DIGITAL MAPPING TECHNIQUES 2020

The following was presented at DMT'20
(June 8 - 10, 2020 - A Virtual Event)

The contents of this document are provisional

See Presentations and Proceedings
from the DMT Meetings (1997-2020)

http://ngmdb.usgs.gov/info/dmt/

Alaska-GeMS Multi-map Database Schema Changes from the Federal GeMS Standard

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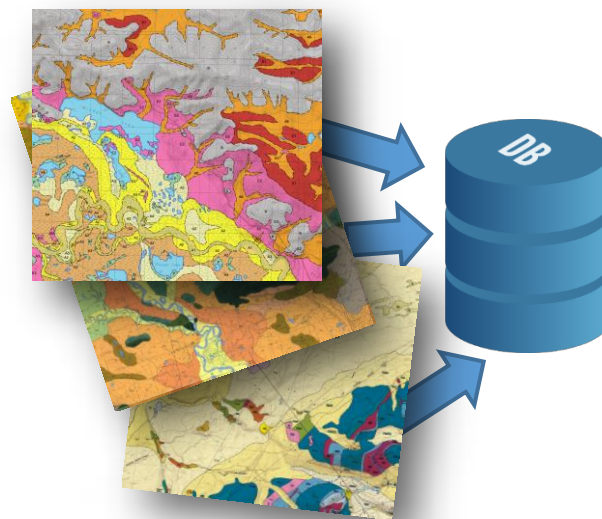ALASKA DNR/DIVISION OF GEOLOGICAL & GEOPHYSICAL SURVEYS (DGGS)

Project goals

EPA-funded research project, Oct 2016-Sept 2019

Various USGS grants and agreements, Oct 2019-August 2021

- ► Develop a schema for a multi-map database
- ► Easy to use by geologists
- ► Design with care
- ► Be true to the implicit relationships of the data
- ► Emphasizes geologic data over cartography

Collaboration

Goals and products benefit from the **collective wisdom** and points of view of a variety of people.
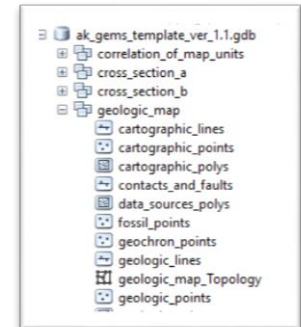
We are smarter together.

- ▶ Ideas could benefit other agencies
- ▶ Can be used for single-map geodatabase
- ▶ Draft files on https://dggs.alaska.gov/gemswiki/

Draft Data Dictionary   Schema v1.1

AK DGGS Geologic Map Production & Management System
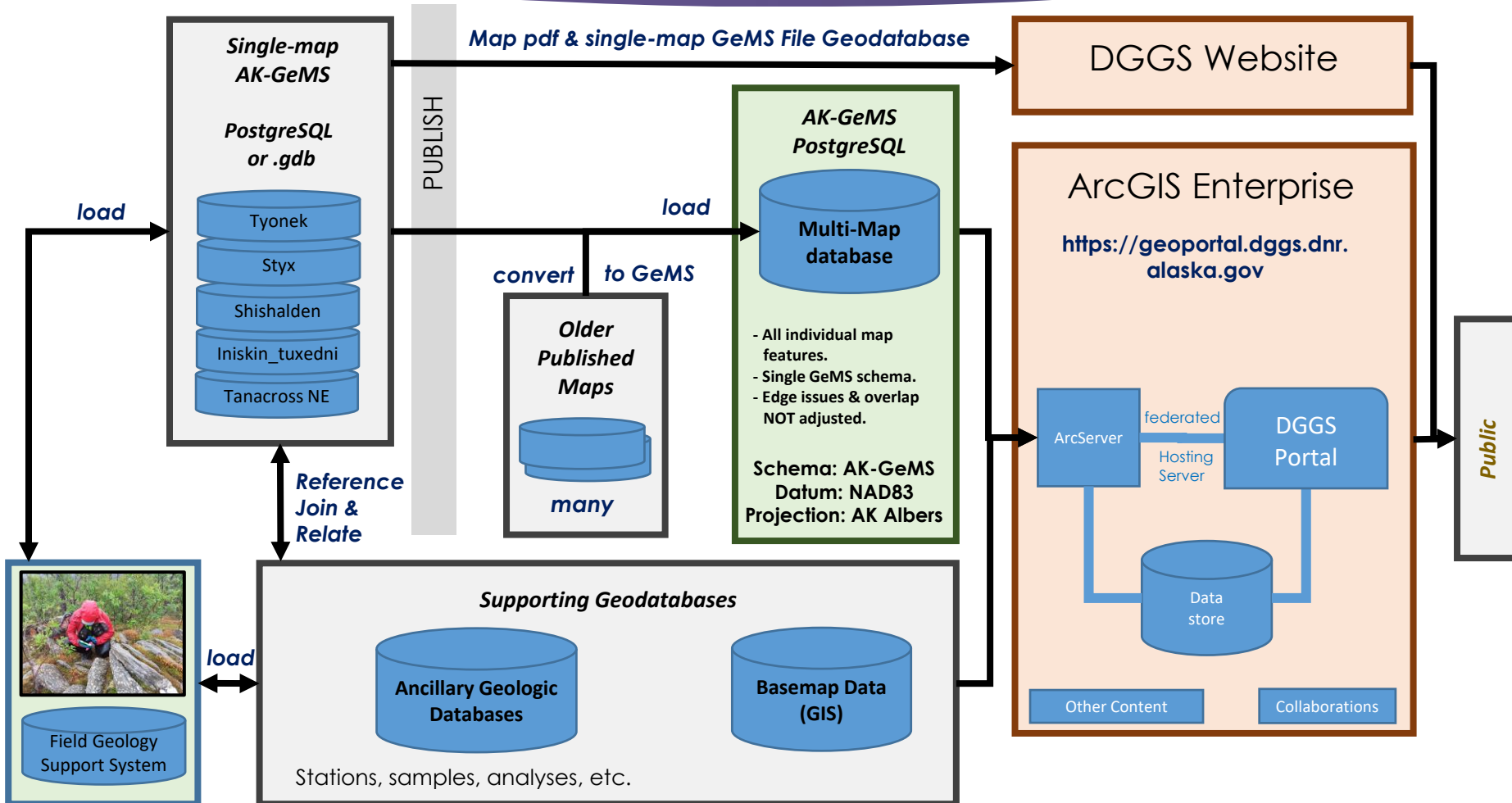
AK-GeMS Universal Changes

▶ Change to "snake_case" from "PascalCase"

▶ Fields are nullable while editing

▶ Additional choices for domains

cf_cat_int_dom	Contacts and Faults Category Integer Coded Domain	
code	description	glossary_definition
100	contact	A linear feature indicating where two map units meet
200	fault	A linear feature indicating where two map units have moved in relation to each other
300	boundary	A linear feature indicating where one map unit ends without an adjacent map unit
997	unprovided	no specific knowledge available to provide a valid entry. Normally used only in data conversion projects
998	unknown	not known to the mapping geologist
999	other	value not provided in the field's attribute domain list. See notes field for details

Schema Comparison, #1

Federal GeMS	Single-Map AK-GeMS	Examples
Items with no real-world existance; only for cartographic display; non-geologic ancillary information		
CartographicLines	cartographic_lines	cross-section traces, pipeline route
	cartographic_points	mine adit, drill hole
	cartographic_polys	polygon for overlay pattern
various annotation	annotation	
Geologic features associated with a map unit; polygons share topology with contacts_and_faults		
	map_unit_lines	long map-unit polygons too thin to show at scale; dike, cliff outcrops
MapUnitPoints	map_unit_points	map-unit polygons too small to show at scale
MapUnitPolys	map_unit_polys	map-unit polygons big enough to show at scale
MapUnitOverlayPolys		overlay polys related to a map unit
Geologic features associated with rock deformation on both a large and a small scale		
ContactsAndFaults	contacts_and_faults	
OrientationPoints	orientation_points	bedding attitudes, foliation attitudes
	structure_lines	fold hinge-surface traces, boundary of basin
	structure_polys	fault-breccia zone, shear zone

Schema Comparison, #2

Federal GeMS	Single-Map AK-GeMS	Examples
Geologic features not covered by normalized feature classses (not fossil locations, not related to structure, not a map unit, etc.)		
GeologicLines	geologic_lines	scarp, key beds that are not map units (fold hinges to structure lines)
GenericPoints	geologic_points	pingo, glacial erratic
	geologic_polys	outcrop area of key bed, hummocky topography
Field obervation, sampling, and analytical points		
Stations	stations	
GeochronPoints	geochron_points	
FossilPoints	fossil_points	
SamplePoints/GenericSamples		denormalized analysis data
Miscellaneous feature classes		
OverlayPolys	overlay_polys	hornfels, alteration zones (not map unit but modifying a map unit)
IsoValueLines	iso_value_lines	geobarometry contours, isopach contours of coal seam thickness
DataSourcePolys	data_sources_polys	

Overlay Polygons and Layers

Overlay polygon related to a Map Unit
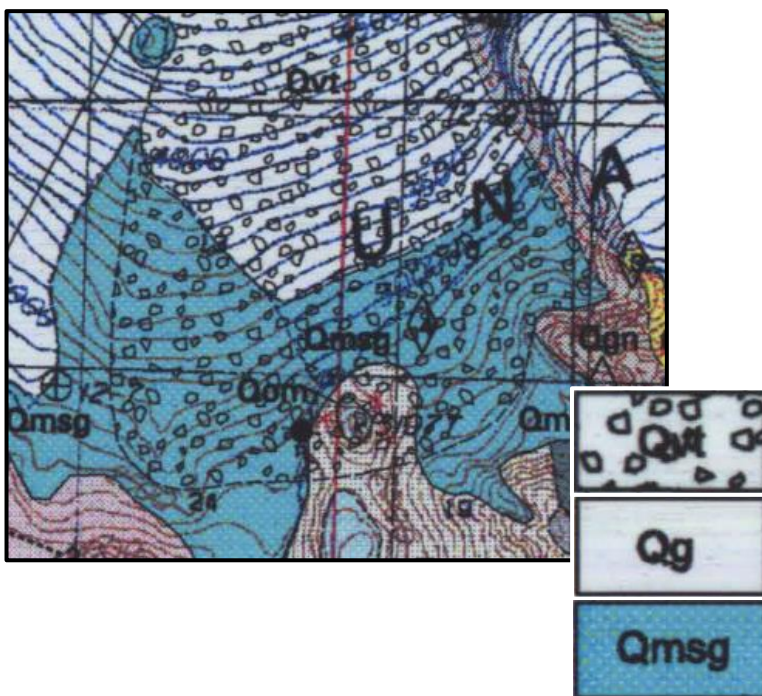
Overlay polygon NOT related to a Map Unit
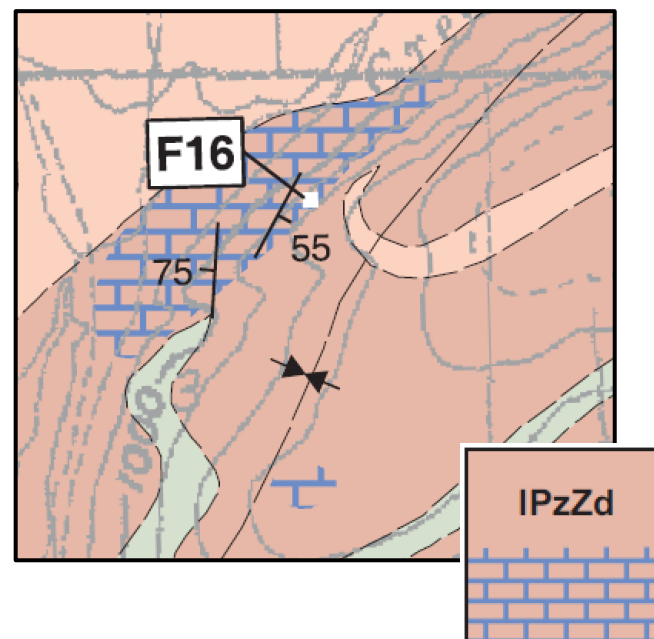
Schema Comparison, #3:
Non-spatial tables

Federal GeMS	Single-Map AK-GeMS
non-spatial tables	
DataSources	data_sources
DescriptionOfMapUnits	description_of_map_units
GeoMaterialDict	geo_material_dict
Glossary	glossary
	location_confidence_lookup
	orientation_confidence_lookup
MiscellaneousMapInformation	product_info
RepurposedSymbols	repurposed_symbols

Contacts_and_faults symbols and confidence
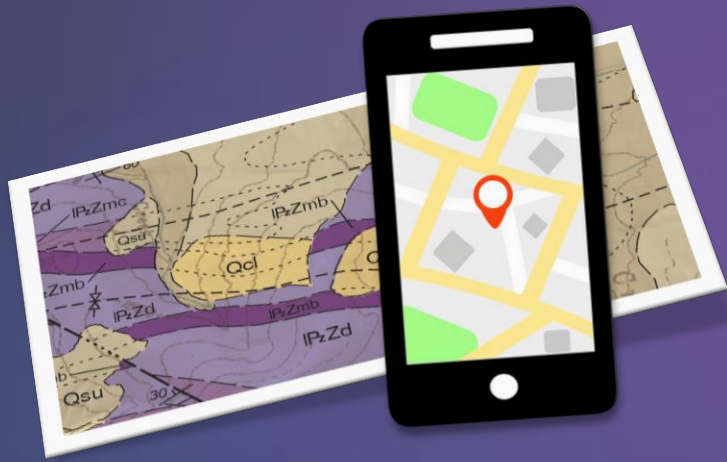
REF NO	DESCRIPTION	SYMBOL
		1.1—Contacts
1.1.1	Contact—Identity and existence certain, location accurate	————————
1.1.3	Contact—Identity and existence certain, location approximate	— — — — — —
1.1.5	Contact—Identity and existence certain, location inferred	– – – – – – –

Location Confidence Method Integer Coded Domain		
code	description	glossary_definition
1	generalized	The feature's location confidence is primarily identified with the ordinal classification scheme used in the location_confidence field.
2	specified	The feature's location confidence is primarily identified with a numeric value provided by the geologist in the location_confidence_meters field.
3	measured	The feature's location confidence is primarily identified with a numeric value provided by GPS in the location_confidence_meters field.
997	unprovided	no specific knowledge available to provide a valid entry. Normally used only in data conversion projects
998	unknown	not known to the mapping geologist

location_confidence_lookup_TABLE									
scale_denom	accurate_min	accurate_default	accurate_max	approximate_min	approximate_default	approximate_max	inferred_min	inferred_default	inferred_max
100000	0	40	40	40	100	100	100	200	Null
63360	0	25	25	25	65	65	65	130	Null
25000	0	10	10	10	25	25	25	50	Null

CDEFG

Capturing Map Metadata

MiscellaneousMapInfo

Table

MiscellaneousMapInformation

MapProperty	MapPropertyValue	Miscella
Title	Lidar-revised geologic map of the D	MMI01
Authors	Rowland W. Tabor and Derek B. Bo	MMI02
Year of publication	2017	MMI03
Publisher	U.S. Geological Survey	MMI05
Series	Scientific Investigations Map	MMI06
Number	3384	MMI07
Geology mapped by	D.B. Booth, 1986-1998, 2004; H.H.	MMI09
Revision by	Rowland W. Tabor (2008-2015)	MMI10
Base-map culture int	Rowland W. Tabor (2008-2013)	MMI11

0 (0 out of 17 Selected)

MiscellaneousMapInformation

product_info

	A	G
1	**Field**	**description_DGGS_GeMS**
2	product_id	Unique ID derived from AK DGGS GERILA database
3	product_guid	
4	name	
5	project_id	
6	project_guid	
7	type	Type of product
8	pub_date	
9	citation_id	Unique ID derived from AK DGGS GERILA database used to identify
10	citation_link	
11	product_map_link	
12	product_db_link	
13	project_link	
14	notes	
15	status	
16	distribution_policy	
17	map_scale_denominator	
18	product_theme	

Extending GeMS Feature Classes

▶ 'category' and 'type'

▶ symbol_alt

▶ 'label' is calculated

▶ layer

▶ modifier

▶ group_id

▶ draw_policy

▶ distribution_policy

▶ data_sources_method

Structure Lines Type Integer Coded Domain			
code	description	glossary_definition	USGS Carto Std
101	fold, anticline	As defined in AGI Glossary	5.1.1-5.1.16
102	fold, anticline, asymmetric	As defined in AGI Glossary	5.3.1-5.3.16
103	fold, anticline, inverted	As defined in AGI Glossary	5.3.33-5.3.48
104	fold, anticline, overturned	As defined in AGI Glossary	5.3.17-5.3.32
105	Etc.		

Data Sources Method Integer Coded Domain		
code	description	glossary_definition
1	Feature unmodified from source material	Feature unmodified from source material
2	Feature modified from source(s), primarily field mapping	Feature modified from source(s), primarily field mapping
3	Feature modified from source(s), primarily basemap data	Feature modified from source(s), primarily basemap data
4	Etc.	

Specific changes

▶ MapUnit => map_unit_associated and map_unit_observed

▶ Data_sources_id: Athey, 1999

▶ Glossary: "As defined in AGI Glossary of Geology"

▶ Linking orientation points: associated_feature_id

▶ Contacts_and_faults: age

age_label
age_type
age_oldest
age_youngest

Single-map to multi-map conversion

- Population of GUIDs
- Convert enumerated domains to coded domains
- Burn overlay polygons into map_unit_polys 'modifier' field
- Remove annotation and cartographic feature classes
- Create many-to-many data sources cross-ref table
- Append map and data elements into single schema (e.g., one contacts_and_faults table, one DMU table)

Join the CDEFG discussion

➢ Monthly telecons
➢ Project wiki
➢ Questions?
Contact Jen Athey at 907.451.5028 or
jennifer.athey@alaska.gov

https://dggs.alaska.gov/gemswiki/