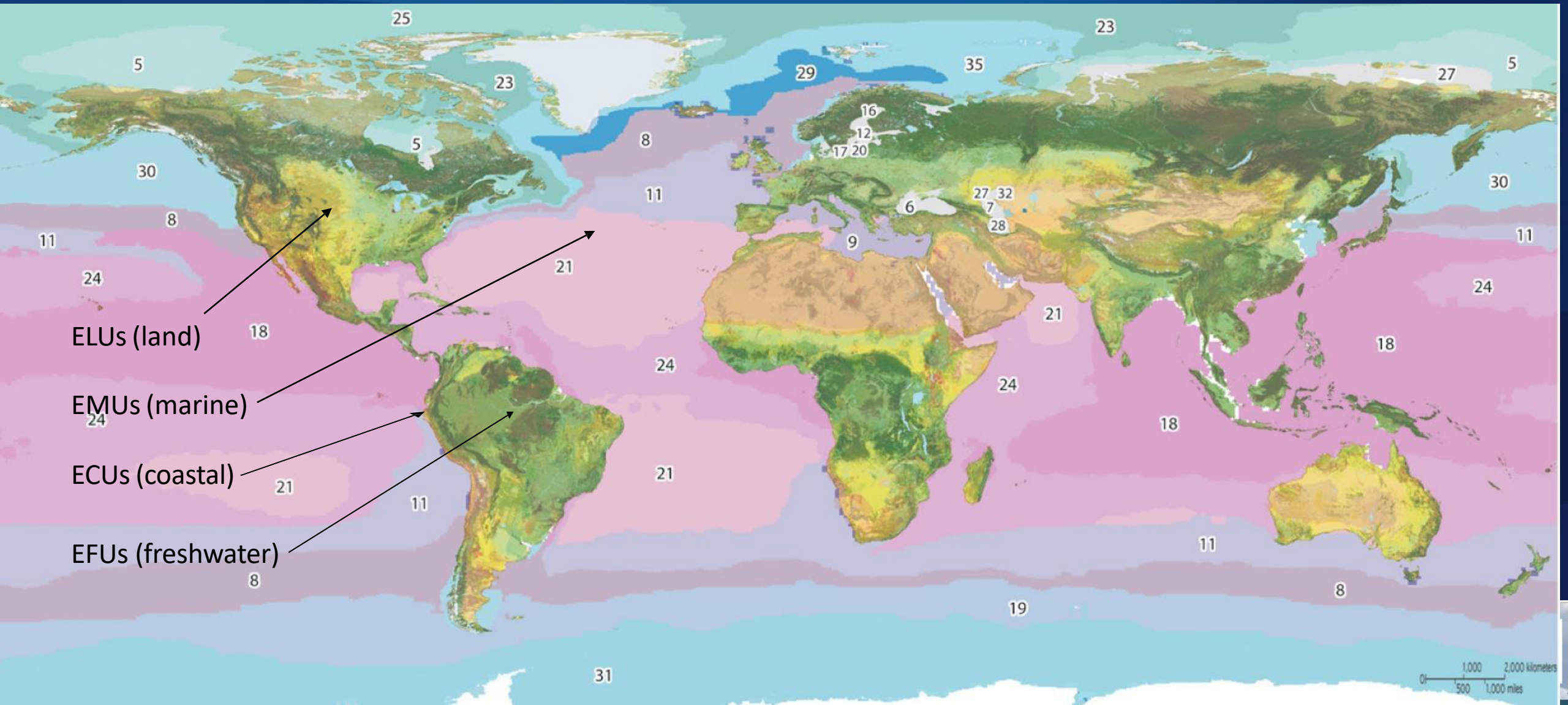
GEO Global Ecosystem Mapping Progress

Roger Sayre (U. S. Geological Survey); Dawn Wright, Sean Breyer, Charlie Frye, and others (Esri)

UN SEEA Experts Forum 18-20 June 2018 Glen Cove, New York



UN Sustainable Development Goals

The need to conserve global ecosystems is mandated in three UN SDGs (below). To conserve them requires knowing where they are on the landscape and in the oceans, and thus the need for global ecosystem mapping.

Terrestrial: By 2020, ensure the conservation, restoration and sustainable use of terrestrial and inland freshwater ecosystems and their services, in particular forests, wetlands, mountains and drylands. By 2030, ensure the conservation of mountain ecosystems, including their biodiversity, in order to enhance their capacity to provide benefits that are essential for sustainable development.

Freshwater: By 2020, protect and restore water-related ecosystems, including mountains, forests, wetlands, rivers, aquifers and lakes.

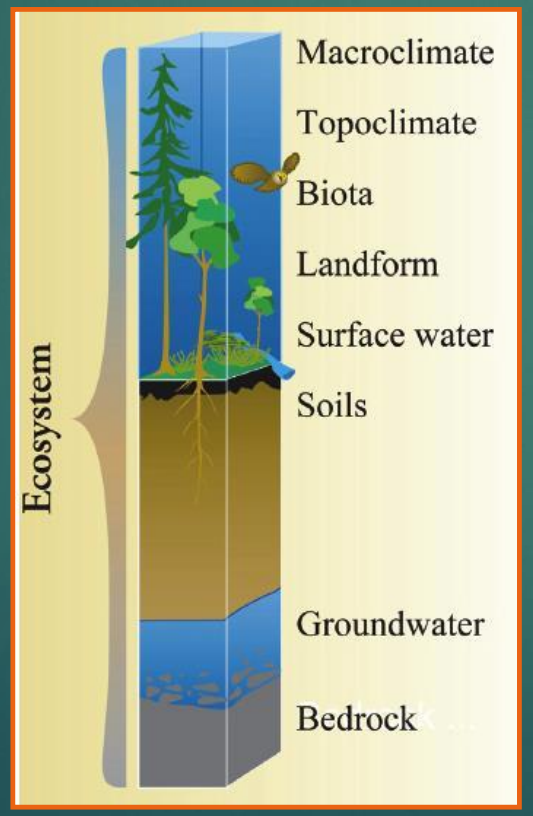
Marine: By 2020, sustainably manage and protect marine and coastal ecosystems to avoid significant adverse impacts, including by strengthening their resilience, and take action for their restoration in order to achieve healthy and productive oceans By 2020, conserve at least 10 per cent of coastal and marine areas, consistent with national and international law and based on the best available scientific information.

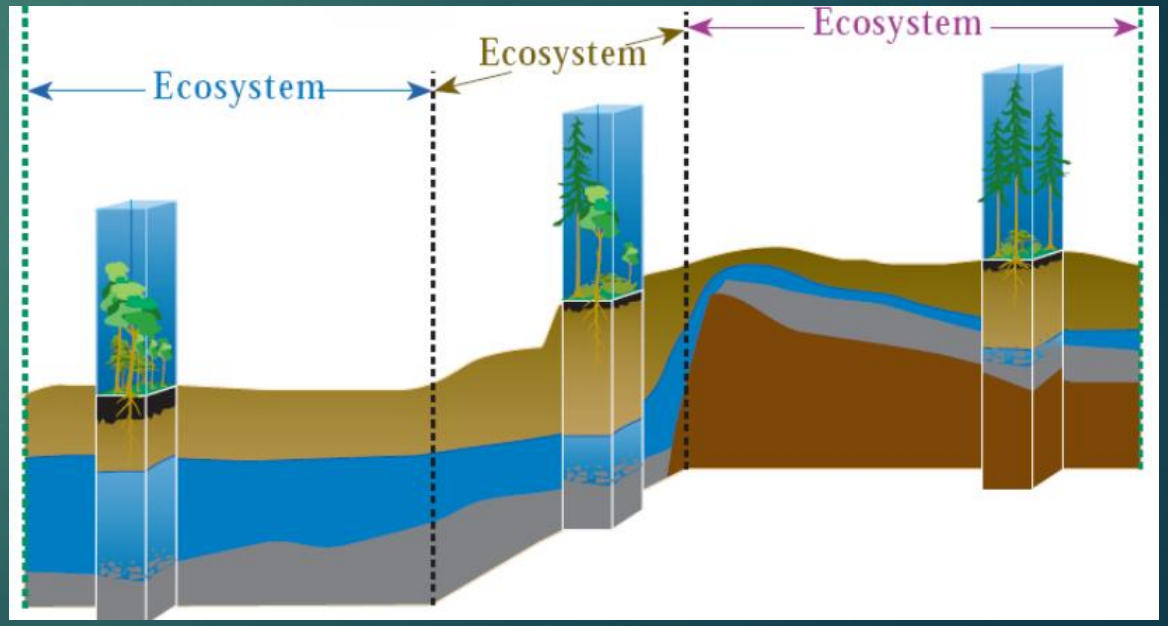
GEO ECOSYSTEMS Initiative: Global Ecosystem Mapping

Develop a standardized, robust, and practical global ecosystems classification and map for the planet's *terrestrial, freshwater,* and *marine* ecosystems.

What Are Ecosystems?

Odum (1953): Systems of biotic communities interacting with their environment.





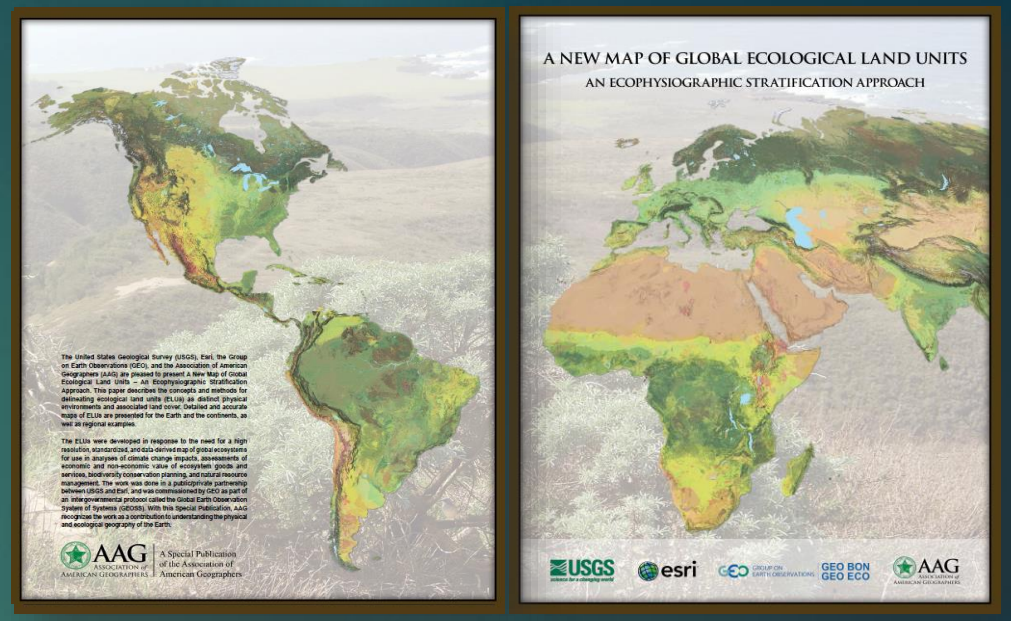
Global Ecological Land Units (ELUs)

Globally comprehensive

~4000 ELUs

Climate/Landform/Geology/Vegetation

250 m spatial resolution



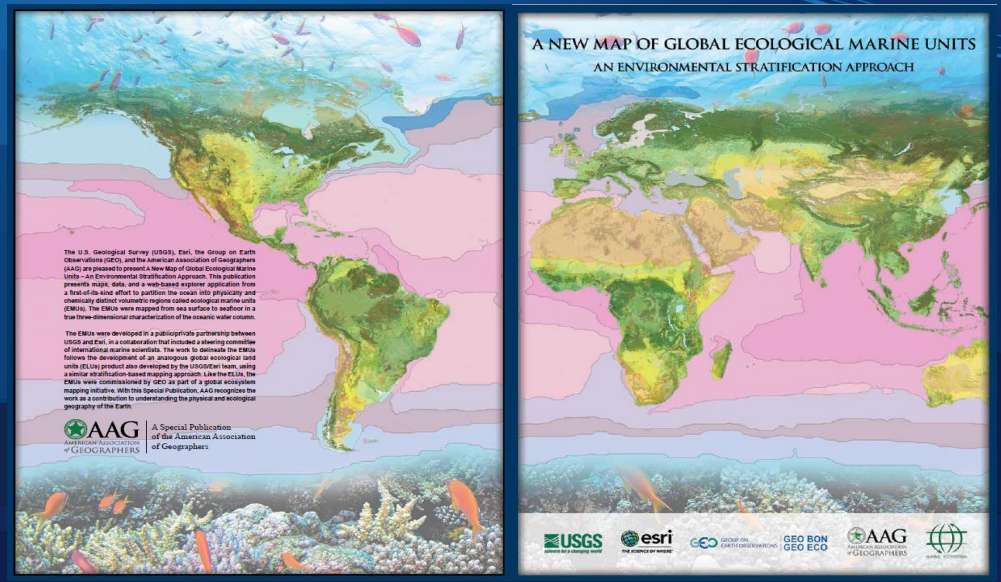
Global Ecological Marine Units (EMUs)

Globally comprehensive and true 3D

37 EMUs

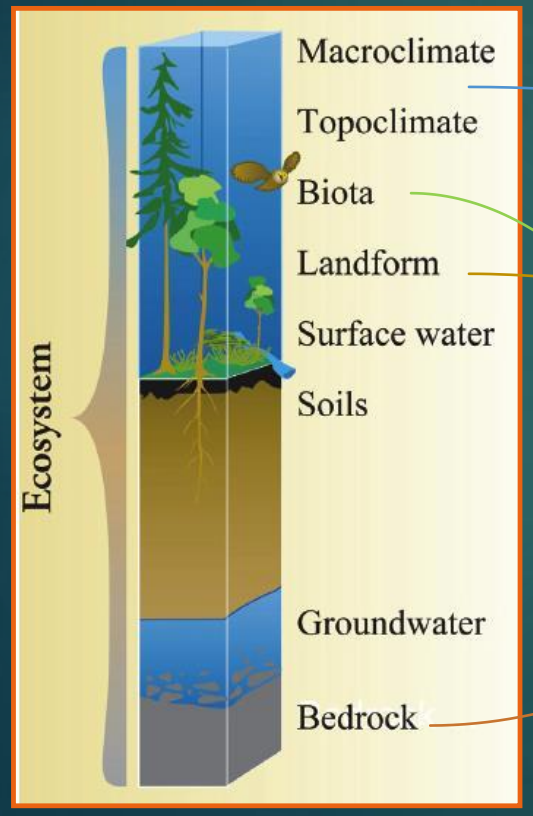
Temperature/Salinity/Oxygen/Nitrate/Phosphate/Silicate

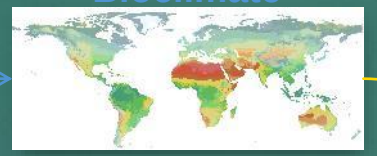
27 km m spatial resolution



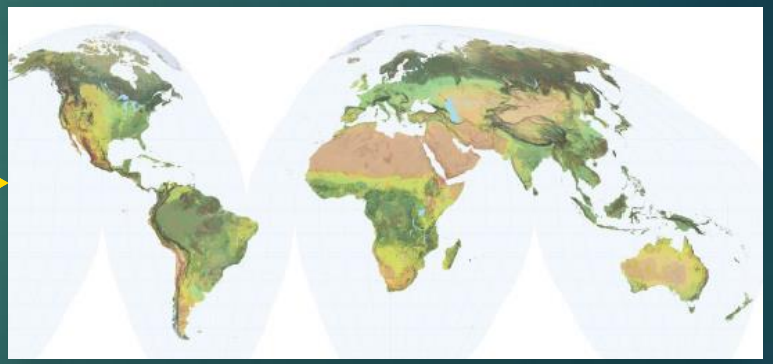
Ecological Land Units (ELUs)

The Ecophysiographic Stratification Approach





Example: Warm Wet Plains on Metamorphic Rock with Mostly Deciduous Forest



3,639 Ecological Land Unit Classes

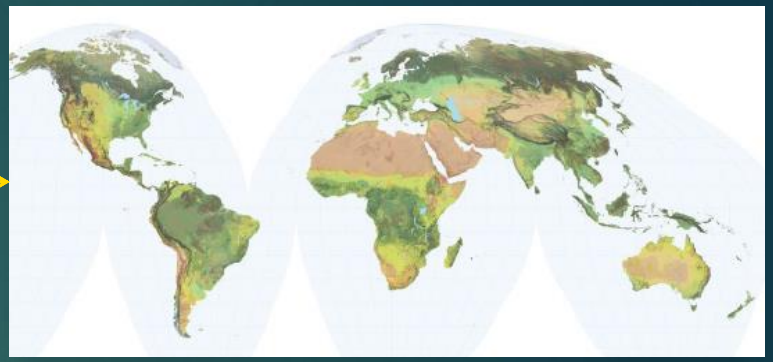
Aggregation and Crosswalking (Version 2.0 ELUs)

Bioclimate (37)

Landform (17)

Lithology (15)

Land Cover (36)



106,959 Ecological Facets (EFs)

Aggregated to:

3,639 Ecological Land Unit Classes (ELUs)

Example: Warm Wet Plains on Metamorphic Rock with Mostly Deciduous Forest

Aggregated to:

531 World Ecological Zones (WEZs)

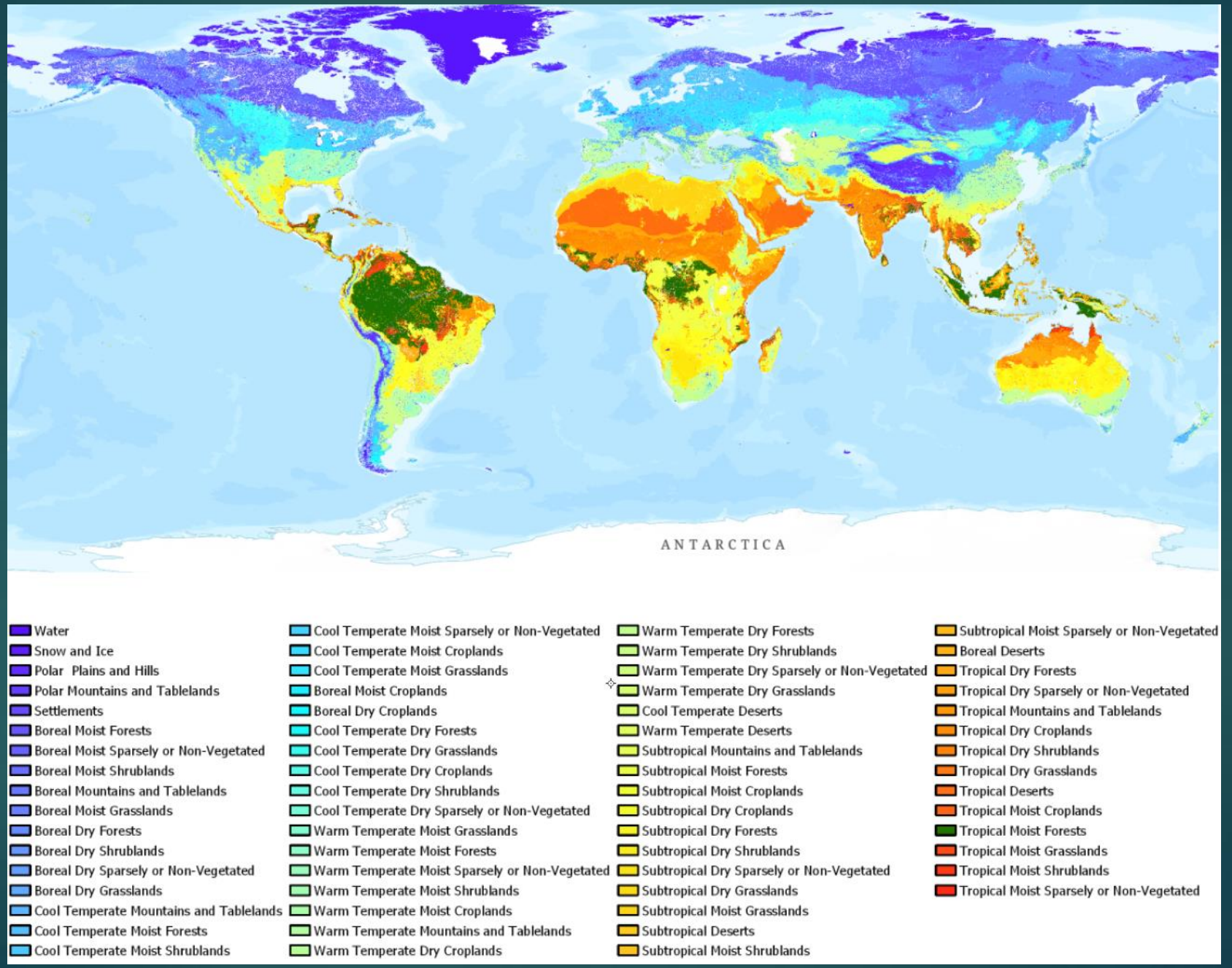
Subtropical Dry Plains Shrubland, Cool Temperate Moist Mountains Forest, etc.

Aggregated to:

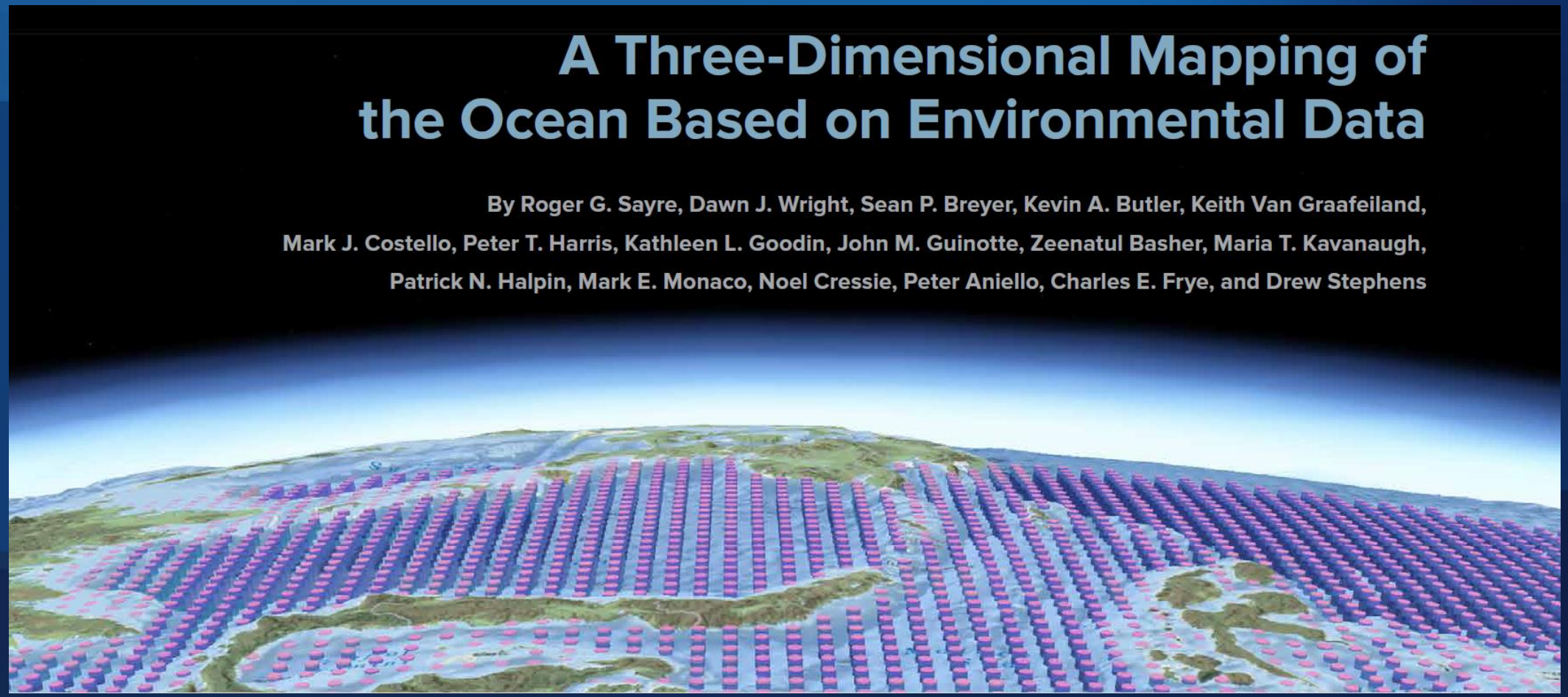
65 IPCC and FAO Compatible Ecozones

Tropical Moist Forests, Boreal Mountains, etc.

65 “FAO/IPCC Ecozones”



Ecological Marine Units (EMUs)



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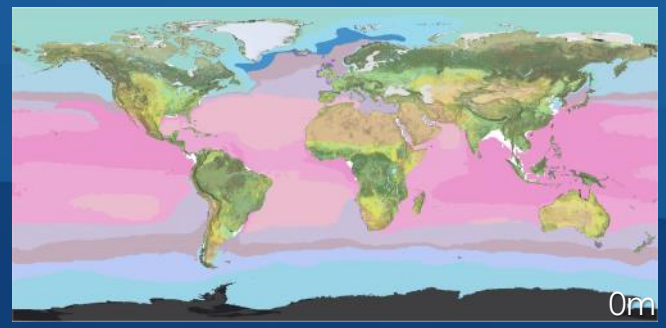
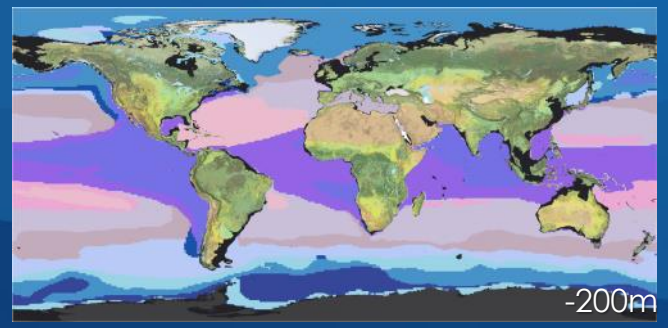
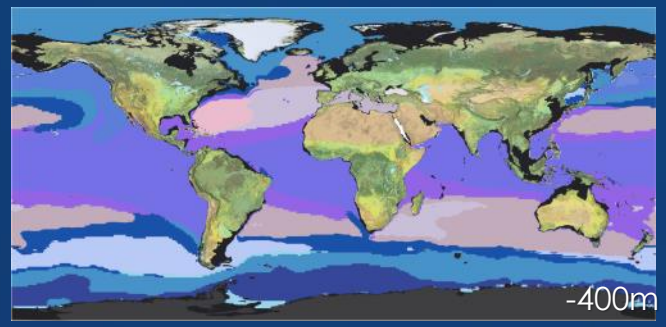
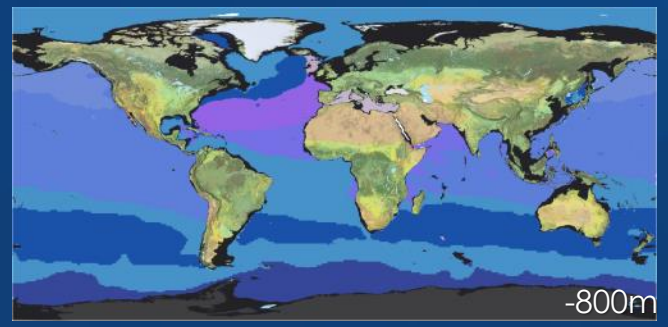
Oceanography

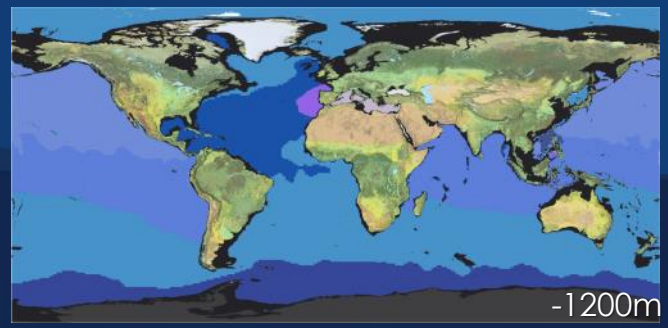
Global Ecological Marine Units (EMUs)

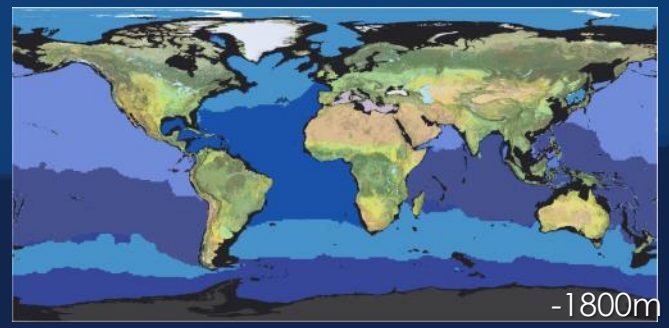


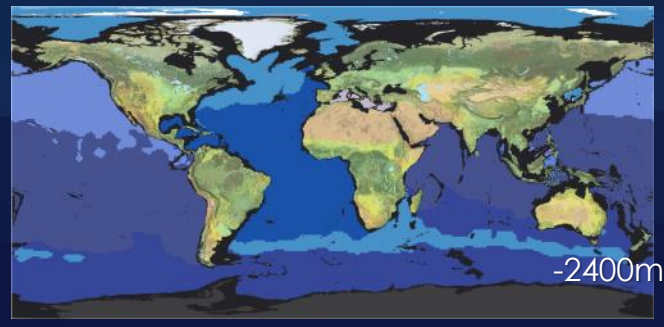


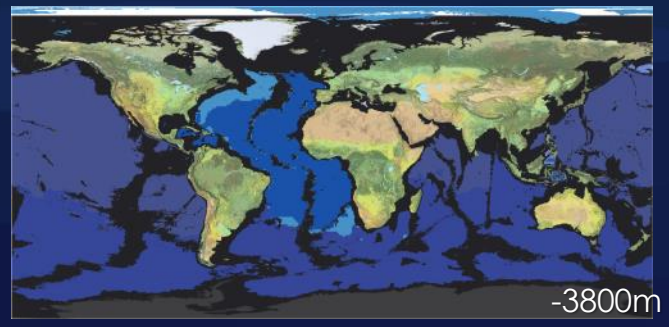


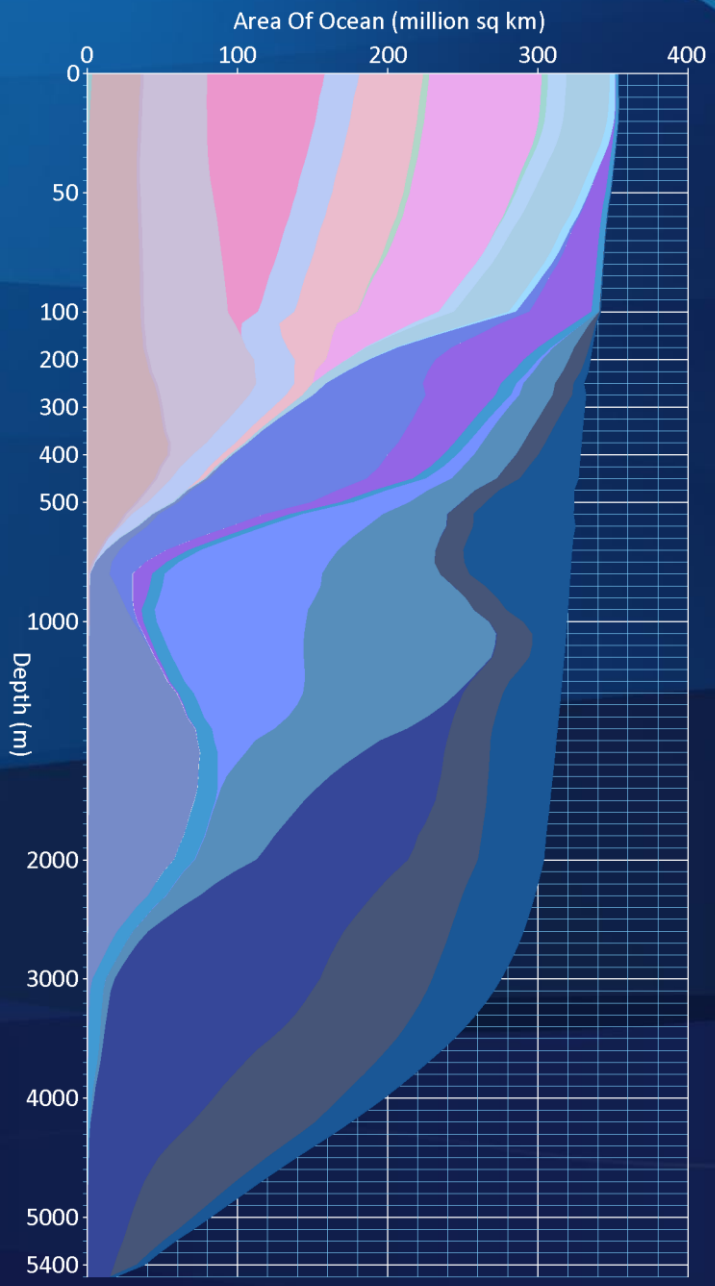




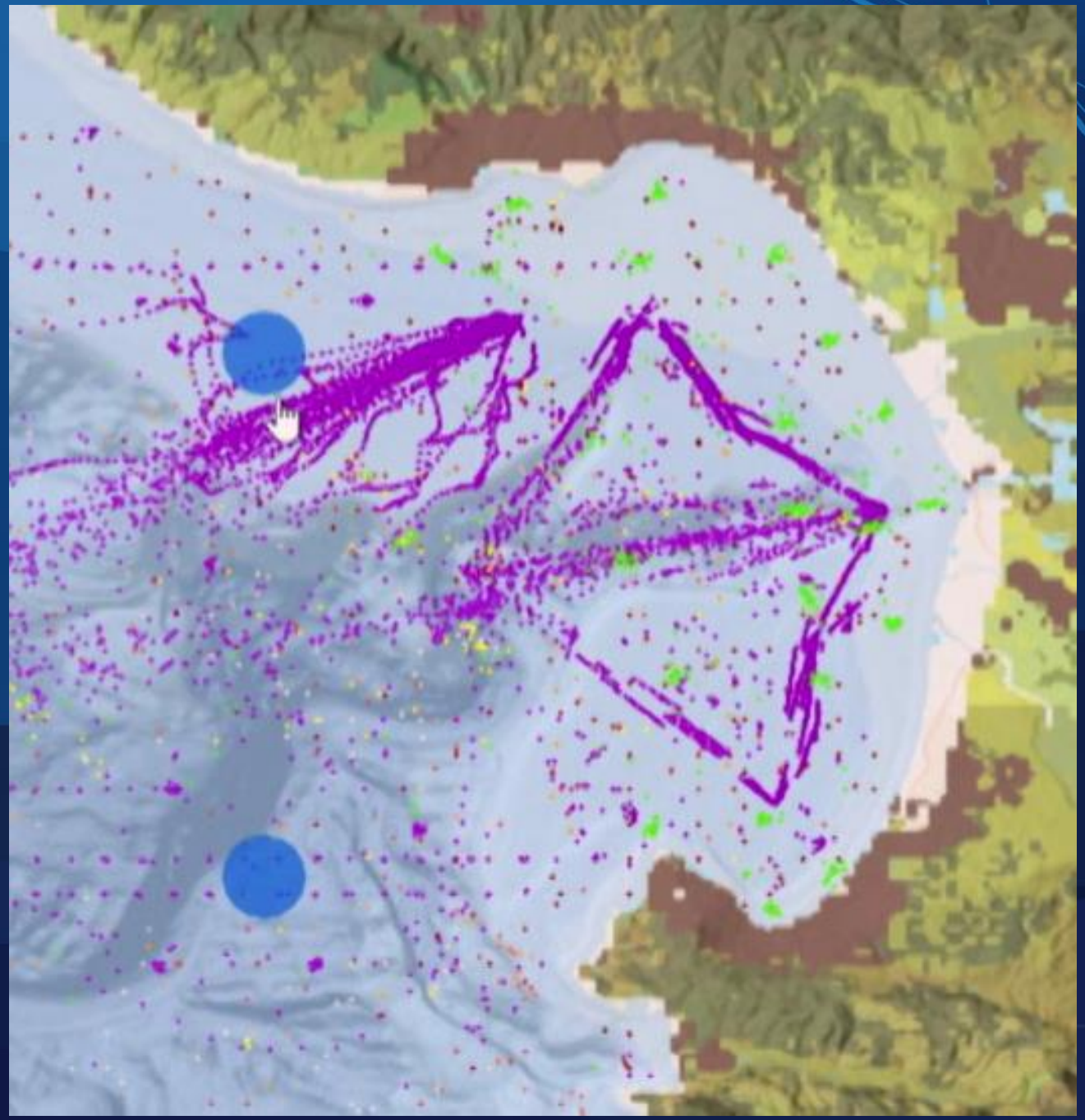




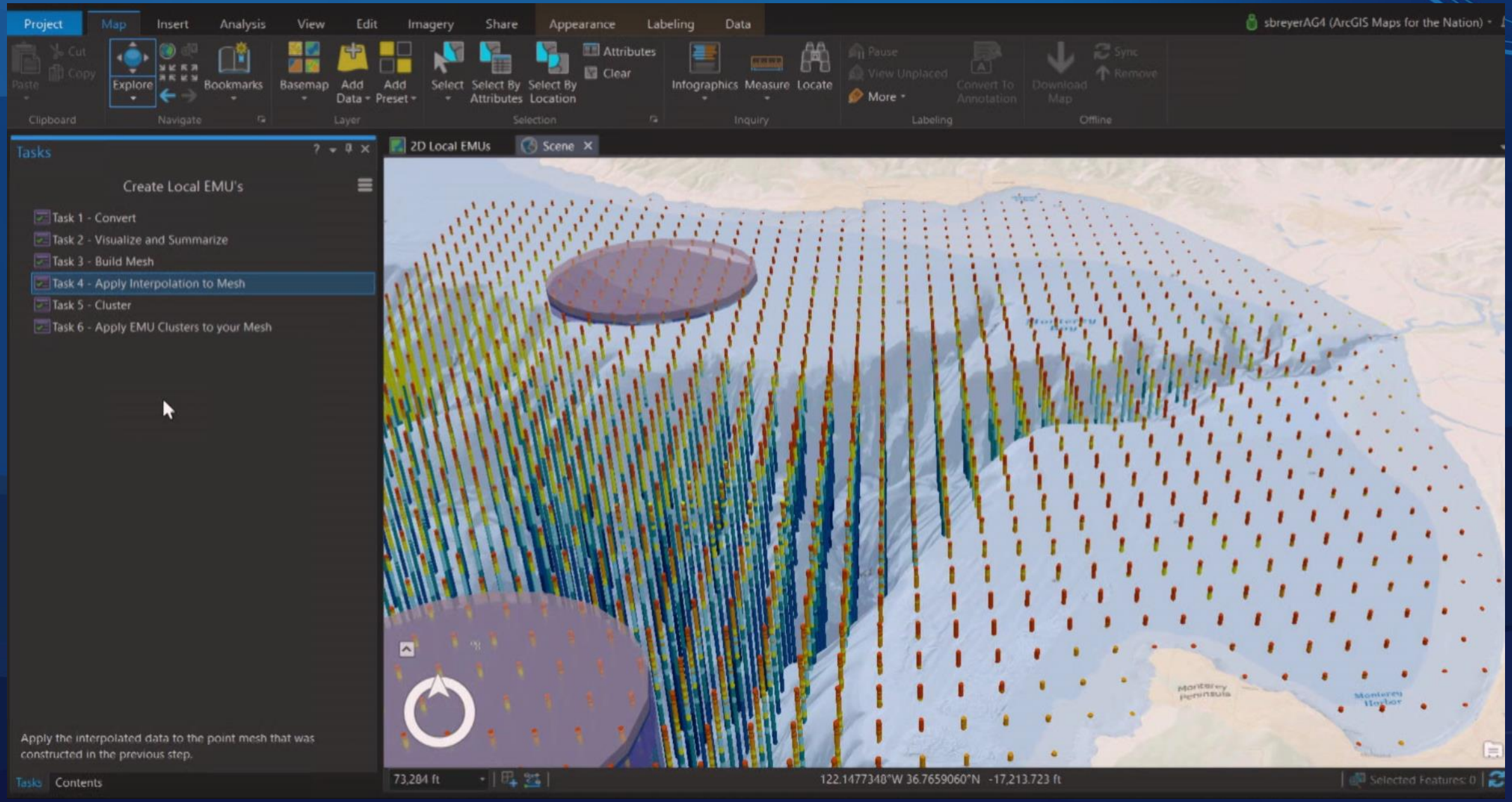




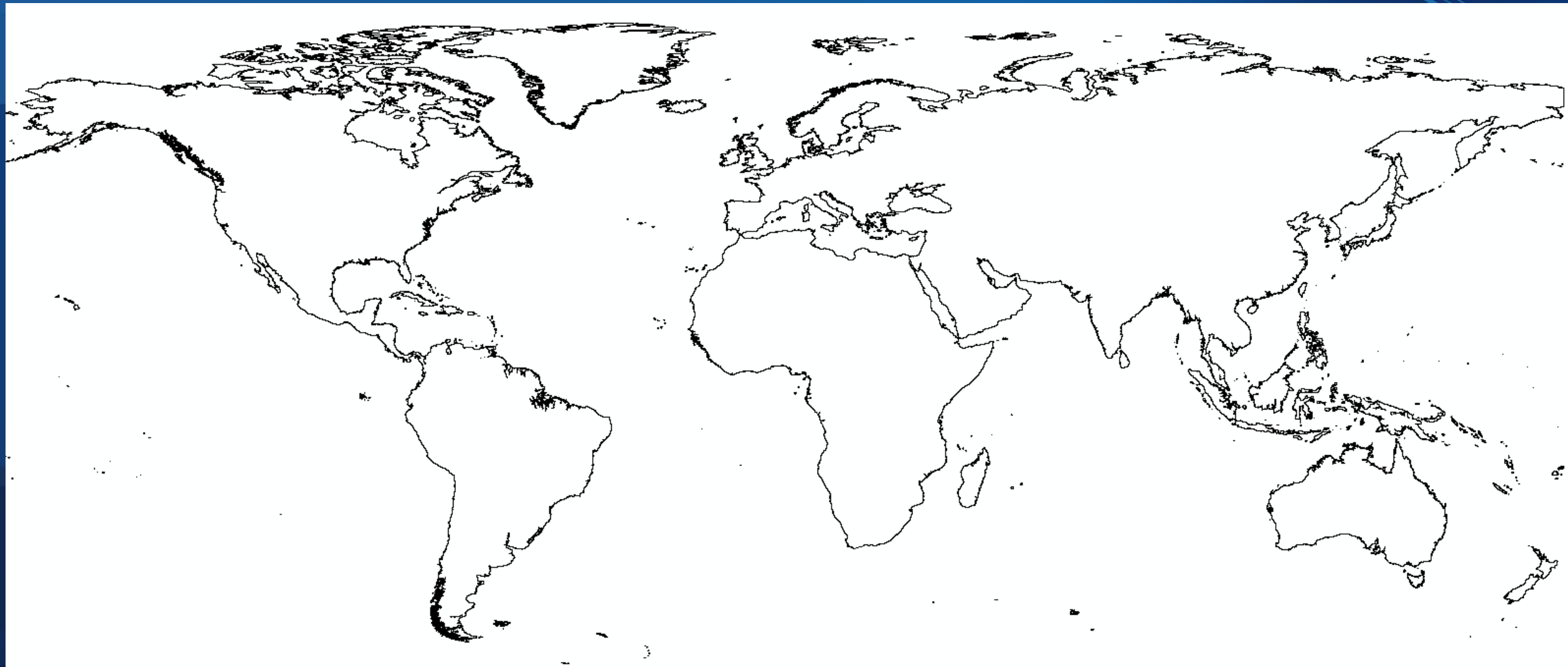
Localized EMUs



Localized EMUs



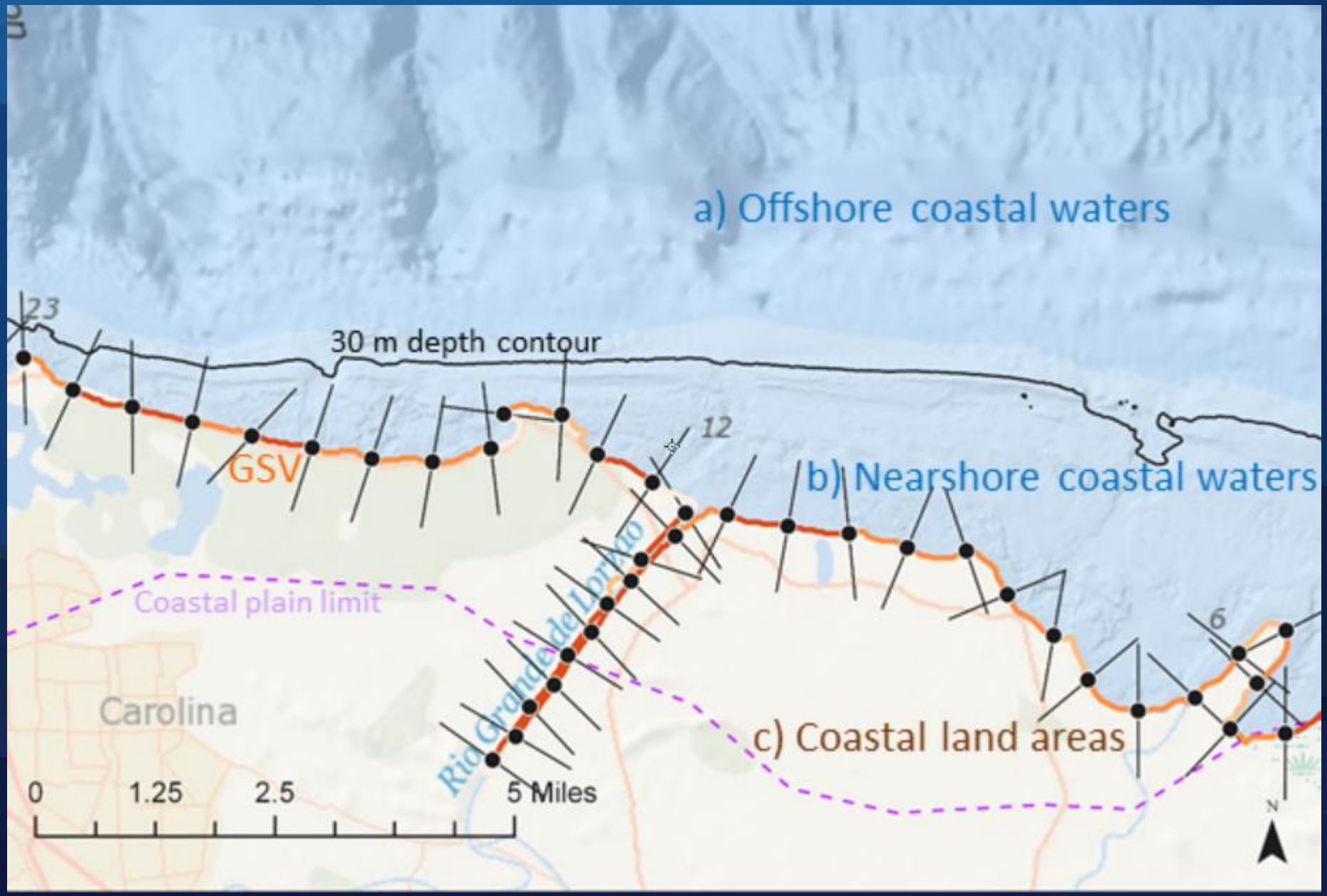
ECUs (Ecological Coastal Units)



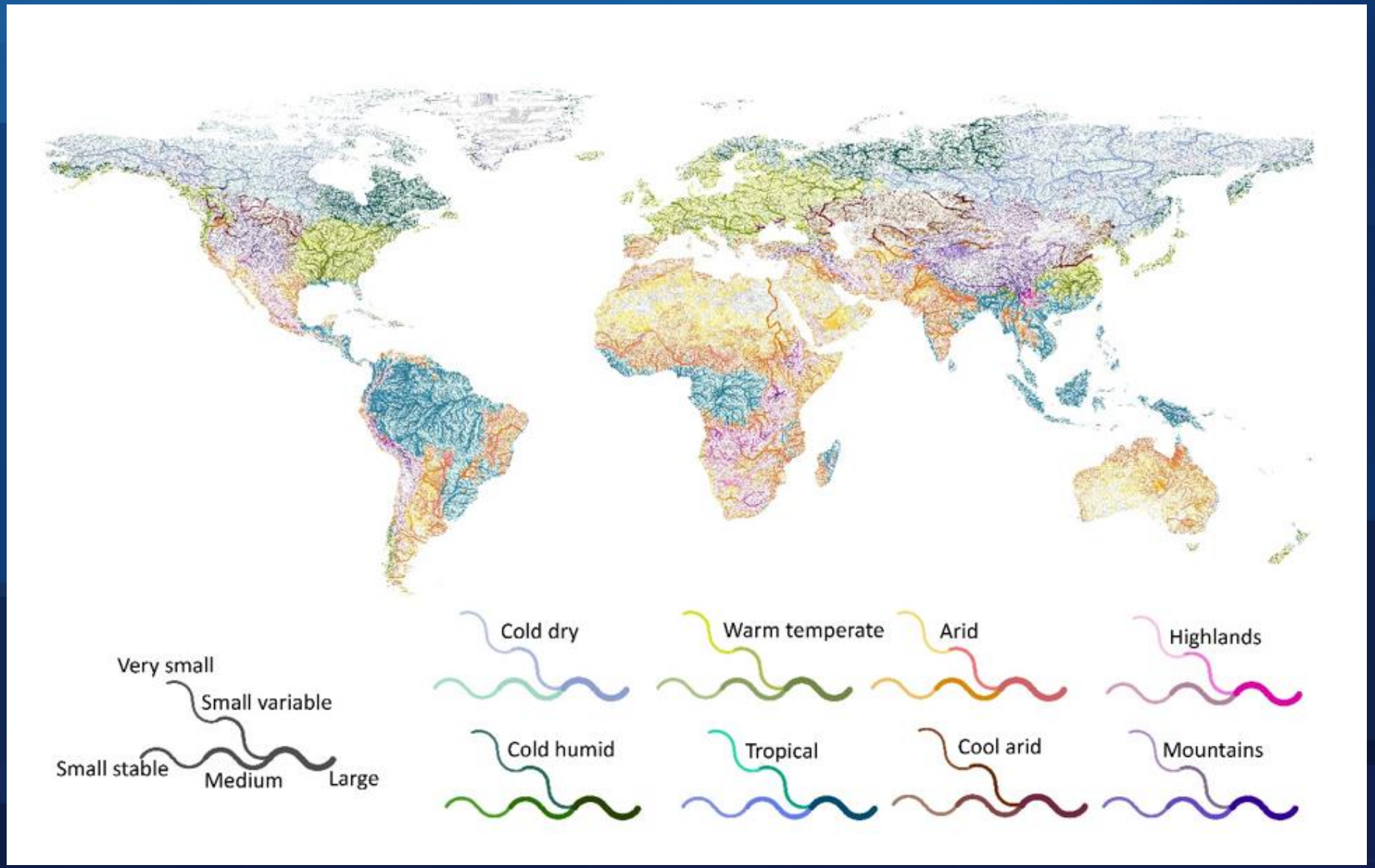
New 30 m Global Shoreline Vector (GSV) from 2014 Landsat imagery!

We will quantitatively segment (stratify) the global coastal zone into environmentally distinct/ecologically meaningful units.

ECUs (Ecological Coastal Units)



EFUs (Ecological Freshwater Units)



We will distinguish global freshwater ecosystems as ecologically significant river reaches, lakes and ponds, and wetlands, and will map these features into meso-scale basins.

Take Homes

Ecosystems – Distinct Abiotic Settings + Matrix-forming Biological Assemblages

Domains - Terrestrial, Freshwater, Marine

Products – Data, Maps, Tools/Services, Publications

Uses – Ecosystem Assessments, Ecosystem Accounting, Conservation and *Green/Blue Infrastructure* Planning, Resource Management, etc.

Public/Private Partnership - Esri and USGS with NGO and Academic Collaborators

Links and Contact Information

ELUs – esriurl.com/elu
ecoexplorer.arcgis.com/eco/

EMUs - livingatlas.arcgis.com/emu/

Global Mountain Explorer – rmgsc.cr.usgs.gov/gme/

Roger Sayre
Senior Scientist for Ecosystems
Land Change Science Program
U.S. Geological Survey
rsayre@usgs.gov