DIGITAL MAPPING TECHNIQUES 2023

The following was presented at DMT'23
May 21 - 24, 2023

The contents of this document are provisional

See Presentations and Proceedings
from the DMT Meetings (1997-2023)

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

Alaska DGGS Geologic Mapping System

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Introduction

The Alaska Division of Geological and Geophysical Surveys (DGGS) produces and publishes numerous geologic maps each year. These maps and their associated databases are made available to the public as downloads and delivered to the USGS in their recently published database standard, GeMS (Geologic Mapping Schema). To produce standards-based, GeMS-compliant geologic maps we developed the AK DGGS Geologic Mapping System. The system controls the process of collecting, producing, converting, packaging, publishing, and sharing geologic map data. To ensure efficient processing we also developed the AK GeMS production workflow standard, which is a 16-phase process that takes a map and its data from planning though production, quality control, publication, and archiving.

Published Standards

The system is built upon published data and symbology standards. We published MP 169, AK GeMS Data Dictionary: A description of the AK GeMS Database Schema, which is an extension to the basic USGS published GeMS schema. In addition, we published a symbology standard, AK GeMS Symbology: A Description of the AK GeMS Style File. The system supports four major categories of geologic mapping production: new mapping, conversions, digitizations, and now more recently, compilations. During the mapping process, geologists heavily reference our published data dictionary and style file. In addition, we have built numerous tools and models to support mapping and improve quality assurance.

AK GeMS Data Dictionary

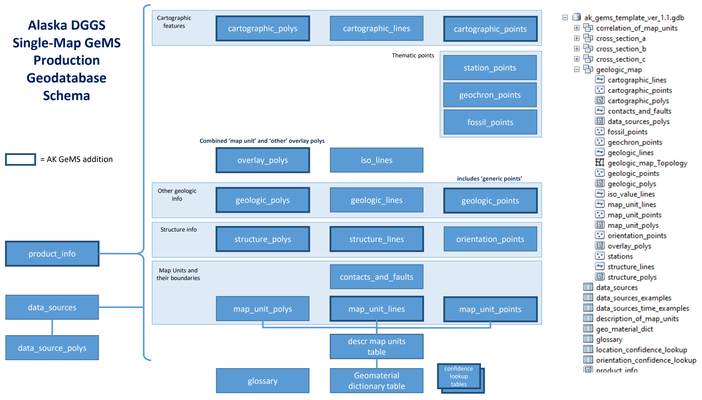
MP 170
AK GEMS DATA DICTIONARY:
A DESCRIPTION OF THE AK GeMS DATABASE SCHEMA
https://dggs.alaska.gov/pubs/id/30669

Includes a Report, Data Dictionary, Entity-Relationship Diagram, XML Workspace Document

Key Aspects of AK GeMS

- Increased focus on **modeling geologic features** (as opposed to graphic elements).
- Capable of **exporting to National GeMS** without signification loss of AK GeMS data extensions.
- Capable of supporting **both single-map** production geodatabases as well as the DGGS **multi-map** enterprise geodatabase (PostGreSQL).
- Support **multiple geologic layers** (i.e. bedrock, surficial, others).
- **Formalized pick lists** as attribute domains with definitions included in a glossary table.
- **Well Documented**.

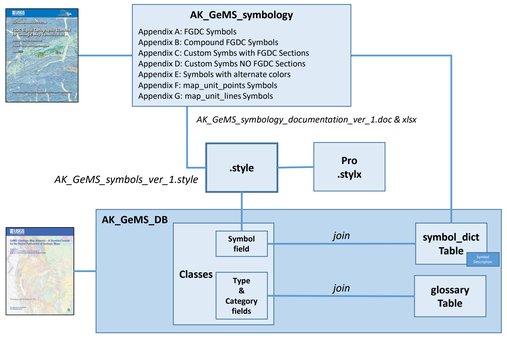
Alaska DGGS Single-Map GeMS Production Geodatabase Schema



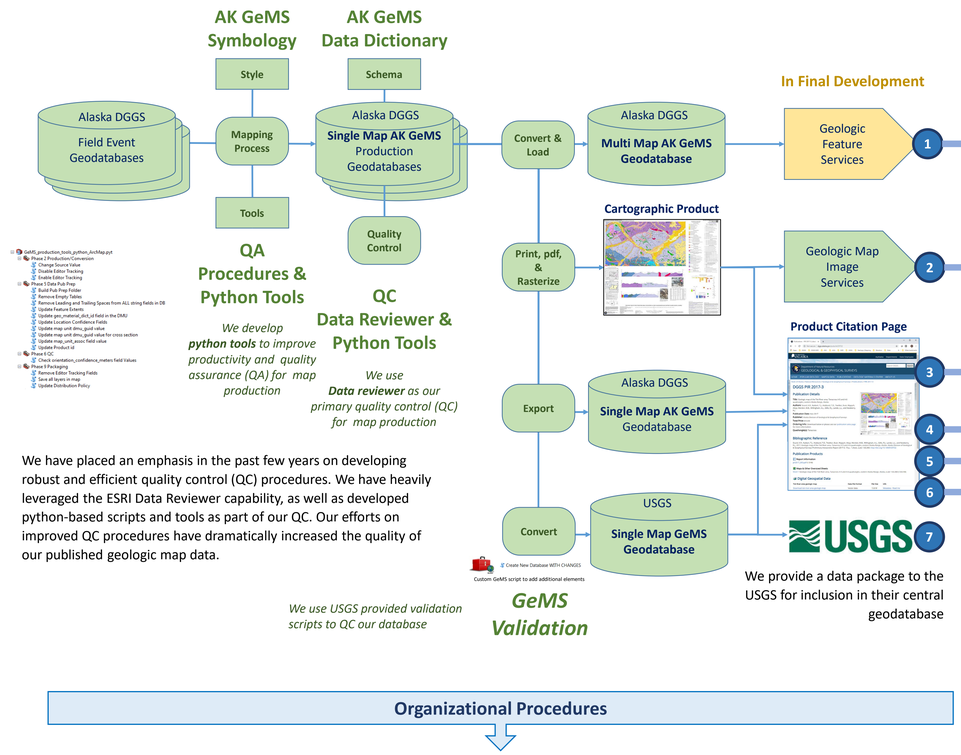
AK GeMS Symbology

MP 169
AK SYMBOLOGY:
A DESCRIPTION OF THE AK GEMS STYLE FILE
https://dggs.alaska.gov/pubs/id/30584

Alaska DGGS has developed and published a GeMS symbology standard and accompanying style file, AK GeMS symbology: A description of the AK GeMS style file. This publication describes the organization and content of the current style file used by DGGS for the Alaska GeMS map production system. In this standard, we have identified the primary and optional FGDC symbols for specific feature type values found within our established attribute domains. In addition, we have established procedures for requesting, creating, coding, and documenting custom symbols added to our style.



AK GeMS Geologic Mapping Product Flow



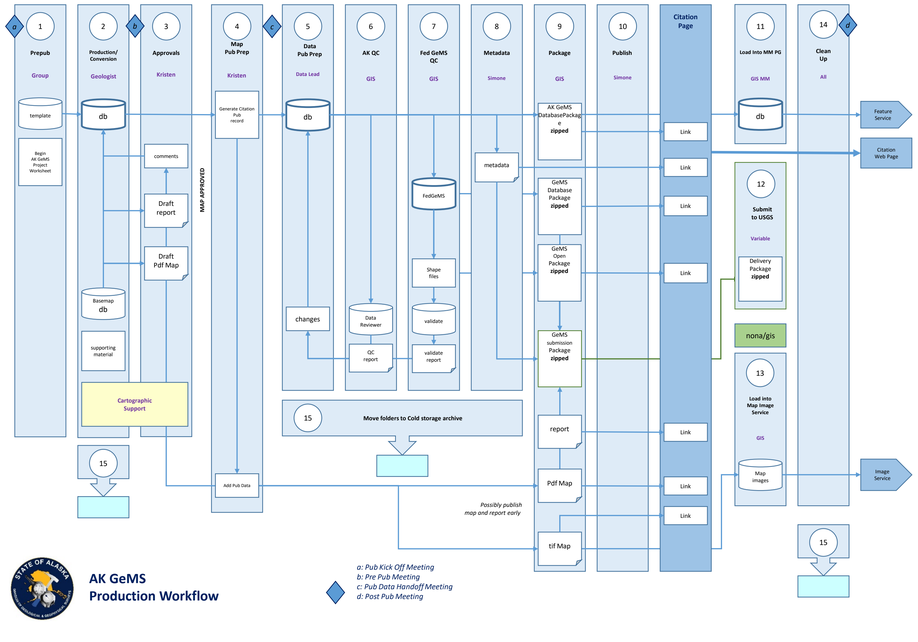
We have placed an emphasis in the past few years on developing robust and efficient quality control (QC) procedures. We have heavily leveraged the ESRI Data Reviewer capability, as well as developed python-based scripts and tools as part of our QC. Our efforts on improved QC procedures have dramatically increased the quality of our published geologic map data.

Organizational Procedures

To ensure that all parties involved with moving geologic maps and data through the system complete their assigned tasks requires well-defined organizational procedures. The backbone of our procedures is our AK GeMS production workflow graphic. This workflow is a 16-phase process that takes a map and its data from pre-publication though production, quality control, publication, and archiving.

The workflow Identifies: Workflow, Responsibilities, Location of data, Production meetings, Products

AK GeMS Production Workflow



Publishing Products

https://geoportal.dggs.dnr.alaska.gov/portal

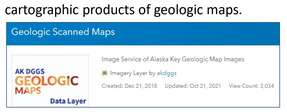
Department of Natural Resources
GEOLOGICAL & GEOPHYSICAL SURVEYS
GEOPORTAL

Multimap Map Image Service

Multimap Feature Service

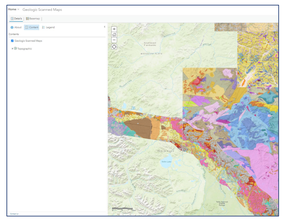
Scanned Geologic Map Image Service

This Image Service hosts raster map images of original cartographic products of geologic maps.



AK GeMS Multimap Explorer Web App

We are in final development of multi-map services and a Geologic Map Data Exploration web app.

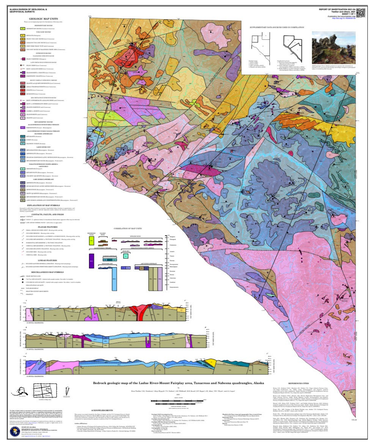


https://geoportal.dggs.dnr.alaska.gov/portal/home/item.html?id=3240b5b3f9d34d3582258b1ec684f1e7

Standard Cartographic Product

We create a standard high quality cartographic product from the AK GeMS Geodatabase

When a map's database passes QC and metadata is complete, we package the geologic map data for publication, sharing, and delivery. We the make following geologic map products available for download: a report, the cartographic product as a pdf, the geologic AK GeMS formatted Geodatabase, the basic GeMS formatted Geodatabase, and shapefiles. In addition, we package and deliver the data to USGS. We also populate web services with our data; we add the cartographic product as a TIF to our Geologic Map Image Service and convert and load the single-map geodatabase into our multi-map PostgreSQL geodatabase.



AK GeMS Formatted Geodatabase Package

GeMS Formatted Geodatabase Package

GeMS Formatted Shapefiles

Data Packages contain:

- File Geodatabase
- Map Document
  - ArcMap now
  - ArcPro in future
- resources folder that includes:
  - fonts folder - Special FGDC fonts used for geologic labels and symbols
  - styles folder - ESRI Style file used for visualizing this data. Numerous symbols are dependent on the provided special FGDC fonts.
  - layer_files folder - ESRI layer files defining symbology and labeling for each feature class in the geodatabase.

AK GeMS Production Status

Available AK GeMS Geodatabases
https://dggs.alaska.gov/pubs/keyword/gems
We have **27 Geologic Maps** currently available

In Production AK GeMS Geodatabases
We have **29 Geologic Maps** currently in production

Planned AK Geodatabases
We have **25+ Geologic Maps** will go into production

Alaska DGGS Map Index Web App

The Map Index Web App is an online web application designed to explore the geologic map holdings of the Alaska Division of Geological & Geophysical Surveys (DGGS). This online exploration tool provides the boundaries of most DGGS and U.S. Geological Survey (USGS) geologic maps of Alaska in a single, interactive web application.