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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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

ARTICLE 76:
Law of the Sea
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
ARTICLE 76: Law of the Sea

Landward portion of Formulae Line and Constraint Line

= “Final Outer Limit”

Formulae Line

Distance Line

Constraint Line

Gardiner Line

Foot of slope (max. change gradient)

Territorial Sea Baseline (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]
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).
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**
A COASTAL STATES’ TEST OF APPURTENANCE
Test of Appurtenance
Test of Appurtenance
Test of Appurtenance

FOS Profile Line

ARTICLE 76:
Law of the Sea
Test of Appurtenance

Continental Shelf
Foot of Continental Slope (FOS)
Continental Rise
Abyssal Plain

ARTICLE 76:
Law of the Sea
Test of Appurtenance

FOS Marker
Test of Appurtenance

FOS Marker

Sediment Profile Line

ARTICLE 76:
Law of the Sea
Test of Appurtenance

Sediment 1% Marker

Continental Rise

Foot of Continental Slope (FOS)

ARTICLE 76:
Law of the Sea
Test of Appurtenance

Sediment 1% Marker even further beyond 200M EEZ Line

60M Radius
ARTICLE 76: Law of the Sea

Test of Appurtenance

200M Position

Formulae (Outer Limit) Position
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 Treated Points

Specific Desktop Study Applications:
i) Maritime Treaty Lines
(for neighbouring and/or opposing Coastal States)
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)
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
ARTICLE 76:
Law of the Sea

SOUTH-WESTERN AFRICA
GENERAL OVERVIEW OF THE REQUIRED PROCEDURES TO BE FOLLOWED IN COMPLETING THE DESKTOP STUDY
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)
SPECIFIC DATA SOURCES TO CONSIDER WHEN CONSTRUCTING THE TERRITORIAL SEA BASELINE MODEL
IMPORT COASTAL STATES’ EXISTING ASCII DATA
ARTICLE 76: Law of the Sea

RASTER NAUTICAL CHARTS

PAPER NAUTICAL CHARTS
PROCEDURAL OVERVIEW : LEGAL LIMITS
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
LEGAL LIMIT LINES

200M (EEZ):
(Using Territorial Sea Baseline Model)

Provisional “Hypothetical” Treaty Lines:
(Using Territorial Sea Baseline Model)
PROCEDURAL OVERVIEW : THE CONSTRAINT LINE
ARTICLE 76: Law of the Sea

TERRITORIAL SEA BASELINE MODEL
(Straight and/or Normal Baselines)

LEGAL LIMITS
200M(EEZ) & *Treaty Lines

CONSTRANT 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

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)
PROCEDURAL OVERVIEW : THE FORMULAE LINE
PRACTICAL BACKGROUND : THE FORMULAE LINE

(Some suggested useful Data Sources)
THE IDEALIZED CROSS-SECTION OF THE CONTINENTAL SHELF
SOUTH AFRICAN BATHYMETRIC CROSS-SECTION

[ETOP05 vs ETOPO2 vs 2MIN vs GEBCO1 vs SHIP-TRACKS]

SHIP-TRACK (SINGLE-BEAM) BATHYMETRY
CONTINENTAL MARGIN
(MORPHOLOGIC CROSS-SECTION)

CONTINENTAL SHELF
CONTINENTAL SLOPE
CONTINENTAL RISE
ABYSSAL PLAIN

MORPHOLOGICAL FOOT OF THE CONTINENTAL SLOPE
DOUGLAS-PEUKER LINEAR FILTER

ARTICLE 76 :
Law of the Sea
CONTINENTAL RISE (SEDIMENT CROSS-SECTION)

SEAFLOOR

CONTINENTAL RISE

BASEMENT (Bedrock)

THICKNESS OF SEDIMENT EQUALS 1% OF DISTANCE FROM FOOT OF SLOPE

FOOT OF SLOPE

ARTICLE 76:
Law of the Sea
WAVES
(SLOPE ~ 0.25 % - 0.45%)

CONTINENTAL RISE

SEDIMENT THICKNESS

BASEMENT

ARTICLE 76:
Law of the Sea
SEISMIC SECTION vs PUBLIC DOMAIN

SEDIMENT THICKNESS DATA

1% SEDIMENT THICKNESS ??

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

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)
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
ARTICLE 76:
Law of the Sea

PART III;
FORMULAE LINE
(Seaward most segments of the combined results of Part I (Distance Formula Line) and of Part II (Gardiner Formula Line))

DISTANCE FORMULA LINE
GARDINER FORMULA LINE

FORMULAE LINE (SEAWARD-MOST SEGMENTS)
PROCEDURAL OVERVIEW:
THE PRELIMINARY OUTER LIMIT
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)
- Formulae Line (Distance & Gardiner)
- Gardiner Line (Sediment 1%)

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
ARTICLE 76: Law of the Sea

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)
PROCEDURAL OVERVIEW:
EVALUATION AND THE FINAL OUTER LIMIT
ARTICLE 76:
Law of the Sea

FINAL OUTER LIMIT

200M (EEZ)

Final Outer Limit

Potential Area
(Northern Region)

Potential Area
(Southern Region)

Polygon Area (Geodetic)

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Polygon Area (Geodetic)

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PROCEDURAL OVERVIEW : SURVEY PLANNING
PROPOSED SURVEY PLANNING

Proposed Survey Area
(Based on Desktop Study Results)

Make use of Existing Single-Beam Bathymetric Survey Lines
(This is to be decided by Coastal State)

Proposed Bathymetric Single Beam Surveys

Proposed Seismic Surveys

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
Thank You

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