**Table A3: Comparison of existing similar analyses to SBAs - cluster description**

|  |  |  |  |
| --- | --- | --- | --- |
| iA SBA Description | Global Seascapes (Harris et al., 2009) | GOODS (UNESCO, 2009/Watling, 2013) | EMU (Sayre et al., 2019) |
| SBA I: Oxic, POC flux influenced, mostly flat with regionally thick sediment cover sedimented, current influenced regions with low seasonal change | **Seascape 7**: ‘Abyssal, volcanic ridges and high, central rift zone, ridge flanks, microcontinents, cold’  **Seascape 4**: ‘Lower Bathyal, continental slope, steep, high [primary production], very thick sediment, warm’ | **LBP[[1]](#footnote-1)2**: Northern North Atlantic, from the Iceland-Faroe Ridge in the north south along the Reykjanes Ridge, over the Newfoundland Seamounts and following the Western Boundary Undercurrent southward along the eastern slope of North America to off Cape Hatteras; | **EMU 29**: Deep, Very Cold, Normal Salinity, Moderate Oxygen, Medium Nitrate, Low Phosphate, Low Silicate; |
| SBA II: MAR spreading centre including abyssal ridges, trenches and continental slopes | **Seascape 2**: ‘Lower bathyal, deep shelf (submerged), marginal plateaus, very high [dissolved oxygen], high [primary productivity], thick sediment, warm’,  **Seascape 4**: ‘Lower Bathyal, continental slope, steep, high [primary production], very thick sediment, warm’,  **Seascape 5**: ‘Lower Bathyal, island arcs, steep, high [dissolved oxygen]’  **Seascape 9**: ‘Abyssal (hadal) trenched, controlled by fracture zones, deep water trenched, large arched uplifted structures, low [primary production], thin sediment, cold’ | **LBP4**: North Atlantic, extends southward along the Mid-Atlantic Ridge from the Reykjanes Ridge to approximately the equator, and along the eastern and western margins of the North Atlantic Ocean  including the Caribbean Sea and Gulf of Mexico; **LBP13**: South Atlantic, encompassing all of the South Atlantic from about the Equator to the Antarctic Convergence; | **EMU 13**: Deep, Very Cold, Normal Salinity, Low Oxygen, High Nitrate, Medium Phosphate, High Silicate (patchy); **EMU 14:** Deep, Very Cold, Normal Salinity, Moderate Oxygen, High Nitrate, Low Phosphate, High Silicate (South Atlantic); **EMU 36**: Deep, Very Cold, Normal Salinity, Moderate Oxygen, Medium Nitrate, Low Phosphate, Low Silicate; **EMU 37**: Deep, Very Cold, Normal Salinity, Moderate Oxygen, High Nitrate, Low Phosphate, Medium Silicate (South to Central Atlantic); |
| SBA III: Deep, cold, fresh & oxygen depleted abyssal plain with increased bottom current velocity | **Seascape 10**: ‘Abyssal, plains with slightly undulating seafloor, flat abyssal plains, continental rise, very flat, high [dissolved oxygen], low [primary production], very cold ’ | **AP[[2]](#footnote-2)2**: North Atlantic; including all areas north of the equator under the influence of North Atlantic Deep water;  **AP3**: Brazil Basin; extending south from the hump of Brazil bordering the Romanche Fracture to Sao Paulo;  **AP4**: Angola and Sierra Leone Basins; to the west of the Congo Fan in the North and limited by the Walvis Ridge to the SE and including the Namibia abyssal plain;  **AP5**: Argentine Basin; from Rio de la Plata to the Falkland Escarpment in the south;  **AP6**: East Antarctic Indian, which includes the areas where very cold bottom water flows into Namibia, Cape, Agulhas, Natal, and Crozet and South Indian Basins; | **EMU 14:** Deep, Very Cold, Normal Salinity, Moderate Oxygen, High Nitrate, Low Phosphate, High Silicate (South Atlantic); **EMU 36**: Deep, Very Cold, Normal Salinity, Moderate Oxygen, Medium Nitrate, Low Phosphate, Low Silicate; **EMU 37**: Deep, Very Cold, Normal Salinity, Moderate Oxygen, High Nitrate, Low Phosphate, Medium Silicate (South to Central Atlantic); |
| SBA IV: Shallow, warm, nutrient-rich and saline deeper shelf zones with thick sediment cover, strong currents and strong local and seasonal changes | **Seascape 2**: ‘Lower bathyal, deep shelf (submerged), marginal plateaus, very high [dissolved oxygen], high [primary productivity], thick sediment, warm’ **Seascape 5**: ‘Lower Bathyal, island arcs, steep, high [dissolved oxygen]’ | **LBP2**: Northern North Atlantic, from the Iceland-Faroe Ridge in the north south along the Reykjanes Ridge, over the Newfoundland Seamounts and following the Western Boundary Undercurrent southward along the eastern slope of North America to off Cape Hatteras; **LBP13**: South Atlantic, encompassing all of the  South Atlantic from about the Equator to the Antarctic Convergence; | **EMU 10:** Mesopelagic, Cold, Euhaline, Severely Hypoxic, High Nitrate, Low Phosphate, Low Silicate  Common (Central Atlantic); **EMU 11**: Epipelagic, Moderate to Cool, Euhaline, Oxic, Low Nitrate, Low Phosphate, Low Silicate (North & South Atlantic); **EMU 21**: Shallow, Warm, Normal Salinity, Moderate Oxygen, Low Nitrate, Low Phosphate, Low Silicate (Central Atlantic); |
| SBA V: Small & regional, cold and fresh deep water influenced areas in North & South Atlantic at medium depth, with locally increased currents and current seasonal change | **Seascape 10**: ‘Abyssal, plains with slightly undulating seafloor, flat abyssal plains, continental rise, very flat, high [dissolved oxygen], low [primary production], very cold | North-Western part of **AP2**: North Atlantic; including all areas north of the equator under the influence of North Atlantic Deep water;  **AP6**: East Antarctic Indian, which includes the areas where very cold bottom water flows into Namibia, Cape, Agulhas, Natal, and Crozet and South Indian Basins;  Fractions of **LBP2**: Northern North Atlantic, from the Iceland-Faroe Ridge in the north south along the Reykjanes Ridge, over the Newfoundland Seamounts and following the Western Boundary Undercurrent southward along the eastern slope of North America to off Cape Hatteras; in North and South Atlantic: **LBP13**: South Atlantic, encompassing all of the South Atlantic from about the Equator to the Antarctic Convergence; | **EMU 29**: Deep, Very Cold, Normal Salinity, Moderate Oxygen, Medium Nitrate, Low Phosphate, Low Silicate (North Atlantic); **EMU 36**: Deep, Very Cold, Normal Salinity, Moderate Oxygen, Medium Nitrate, Low Phosphate, Low Silicate; **EMU 37**: Deep, Very Cold, Normal Salinity, Moderate Oxygen, High Nitrate, Low Phosphate, Medium Silicate (South to Central Atlantic) |
| SBA VI: Central deep Atlantic cool, nutrient-depleted area with very weak currents, covering some abyssal elevations and sinks | **Seascape 10:** ‘Abyssal, plains with slightly undulating seafloor, flat abyssal plains, continental rise, very flat, high [dissolved oxygen], low [primary production], very cold ’  **Seascape 6**: ‘Lower Bathyal (Abyssal-Hadal), deep water trenches, island arcs, tranches controlled by fracture zones, volcanic ridges and plateaus, very steep’  **Seascape 9**: ‘Abyssal (hadal) trenched, controlled by fracture zones, deep water trenched, large arched uplifted structures, low [primary production], thin sediment, cold’ | **AP2**: North Atlantic; including all areas north of the equator under the influence of North Atlantic Deep water;  South – Eastern Atlantic: **AP4**: Angola and Sierra Leone Basins; to the west of the Congo Fan in the North and limited by the Walvis Ridge to the SE and including the Namibia abyssal plain; | **EMU 36**: Deep, Very Cold, Normal Salinity, Moderate Oxygen, Medium Nitrate, Low Phosphate, Low Silicate; **EMU 37**: Deep, Very Cold, Normal Salinity, Moderate Oxygen, High Nitrate, Low Phosphate, Medium Silicate (South to Central Atlantic) |
| SBA VII: Small & regional, deep, flat, sedimented oxic region with strong currents and high seasonal current change | **Seascape 10**: ‘Abyssal, plains with slightly undulating seafloor, flat abyssal plains, continental rise, very flat, high [dissolved oxygen], low [primary production], very cold ’ | North American basin: **AP2**: North Atlantic; including all areas north of the equator under the influence of North Atlantic Deep water; | **EMU 36**: Deep, Very Cold, Normal Salinity, Moderate Oxygen, Medium Nitrate, Low Phosphate, Low Silicate (Central Atlantic); |
| SBA VIII: Wider region around MAR covering new seafloor, faults and fracture zones, with extremely low sediment cover, no currents, very low oxygen and temperature | **Seascape 7**: ‘Abyssal, volcanic ridges and high, central rift zone, ridge flanks, microcontinents, cold’ and **Seascape 5**: ‘Lower Bathyal, island arcs, steep, high [dissolved oxygen]’ and **Seascape 9**: ‘Abyssal (hadal) trenched, controlled by fracture zones, deep water trenched, large arched uplifted structures, low [primary production], thin sediment, cold’ | South of Argentina: **AP7**: West Antarctic, includes the Amundsen and Bellinghausen abyssal Plains in the region from the Ross Sea to the Antarctic Peninsula and north to the Antarctic-Pacific Ridge and the Southeast Pacific Basin;South & Central Atlantic: **AP2**: North Atlantic; including all areas north of the equator under the influence of North Atlantic Deep water;  **AP4**: Angola and Sierra Leone Basins; to the west of the Congo Fan in the North and limited by the Walvis Ridge to the SE and including the Namibia abyssal plain;  Central/North Atlantic: **LBP4**: North Atlantic, extends southward along the Mid-Atlantic Ridge from the Reykjanes Ridge to approximately the equator, and along the eastern and western margins of the North Atlantic Ocean  including the Caribbean Sea and Gulf of Mexico; | **EMU 36**: Deep, Very Cold, Normal Salinity, Moderate Oxygen, Medium Nitrate, Low Phosphate, Low Silicate (Central Atlantic); **EMU 37**: Deep, Very Cold, Normal Salinity, Moderate Oxygen, High Nitrate, Low Phosphate, Medium Silicate (South to Central Atlantic) |
| SBA IX: Oxic, POC flux influenced, mostly flat with regionally thick sediment cover sedimented, current influenced regions with low seasonal change | excluded | excluded | **EMU 11**: Shallow, Cool, Normal Salinity, Moderate Oxygen, Low Nitrate, Low Phosphate, Low Silicate  (South West and North East Atlantic); **EMU 21**: Shallow, Warm, Normal Salinity, Moderate Oxygen, Low Nitrate, Low Phosphate, Low Silicate (wider Central Atlantic); **EMU 24**: Epipelagic, Warm to Very Warm, Euhaline, Oxic, Low Nitrate, Low Phosphate, Low Silicate (Central Atlantic) |

**Table A4: Comparison of existing similar analyses to SBAs - methods**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **iA SBAs** | **Global Seascapes (Harris et al., 2008)** | **GOODS (UNESCO, 2009/Watling, 2013)** | **EMU (Sayre et al., 2019)** |
| **No. of clusters (in Atlantic basin)** | 9 | 8 | 12 [4 (lower bathyal: BY1,2,4,13); 5 (abyssal: AB2-6); 3 (hadal: HD8-10)] | 8 |
| **Classification method** | Unsupervised (mclust) | Unsupervised (ER-Mapper isoclass) | Hierarchical depth-dependant; Delphic (expert knowledge); | Unsupervised (KMeans) |
| **Depth level** | Benthic | Benthic | Pelagic; Benthic: upper & lower bathyal, abyssal, hadal; | Epipelagic, Mesopelagic, Benthopelagic, Abyssopelagic |
| **Model data resolution [°]** | 1/12 | 1/10 | - | 1/4 |
| **Input data/Source:** |  |  |  |  |
| **Depth** | SRTM15+V2 | ETOPO2 | ETOPO2; GEBCO 2003 | WOA depth intervals |
| **Slope** | v | v | - | - |
| **TPI** | v | - | - | - |
| **TRI** | v | - | - | - |
| **POC** | Lutz 2007 | - | Yool 2007 | - |
| **Phytoplankton** | CMEMS | - | - | - |
| **Sediment** | GLOBSED; Straume et al. 2019 | NGDC; Divins 1998 | NGDC; Divins 1998 | - |
| **Current Speed** | CMEMS | - | - | - |
| **Current Direction** | - | - | - | - |
| **Salinity** | CMEMS | - | WOA | WOA |
| **Temperature** | CMEMS | WOA | WOA | WOA |
| **Oxygen** | CMEMS | WOA | WOA | WOA |
| **Seasonality** | CMEMS | - | - | - |
| **Species** | - | - | several | - |
| **Else** | - | Primary Production (SeaWIFs), Sediment types (Davies & Gorsline 1976) | Seamounts (Kitchiman & Lai 2004), Hydrthermal vents (InterRidge and Cindy VanDover), Plate boundaries (PLATES, University of Texas), SST (NASA); Primary Productivity (OregonState University), Cold Water Coral Reefs (UNEP-WCMC), Global Ocean Current systems and gyres | Nitrate, Phosphate, Silicate (WOA) |

1. LBP: Lower Bathyal Province, as in UNESCO, 2009 [↑](#footnote-ref-1)
2. AP: Abyssal Province, as in UNESCO, 2009 [↑](#footnote-ref-2)