Reducing Contentious Issues of Baselines and Maritime Limits through the Use of an International Data Standards for the Submission of Law of the Sea Data

Serge LÉVESQUE
Cameron MCLEAY
Ottokarl BÜCHSENSCHÜTZ-NOTHDURFT

October 2010

caris

Outline

Introduction

Sources Of Uncertainties leading to Contentious Issues

Data Standards

Limitations & Extensions

Additional Benefits

Operational Challenges

Conclusions

6th ABLOS Conference, Monaco, October 25th – 27th, 2010

caris

Introduction

- Relevant UNCLOS Articles:
  - 16 – Charts and Lists of Geographic Coordinates (Part II)

  - 47 (47.8 & 47.9) – Archipelagic Baselines

  - 75 – Charts and Lists of Geographic Coordinates (Part V)

  - 84– Charts and Lists of Geographic Coordinates (Part VI)

caris

Sources of Uncertainties

- **Nautical Charts**
  - Paper charts
  - Infrequent updates
  - Insufficient scales
  - Different vendors
  - Contentious datums

- **List of Coordinates**
  - Discrepancies between different datums
  - No geodetic datum at all

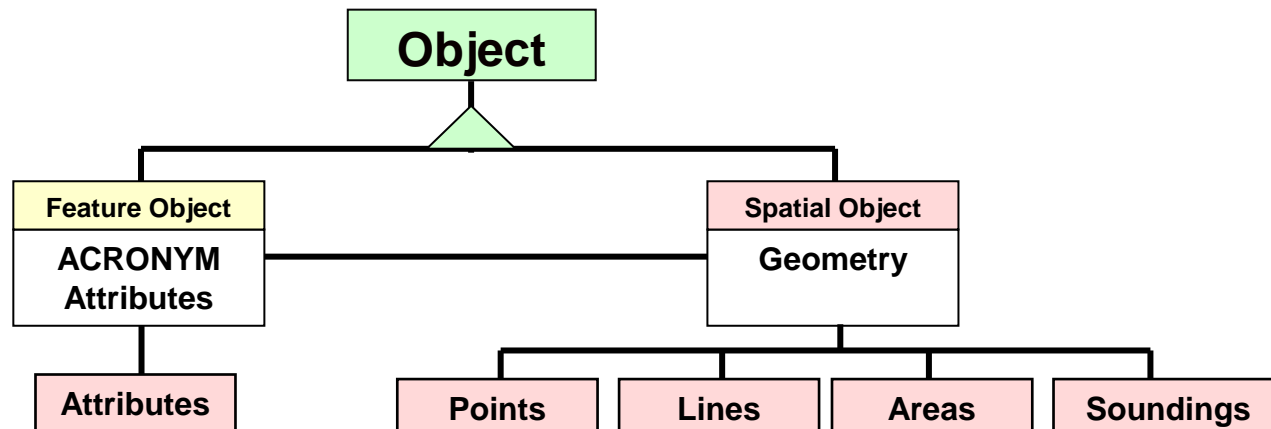**6th ABLOS Conference, Monaco, October 25th – 27th, 2010**

caris

Data Standards – Status & Benefits

- S-57
  - In use, development frozen
  - World wide recognition
  - ABLOS recommendation for ENC consideration as nautical chart
  - Intended for extension beyond ENCs, but hardly done
- S-100
  - Published January 2010
  - IHO Registry Extensions already planned as well

caris

S-57 Data Model

- Object oriented
- Stores real world entities as "objects" having a
  - "Feature object" component: descriptive information
  - "Spatial object" component: positional information

```
                        ┌──────────────┐
                        │    Object    │
                        └──────────────┘
                               △
            ┌──────────────────┴──────────────────┐
   ┌─────────────────┐                    ┌─────────────────┐
   │ Feature Object  │                    │ Spatial Object  │
   ├─────────────────┤────────────────────├─────────────────┤
   │    ACRONYM      │                    │    Geometry     │
   │   Attributes    │                    │                 │
   └─────────────────┘                    └─────────────────┘
            │                      ┌──────────┬──────┴────┬──────────┐
   ┌─────────────────┐        ┌────────┐ ┌───────┐ ┌───────┐ ┌───────────┐
   │   Attributes    │        │ Points │ │ Lines │ │ Areas │ │ Soundings │
   └─────────────────┘        └────────┘ └───────┘ └───────┘ └───────────┘
```

- Allows relationships between objects (master/slave, collection, associaton)

Limitations of S-57

- Limited object and attribute set for LOS

- Available geometries for LOS not ideal

Law of the Sea objects in S-57

- Line
  - STSLNE: Straight Territorial Sea Baseline

- Area
  - ADMARE: Administration Area
  - TESARE: Territorial Sea Area
  - CONZNE: Contiguous Zone (TS to 24 M)
  - EXEZNE: Exclusive Economic Zone (TS to 200 M)
  - FSHZNE: Fishery Zone
  - COSARE: Continental Shelf Area (TS to Outer Limit of the Continental Shelf)

caris

S-57 limitations due to Geometries

- Maritime Limits and Boundaries (MLB) are generated
  - with geodetic tools
  - as line objects
- Easier to maintain MLBs as line objects

→ Require new MLB objects and attributes

caris

Proposed Extensions and Modifications

- Modify some existing features and attributes

- New features and attributes

- Additional Geometries

Proposed catalogue extension for MLB objects

- Lines
  - Normal baselines
  - Straight baselines
  - Maritime Limits: 12M (Territorial Sea) 24 M (Contiguous Zone), 200 M (EEZ), Outer Limit of the Continental Shelf
  - Maritime Boundaries
  - Article 76 components: Formulae and Constraints

6th ABLOS Conference, Monaco, October 25th – 27th, 2010

caris

New proposed catalogue extension for MLB objects

- Points
  - Baseline points
  - Maritime Boundary points
  - Maritime Limits points
  - Foot of the slope markers
  - Sediment 1% markers
  - Outer continental shelf points
- Areas
  - Marine Areas such as JDAs, marine sanctuaries, environment protected areas, joint fishing zones, etc.

Proposed catalogue extension for law of the sea attributes

- New attributes to characterize legal and temporal aspects as well as link them to other functions of the database.

    - Categories of limits and boundaries
    - Data source
    - Legal source
    - Legal status
    - Date of change in legal status
    - National ownership or sharing of the limit or boundary
    - Source document, associated legal documents or reports
    - Nautical chart reference
    - Date of publication or entry into force
    - Dependence on other features in the database

caris

Example 1: Reworked existing object

strbln

Straight baseline. Part of the territorial sea baseline model. Can be straight baseline, archipelagic, bay closing, river mouth closing, historic bay closing or delta or dynamic coastal environment straight baseline

- Type: Line
- Defining attribute: category of straight baseline

The Defining attribute will control the display appearance of the object.

caris

Example 1: Newly proposed attribute for reworked existing object

catsbl

Category of straight baseline used in the territorial sea baseline model. Applies as defining attribute to the Straight Baseline object: **strbln**

1. Straight baseline
2. Archipelagic baseline
3. Bay closing line
4. Delta and unstable area baseline
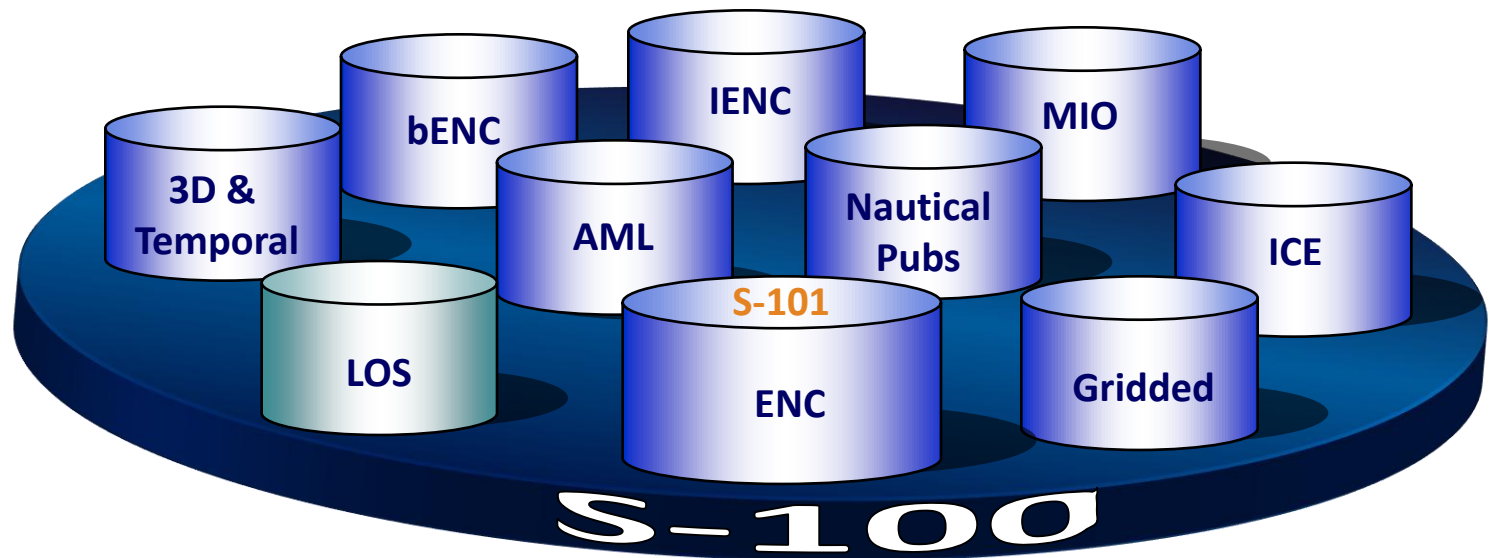5. Historic bay closing line
6. River mouth closing line

Type: Enumeration

caris

Example 2: Newly proposed attribute

catbas

Category of territorial sea baseline

1. normal baseline
2. straight baseline

Type: Enumeration

If the category of baseline is 2. straight baseline, then conditionally the attribute **catsbl** must also be populated with the type of straight baseline.

Example 2: Newly proposed object

basept

Territorial sea baseline model point.

- – Type: Point
- – Defining attribute: category of baseline
- – Will also have attributes to retain the original published values of the coordinates: **coorla** and **coorlo**
- – A base point can be uniquely named and identified. Straight baseline points are almost always named and identified.

Example new object & attribute

What standard to extend

- S-57 > Frozen
- S-100!

6th ABLOS Conference, Monaco, October 25th – 27th, 2010

Registries

- Operational Registry available (http://195.217.61.120/iho_registry/)

www.caris.com

caris

Additional Benefits to S-100 extension

- Open – can be integrated by others

- Faster updating of official nautical charts (BSH, 2008) or other nautical products with up-to-date maritime limits and boundaries

Ongoing Work

- DOALOS tasked by IHO to produce S-100 extension

- DOALOS attending IHO HSSC Meetings in 2009

- CARIS prototype catalogues available to DOALOS

caris

Technological Challenges

- Stand Alone applications in principle possible

- Database driven highly recommended
  - Benefit: seamless feature relationships and history tracking
  - Needs: Geodetic tools
    - Equidistant / Median Line
    - Envelope of Arcs from normal points & straight baselines
    - Wagon Wheel Filter
    - Legal Bay Closing Evaluation
    - Geodetic Line Intersection
    - Interactive baseline tool

caris

Technological Challenges II

- MLB's lists: Joining points into lines
  - Loxodromes
  - Geodesics
  - Envelops of Arcs

- Points need nature of limit information

Conclusions

- Standards help to overcome contentious issues on coordinate publication

- S-100 seems the perfect basis

- Extensions are needed and should be discussed further by stakeholders

www.caris.com