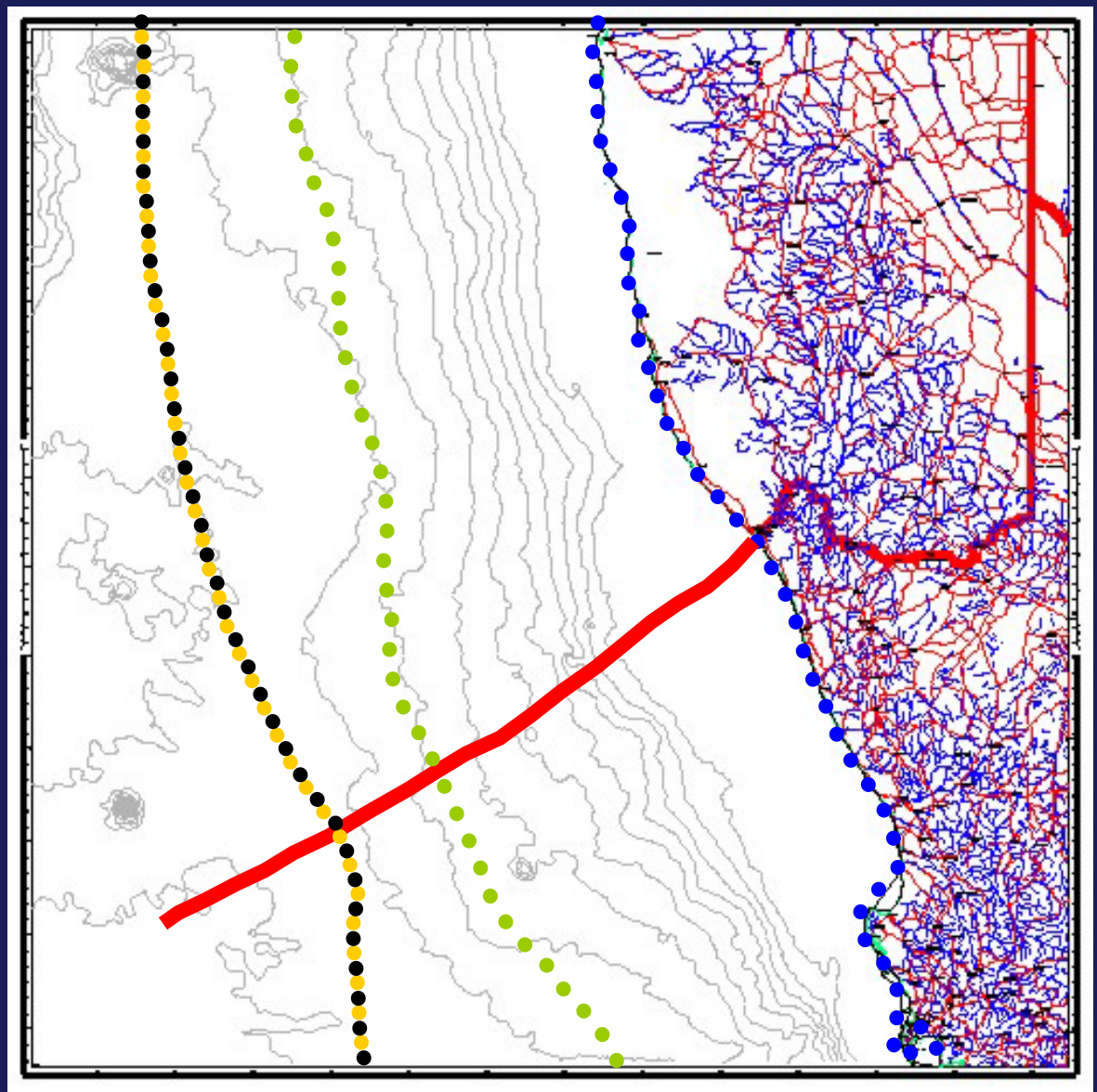
CONSTRAINT LINE



PART I:
350M Limit

(Using Territorial Sea Baseline Model)

PART II:
2500m Plus 100M

(Using 2500m Isobath)

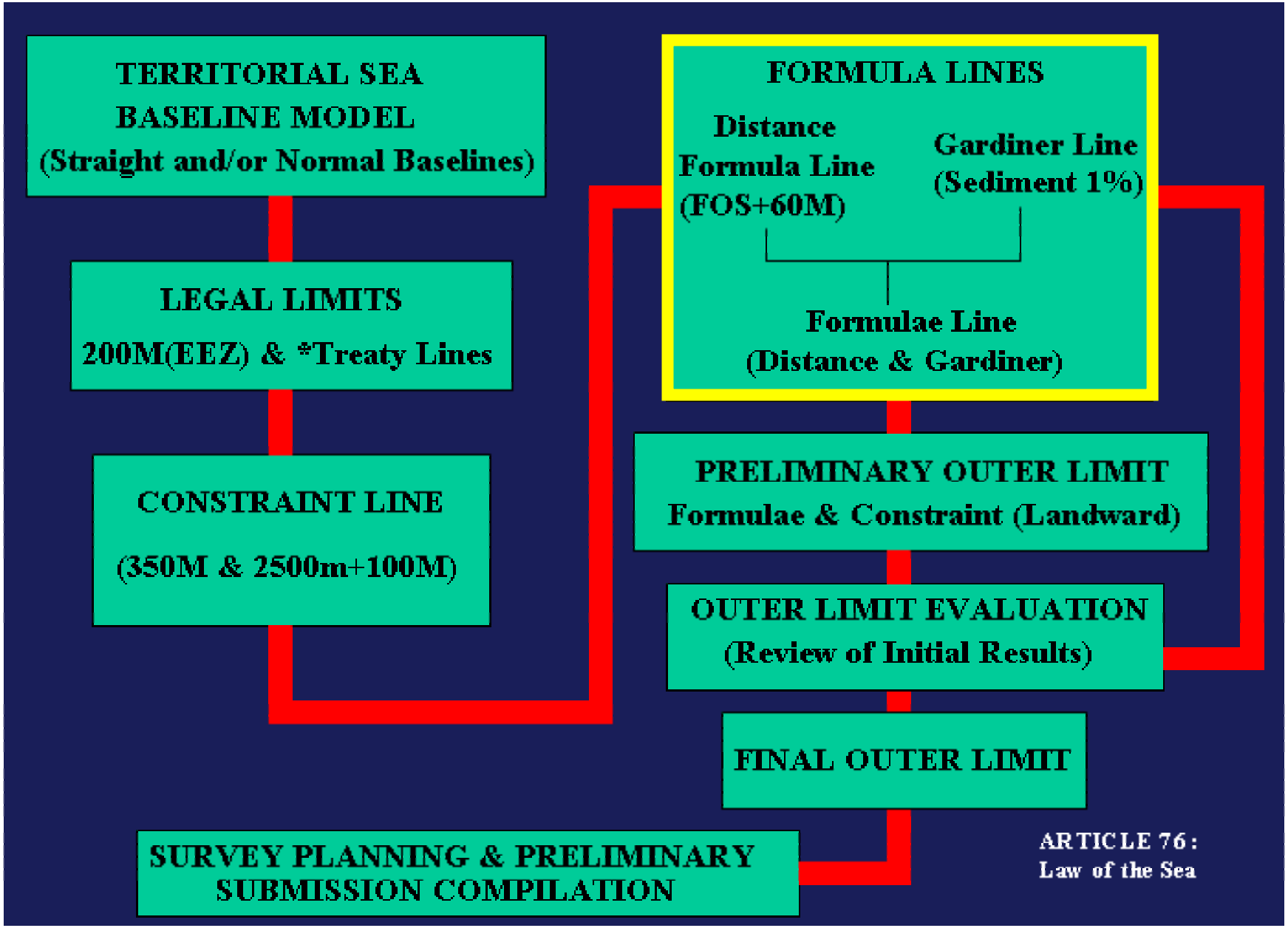
PART III:
Constraint Line

(Using Seaward-most results of I & II)

ARTICLE 76 :
Law of the Sea

PROCEDURAL OVERVIEW : THE FORMULAE LINE

ARTICLE 76 :
Law of the Sea

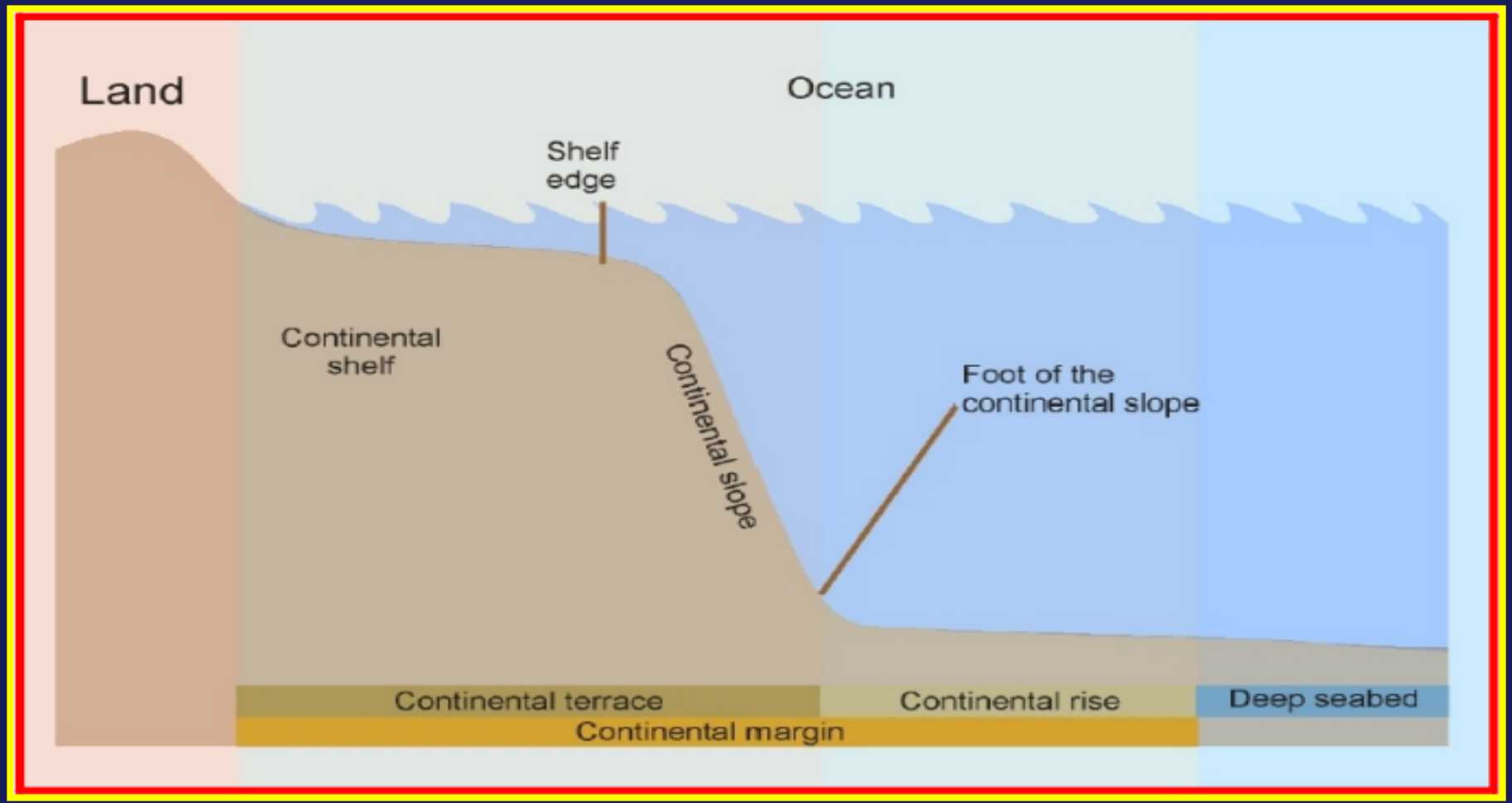

TERRITORIAL SEA
BASELINE MODEL
(Straight and/or Normal Baselines)
LEGAL LIMITS
200M(EEZ) & *Treaty Lines
CONSTRAINT LINE
(350M & 2500m+100M)
FORMULA LINES
Distance
Formula Line
(FOS+60M)
Gardiner Line
(Sediment 1%)
Formulae Line
(Distance & Gardiner)
PRELIMINARY OUTER LIMIT
Formulae & Constraint (Landward)
OUTER LIMIT EVALUATION
(Review of Initial Results)
FINAL OUTER LIMIT
SURVEY PLANNING & PRELIMINARY
SUBMISSION COMPILATION
ARTICLE 76:
Law of the Sea

PRACTICAL BACKGROUND : THE FORMULAE LINE

(Some suggested useful Data Sources)

ARTICLE 76 :
Law of the Sea

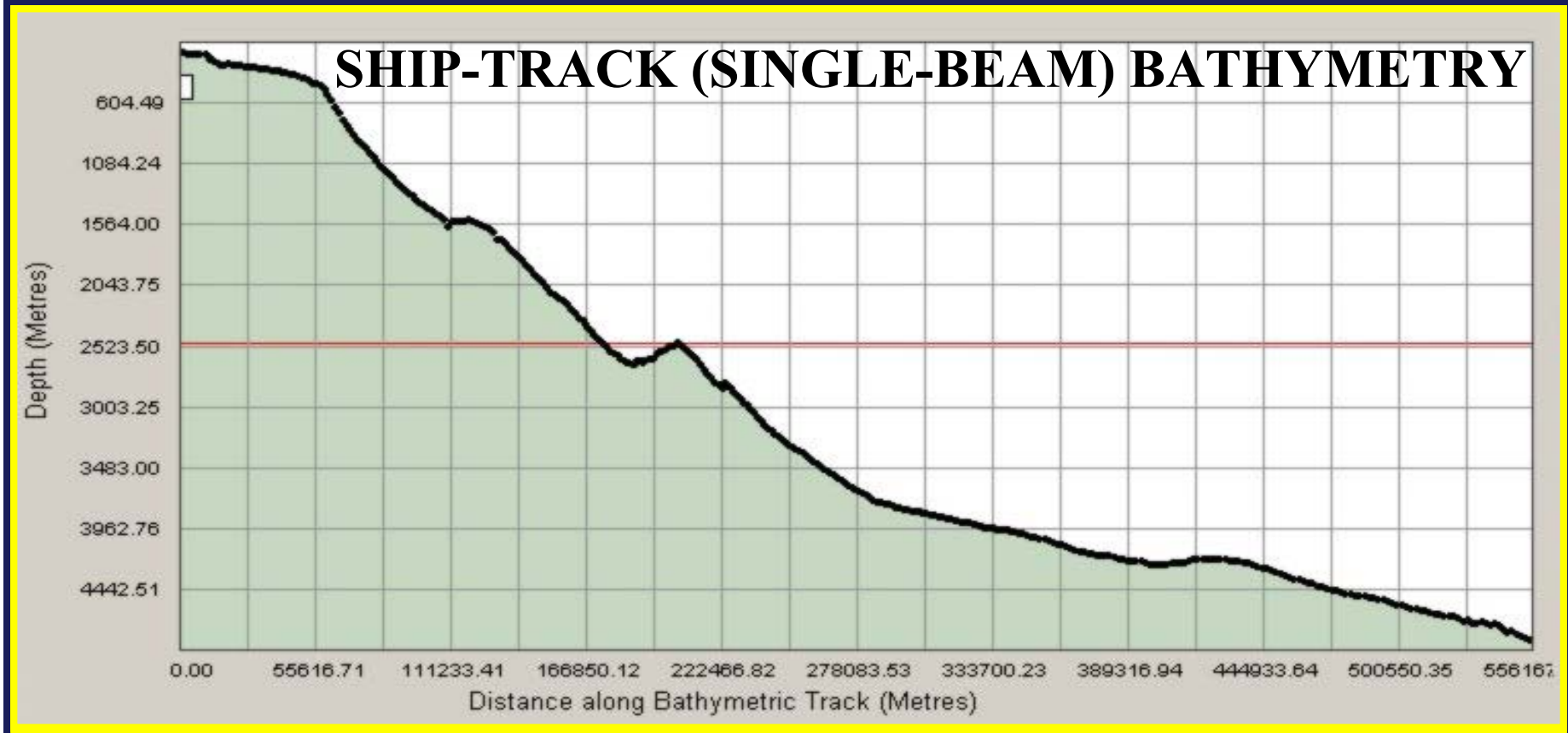
THE IDEALIZED CROSS-SECTION OF THE CONTINENTAL SHELF



ARTICLE 76 :
Law of the Sea

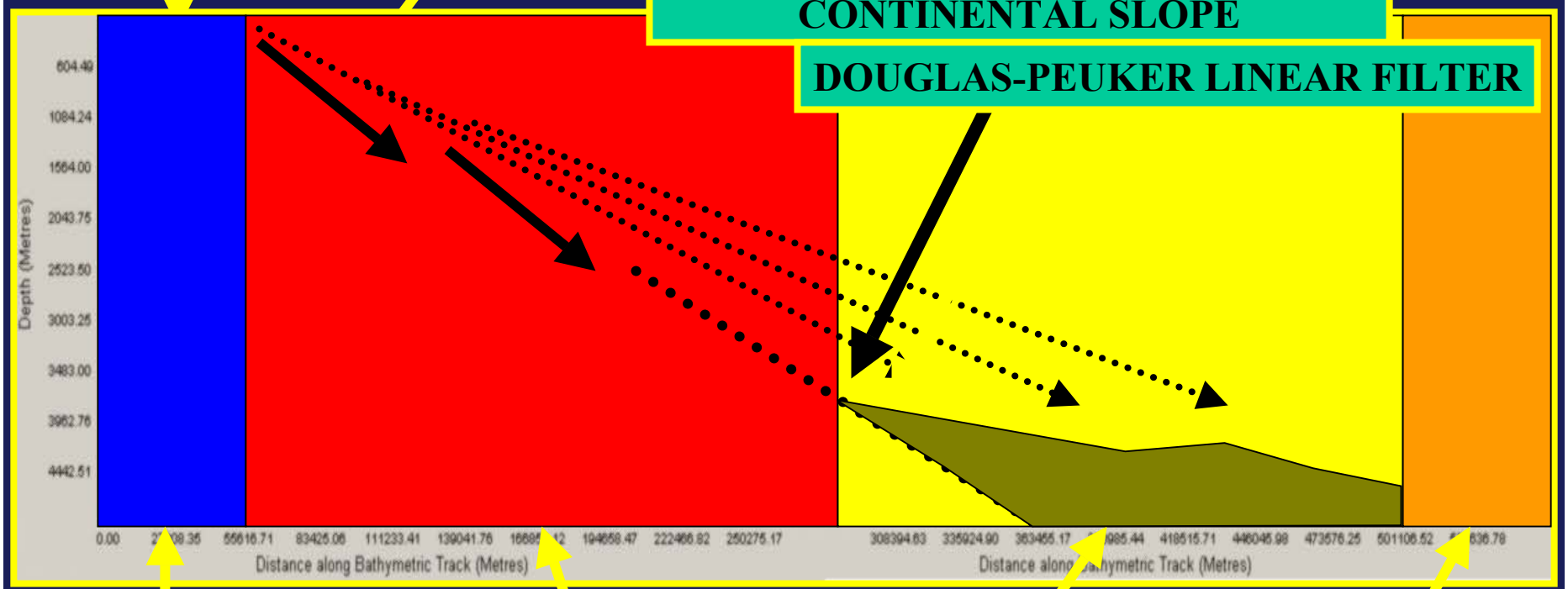
SOUTH AFRICAN BATHYMETRIC CROSS-SECTION

[ETOPO5 vs ETOPO2 vs 2MIN vs GEBCO1 vs SHIP-TRACKS]



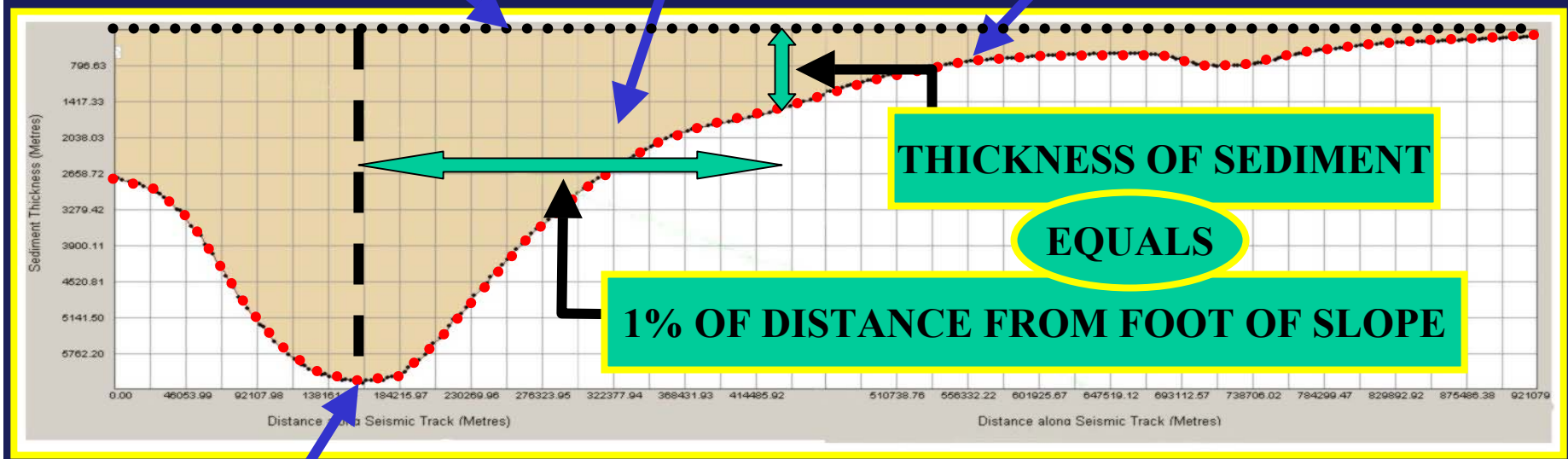
ARTICLE 76 :
Law of the Sea

CONTINENTAL MARGIN (MORPHOLOGIC CROSS-SECTION)



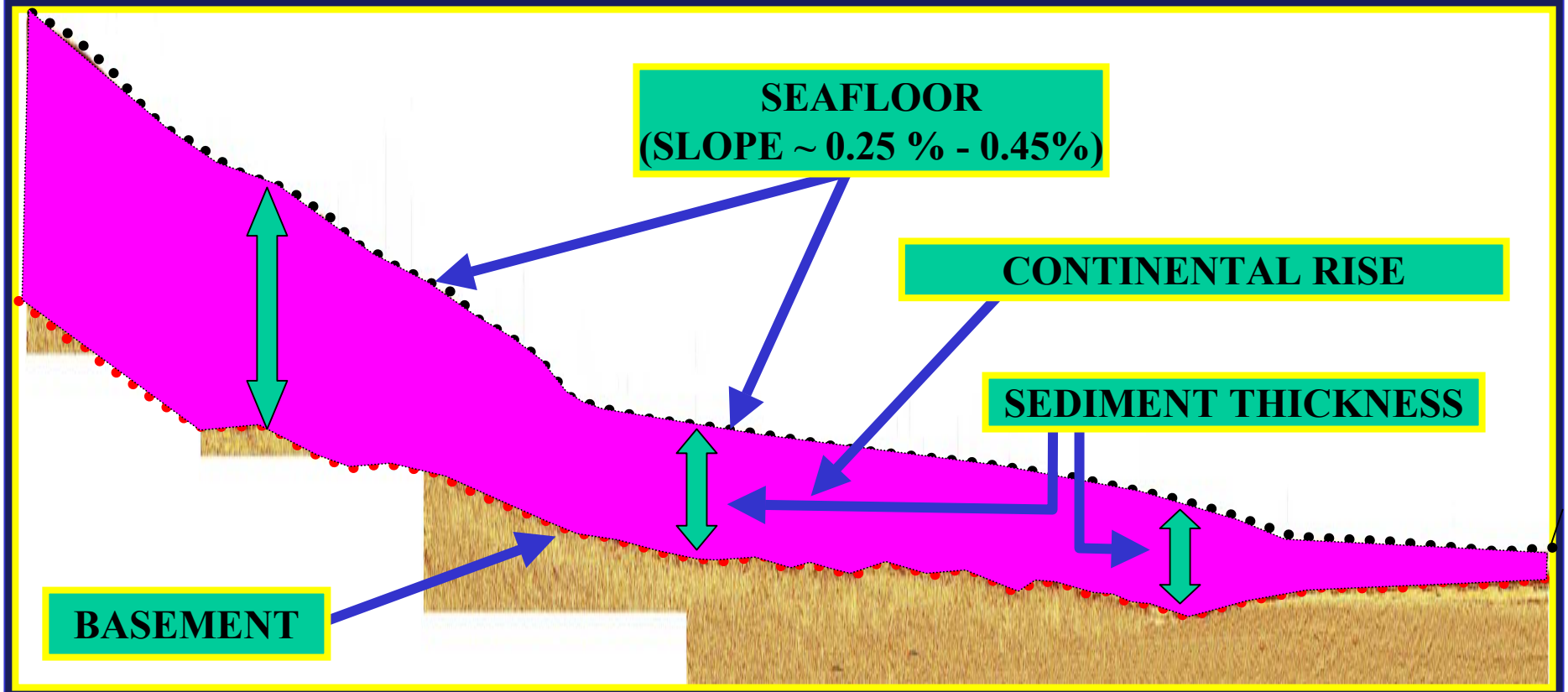
ARTICLE 76 :
Law of the Sea

CONTINENTAL RISE (SEDIMENT CROSS-SECTION)



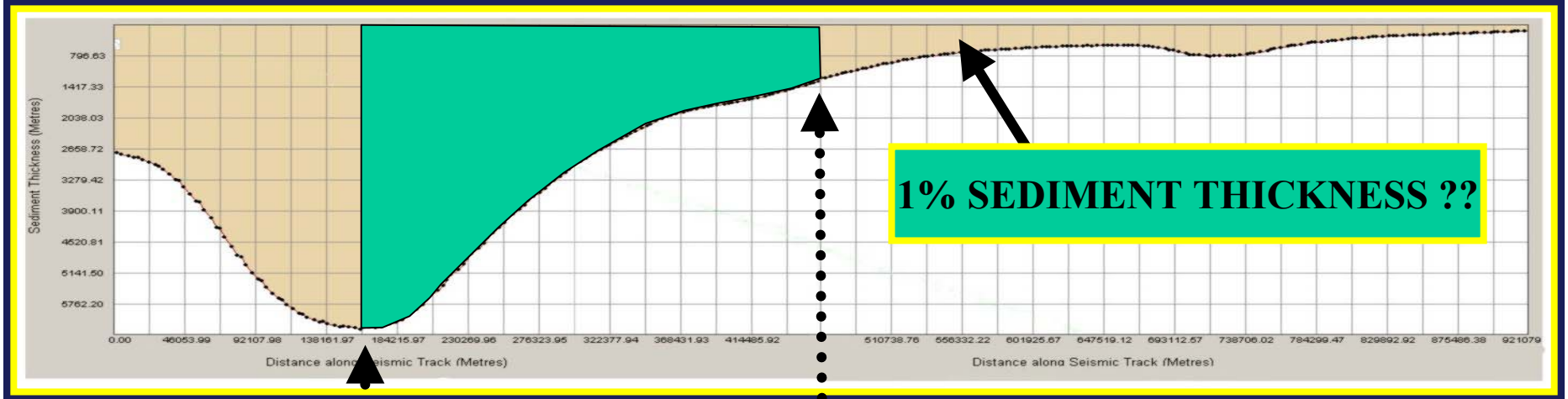
ARTICLE 76 :
Law of the Sea

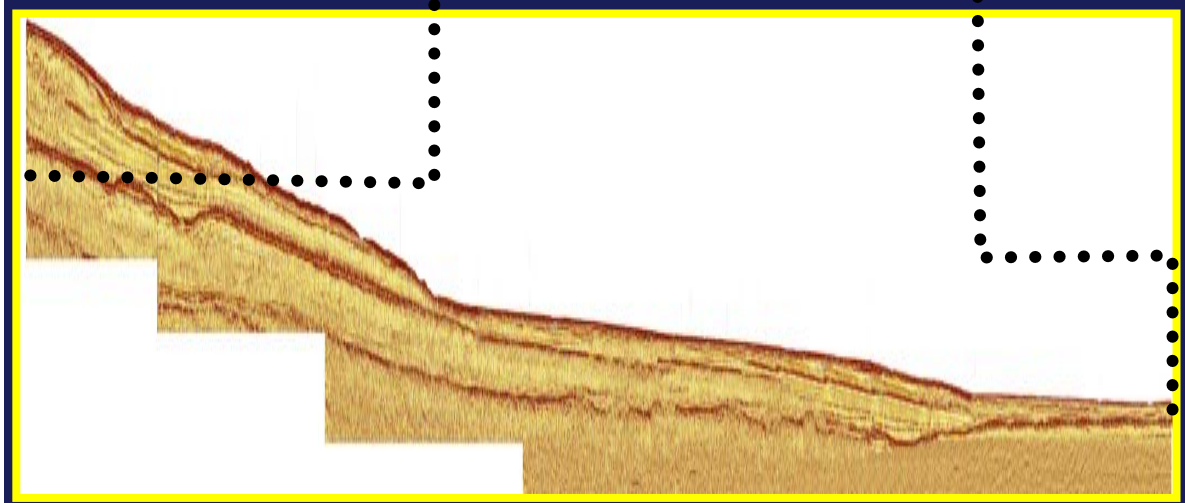
WEST AFRICAN SEISMIC SECTION (SEG-Y FORMAT)



ARTICLE 76 :
Law of the Sea

SEISMIC SECTION vs PUBLIC DOMAIN SEDIMENT THICKNESS DATA





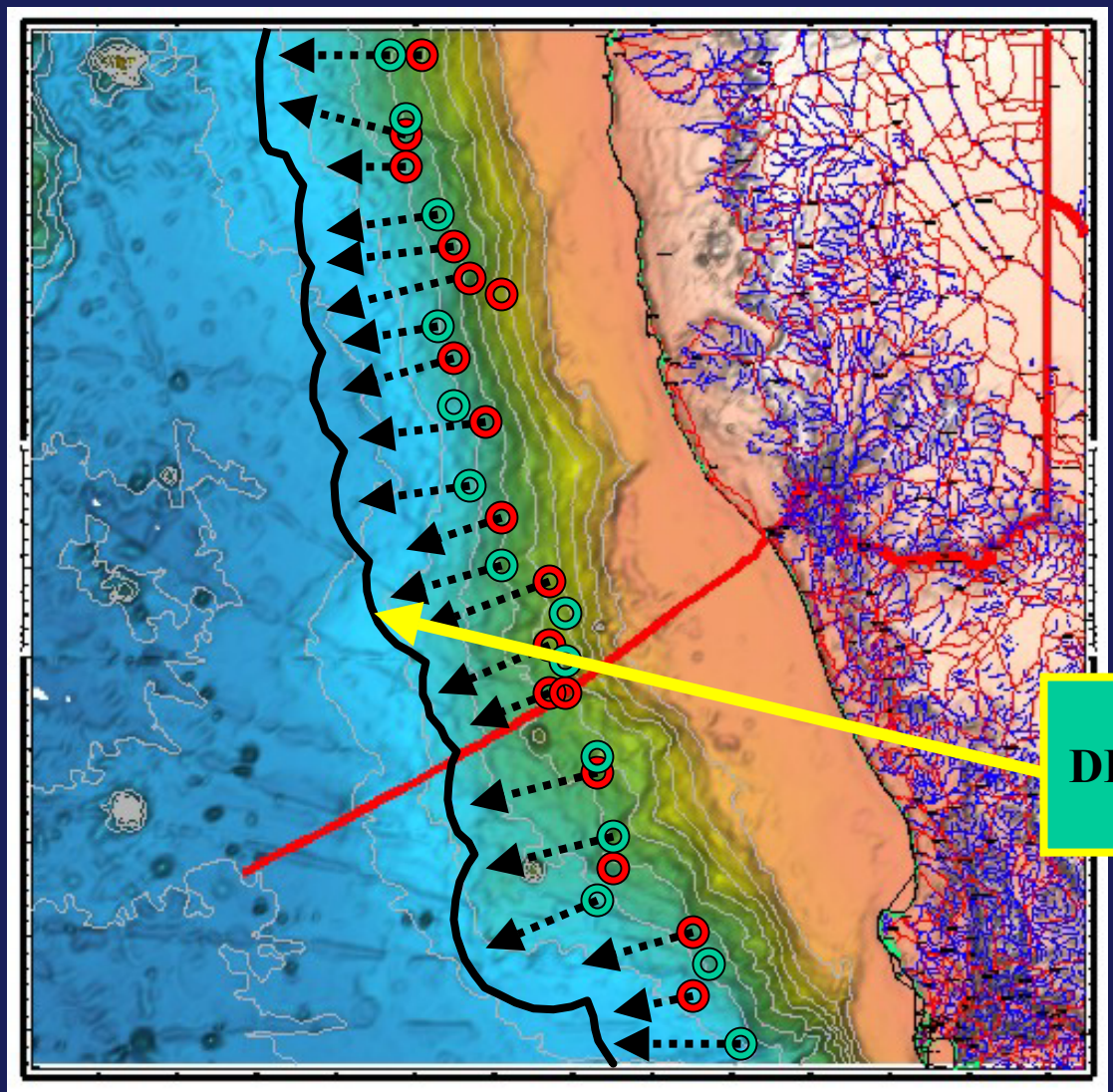
SEDIMENT THICKNESS IS STILL GREATER THAN 1% DISTANCE BACK TO THE FOOT OF THE SLOPE

ARTICLE 76 :
Law of the Sea

PROCEDURAL OVERVIEW : THE FORMULAE LINE

ARTICLE 76 :
Law of the Sea

FORMULAE LINE



PART I;

Distance Formula Line

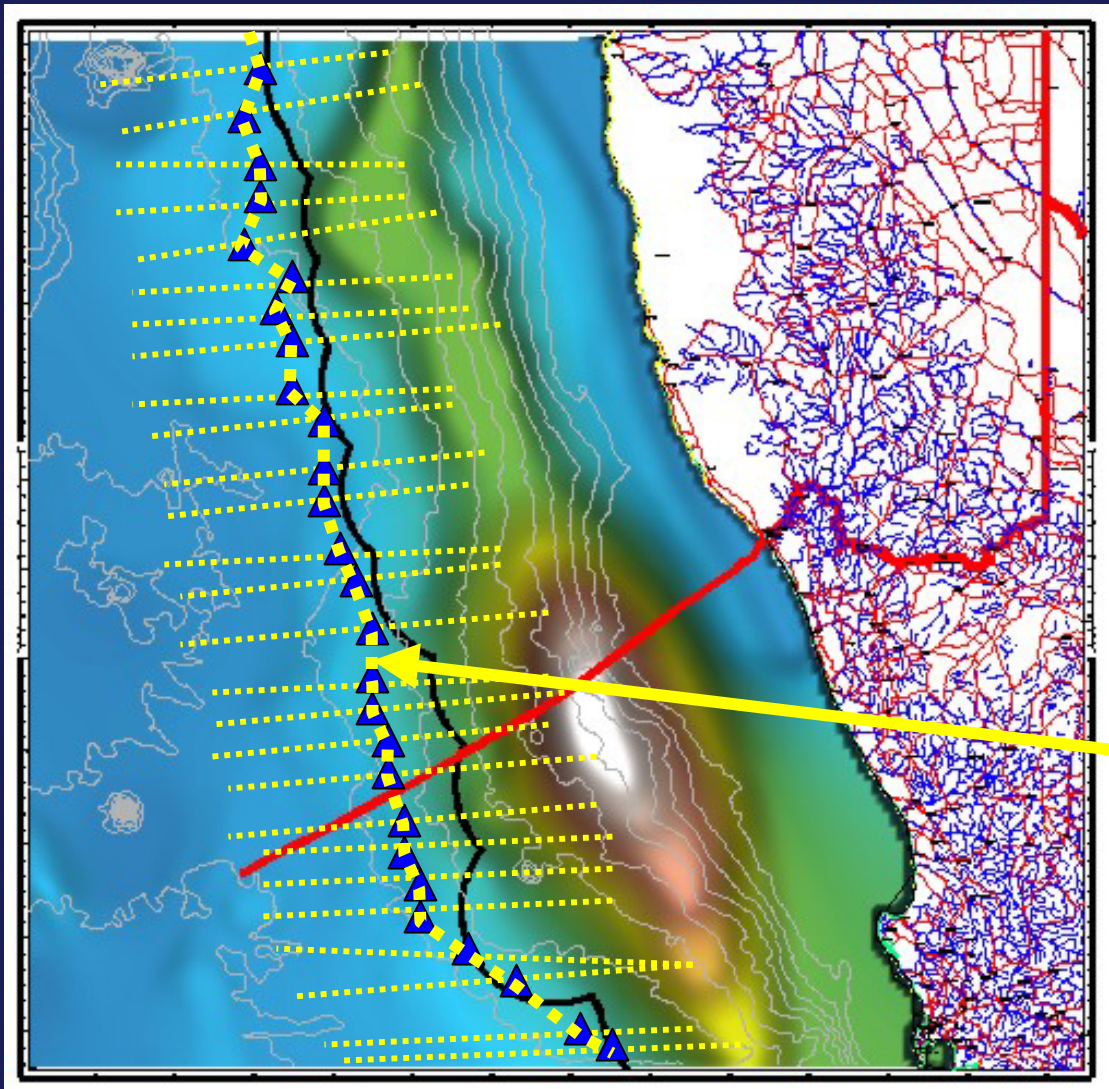
(Foot of the Slope + 60M)

Select individual FOS Markers to be used to Produce the Distance Formula Line

(Using Hierarchy Logical Selection of most accurate FOS Markers)

ARTICLE 76 : Law of the Sea

FORMULAE LINE



PART II;

Gardiner Formula Line

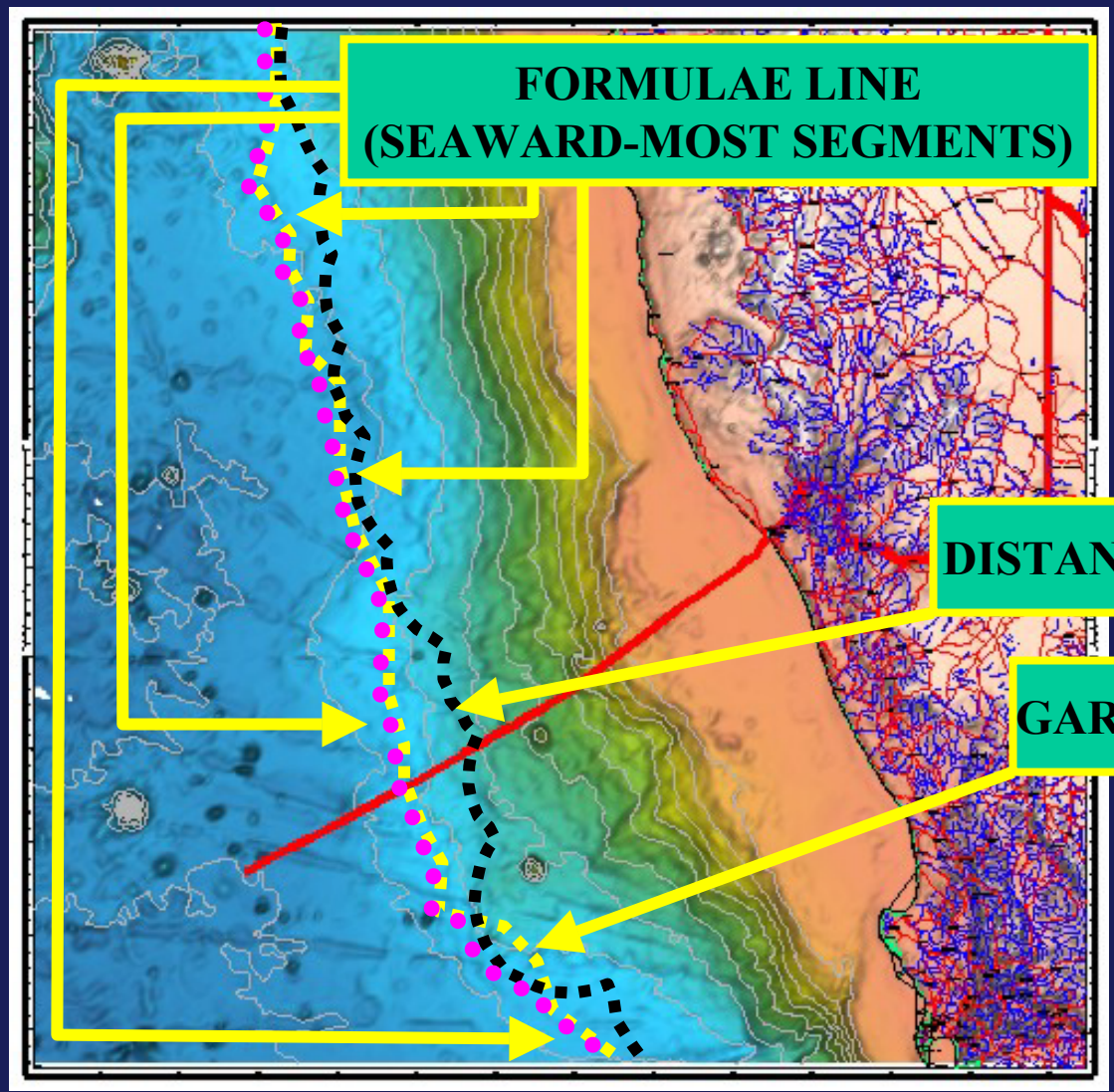
(Sediment 1% Line)

Connect the Sediment 1% markers together to create the Gardiner Line

GARDINER (SEDIMENT 1%) FORMULA LINE

ARTICLE 76 : Law of the Sea

FORMULAE LINE



PART III;

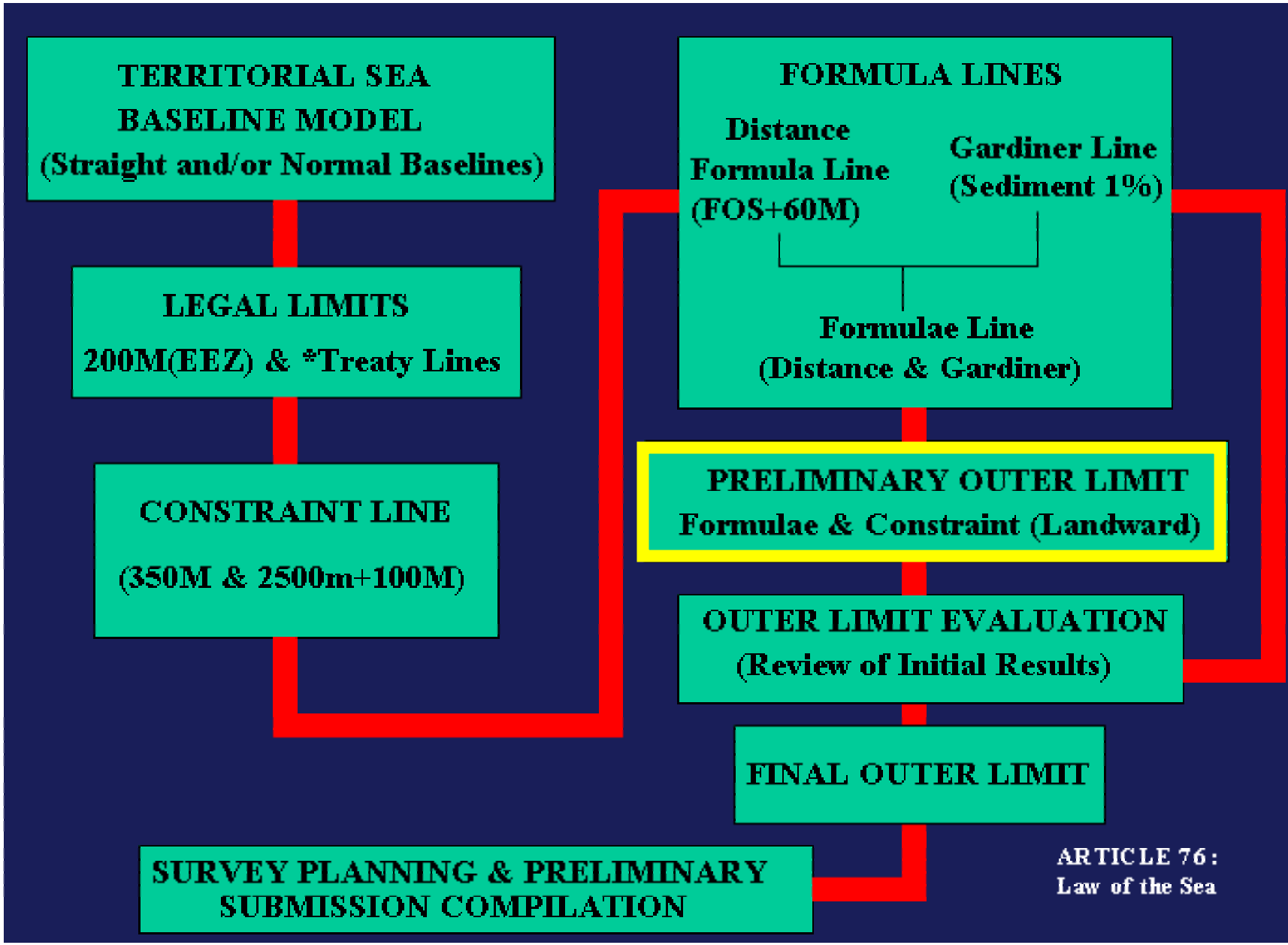
FORMULAE LINE

(Seaward most segments of the combined results of Part I (Distance Formula Line) and of Part II (Gardiner Formula Line)

ARTICLE 76 :
Law of the Sea

PROCEDURAL OVERVIEW :
THE PRELIMINARY OUTER LIMIT

ARTICLE 76 :
Law of the Sea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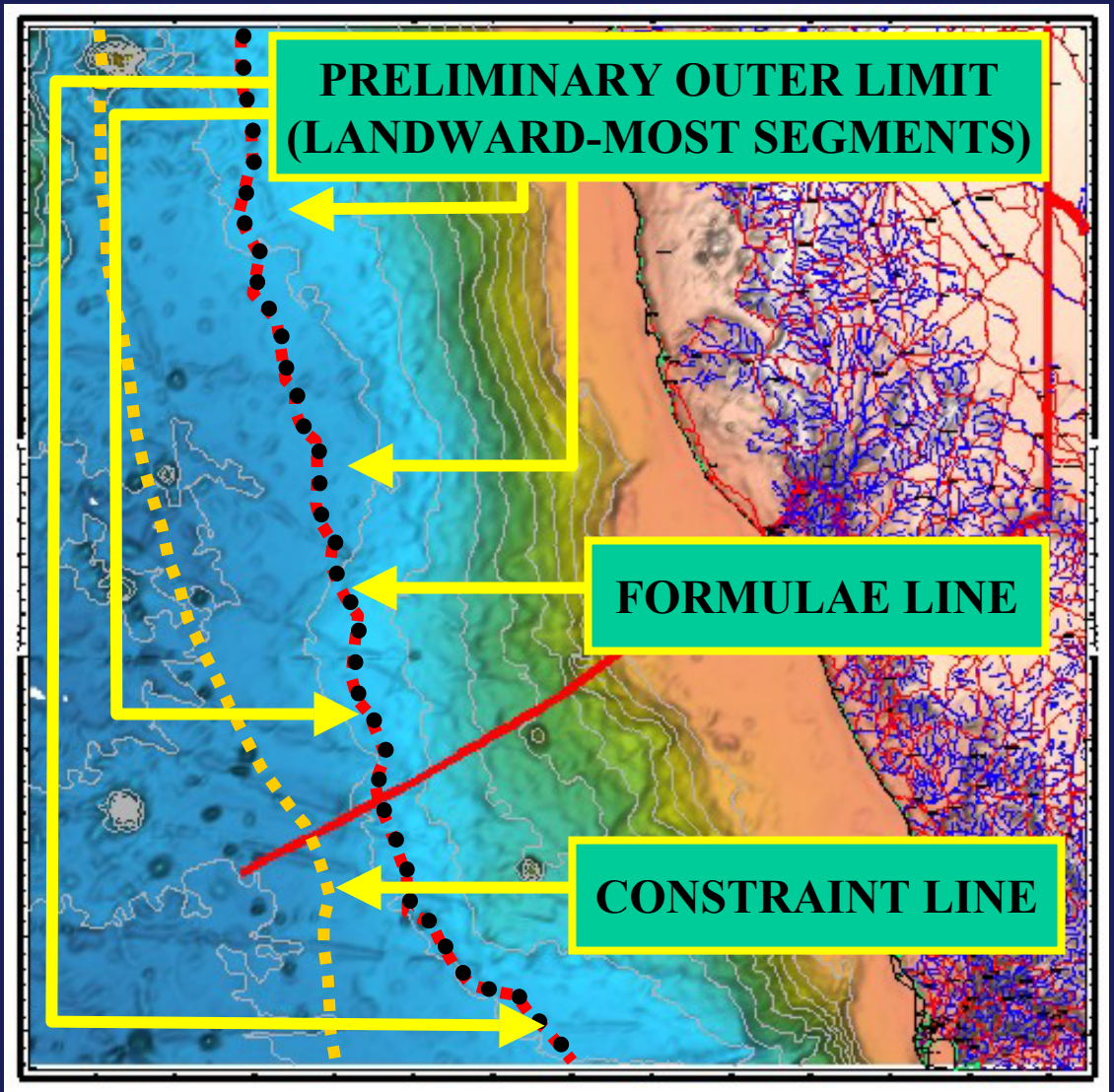
(Review of Initial Results)
FINAL OUTER LIMIT
SURVEY PLANNING & PRELIMINARY
SUBMISSION COMPILATION
ARTICLE 76:
Law of the Sea

PRELIMINARY OUTER LIMIT



PART I:

Constraint Line

(350M & 2500m plus 100M)

PART II:

Formulae Line

(Distance & Gardiner Lines)

PART III:

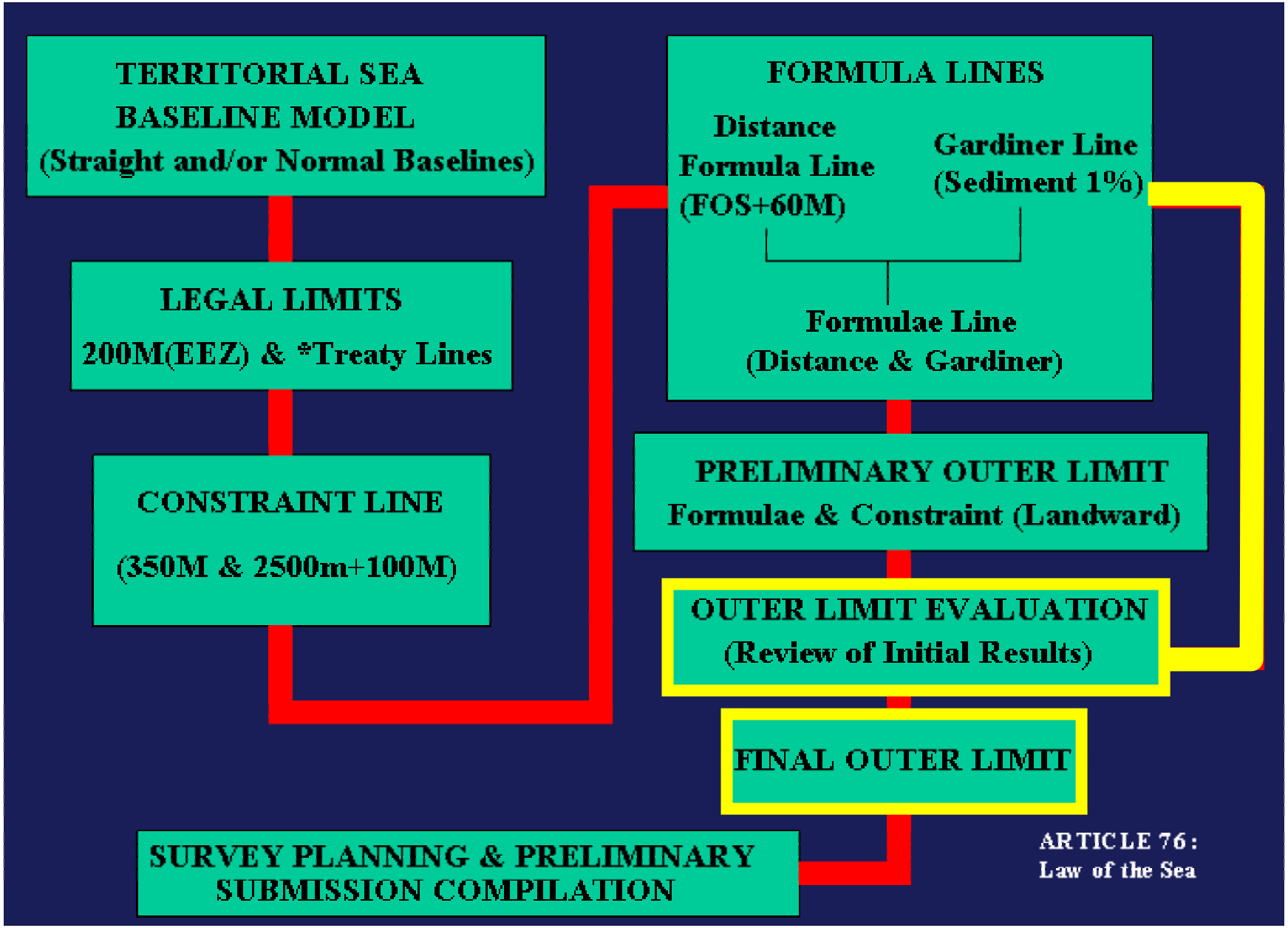
Preliminary Outer Limit

(Using Landward-most results of I & II)

ARTICLE 76 :
Law of the Sea

PROCEDURAL OVERVIEW :
EVALUATION AND THE FINAL OUTER LIMIT

ARTICLE 76 :
Law of the Sea


TERRITORIAL SEA
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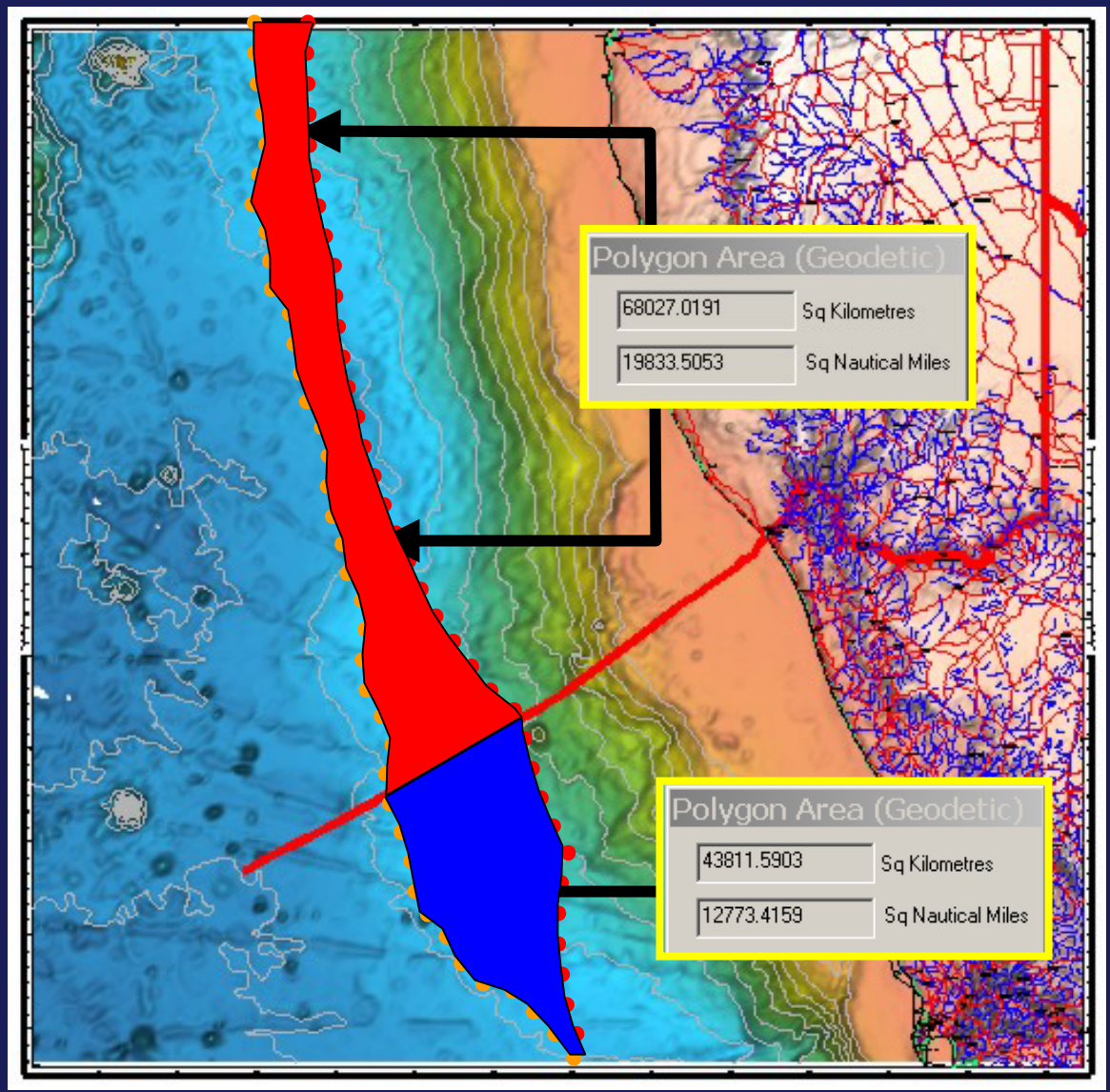
SUBMISSION COMPILATION
ARTICLE 76:
Law of the Sea

FINAL OUTER LIMIT



200M (EEZ)

Final Outer Limit

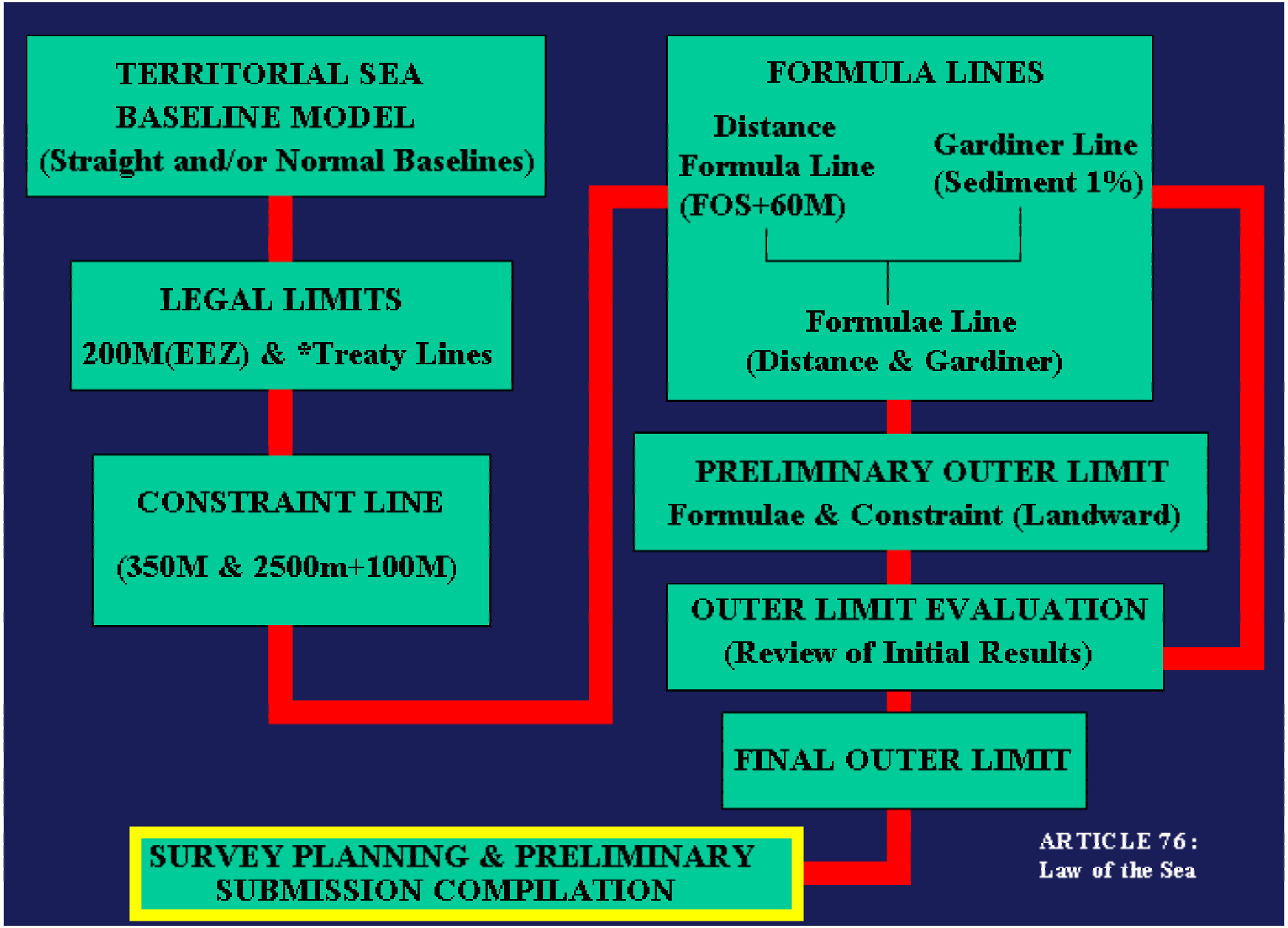
Potential Area (Northern Region)

Potential Area (Southern Region)

ARTICLE 76 : Law of the Sea

PROCEDURAL OVERVIEW : SURVEY PLANNING

ARTICLE 76 :
Law of the Sea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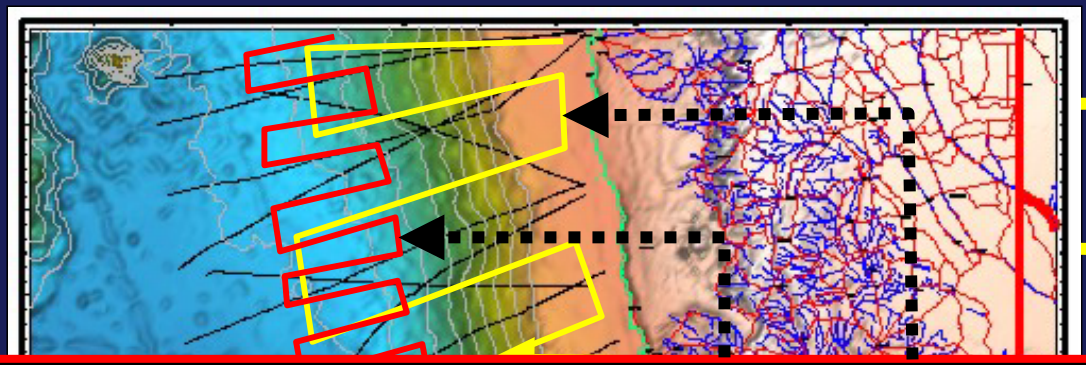
SURVEY PLANNING & PRELIMINARY
SUBMISSION COMPILATION
ARTICLE 76:
Law of the Sea

PROPOSED SURVEY PLANNING



Proposed Survey Area

(Based on Desktop Study Results)

Projected Bathymetric & Seismic Survey Costs: (Data Processing Costs not Included)

- **4650M Single-Beam Bathymetric Survey (based on Desktop Study Results)**
- **3875M Seismic Survey (based on Desktop Study Results)**
- **31 Days Bathymetric Survey & 31 Days Seismic Survey Estimates (based on 150M/day Bathymetric & 125M/day Seismic survey rates)**
- **Survey Costs:**
  - **US$ 387,500.00 – Bathymetric Survey (based on US$12,500.00/day Single-Beam)**
  - **US$ 837,000.00 – Seismic Survey (based on US$27,000.00/day Seismic)**
  - **US$ 50,000.00 – Mobilization / Demobilization**

    (based on 5-day travel from Cape Town, South Africa)

-TOTAL : US$ 1,274,500.00

CONCLUSIONS

- **For Every Coastal State wishing to complete the UNCLOS Article 76 submission … it is and will be a complex and costly procedure …**

  … upon completion of the Coastal States' Desktop Study, these produced results will not only give a good initial indication of the expected results of the final Article 76 submission, but also, projected project costs can be made for the proposed surveys to be carried out for the collection of the required additional data sources.

- **The compilation of the Desktop Study will follow the same steps and procedures needed for the Completion of the Final Submission to be presented to the United Nations**

- **Currently Available Data Sources can produce very good Initial results for Any Coastal States UNCLOS Article 76 submission around the world**

- **Overall Project Costs to the Coastal State should be kept at a Minimum upon the successful completion of the Desktop Study**

ARTICLE 76 :
Law of the Sea

Thank You

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Marine Division
CARIS CANADA

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ARTICLE 76 :
Law of the Sea