DIGITAL MAPPING TECHNIQUES 2014

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The contents of this document are provisional

See Presentations and Proceedings
from the DMT Meetings (1997-2014)

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

Implementing disparate geologic mapping standards through community

A presentation for Digital Mapping Techniques 2014

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The Geologic Map

The

1. Representation

of the

2. Interpretation

of the

3. Observation

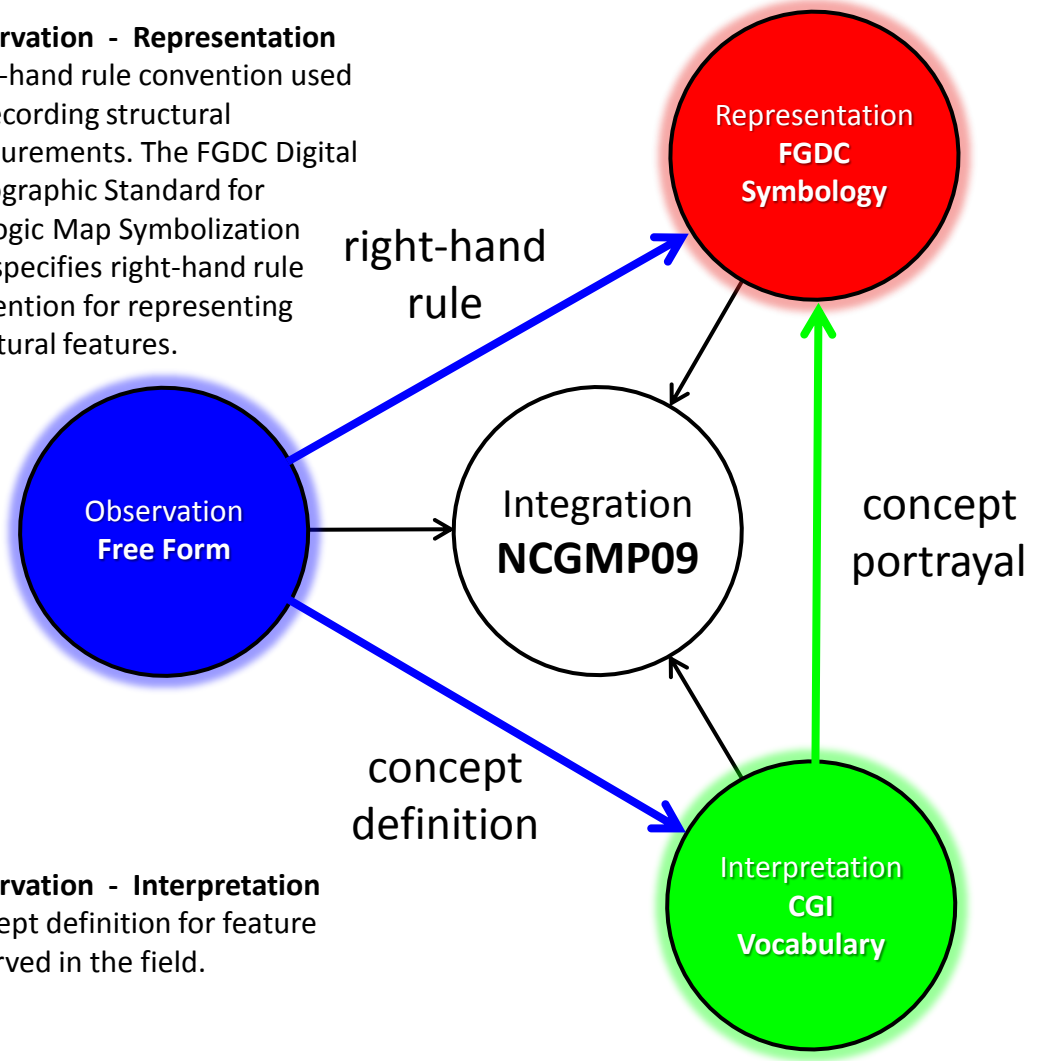
Standards for The Geologic Map

1. Representation
   a. FGDC Digital Cartographic Standard for Geologic Map Symbolization
2. Interpretation
   a. International Union of Geological Sciences (IUGS) Commission for Geoscience Information (CGI) Concept Definitions
3. Observation
   a. Free-form

Integrating Standards

Observations, interpretation and representation information stored in NCGMP09 database

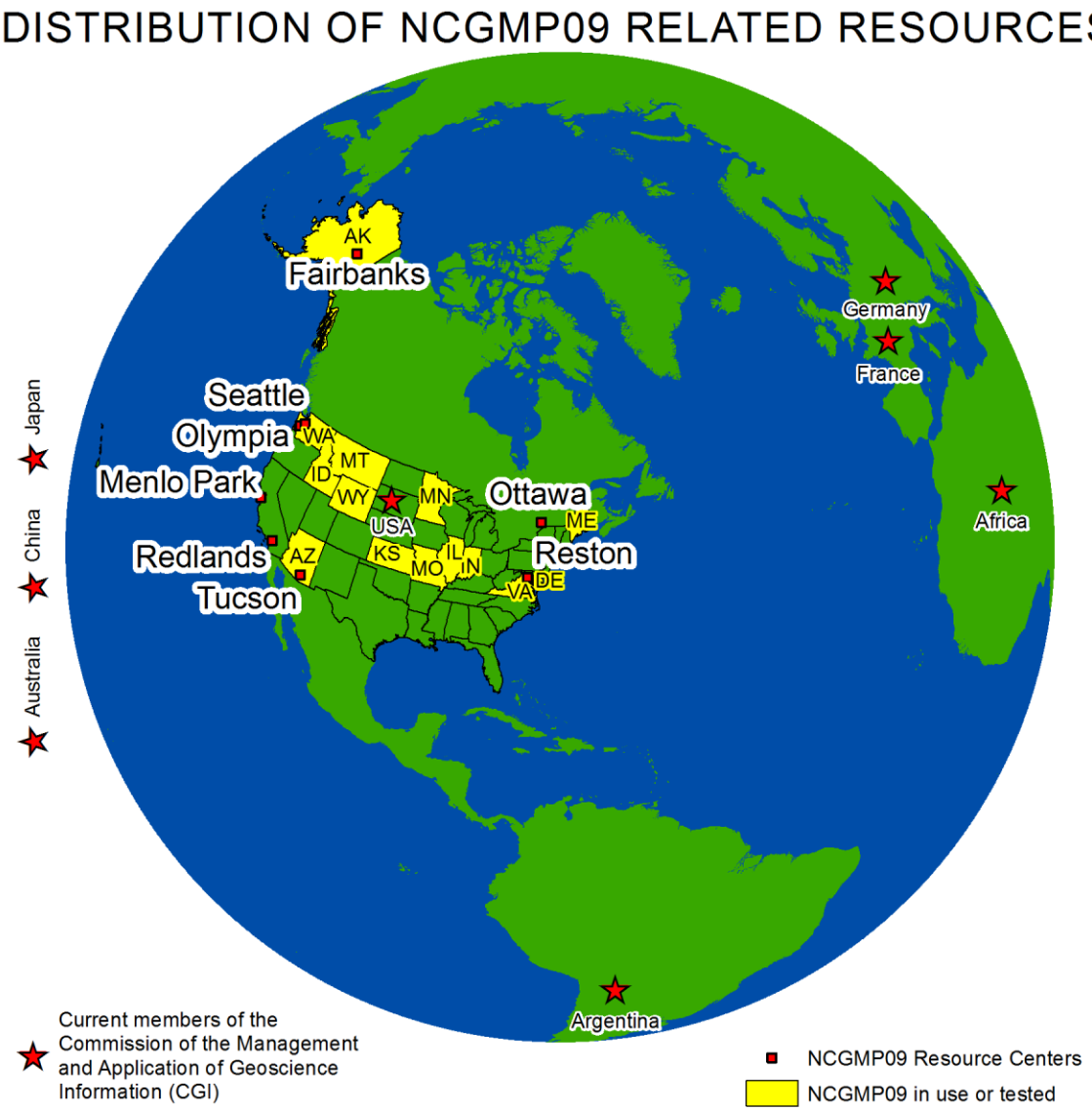
Observation - Representation
Right-hand rule convention used for recording structural measurements. The FGDC Digital Cartographic Standard for Geologic Map Symbolization also specifies right-hand rule convention for representing structural features.



Representation - Interpretation
Each interpretation has a corresponding representation.

Observation - Interpretation
Concept definition for feature observed in the field.

Standards Implementation Community



The Geologic Map at the AZGS (2009-2013)

- Data for geologic maps input into a preliminary NCGMP09-formatted database (pNCGMP09)
- Made use of cartographic representations developed by Esri
- Added additional representations for features that were not created by Esri or defined in the FGDC Digital Cartographic Standard for Geologic Map Symbolizaton (Cartographic Standard)

Geologic Map Tools at the AZGS (2009-2013)

- Created pNCGMP09 database:
  - Feature datasets
  - Topology
  - Domains
  - Relationships between feature classes and tables
- Custom ArcMap Editing Templates
- User Interface for inputting unit descriptions
- Managed unit, unit descriptions and color that will be used to represent the unit on the map, correlation diagrams and cross section
- Managed feature-level metadata
- Tool that allows cartographer to plot description of map units on the map layout page

Problems with AZGS Tools

- Unable to share tools with the greater geologic mapping community
  - Data for 60+ Geologic Maps in pNCGMP09 format
    - http://ngmdb.usgs.gov/Info/docs/AZGS-NCGMP09_Discrepancies_2-28-14.pdf (schema differences documented)
    - Confidence terms used differed from suggested terms in NCGMP09 design document
  - Toolbar only created datasets with a spatial reference of UTM Zone 12 (NAD83)
  - Toolbar hard coded to work with pNCGMP09 schema

Solution

- Open up AZGS tools and internal data management to take advantage of and support the work of the greater geologic mapping community

How?

- Take advantage of and integrate existing resources developed by the geologic mapping community, including:
  - Ralph Haugerud's Tools
  - AZGS Toolbar
  - Esri's map symbols (Cartographic Representations)
  - Geological Survey of Canada's map symbols (style file)
- Share integrated resources

To meet the goals, AZGS needed to…

- Transfer 60+ datasets from pNCGMP09 schema to NCGMP09 schema
- Modify Ralph's Create Database script
- Modify AZGS Toolbar code

Transferring data

- Wrote a series of scripts to automate the process
  - https://github.com/ncgmp09/transfer-data-to-ncgmp09
- Script maps data from pNCGMP09 fields to NCGMP09 fields

Ralph's Create Database script modifications

- Added:
  - SysInfo table that the AZGS Toolbar needs for managing feature-level metadata
  - Domains
  - Topology
  - Spatial Reference System for correlation of map units and cross section

AZGS Toolbar code modifications

- Modified to work against schema that Ralph's tool produces
- Presumably, the tool produces the schema, as described in the design document
  - http://pubs.usgs.gov/of/2010/1335/pdf/usgs_of2010-1335_NCGMP09.pdf

Data migration challenges occurred when…

- Field data types were different
- Character length of data in pNCGMP09 field exceeded the max character length of NCGMP09, data transfer failed.
- Fields missing data in pNCGMP09 that were mapped to non-nullable fields in NCGMP09 caused data transfer to fail.
- Multiple fields carried similar information, but not the same information (i.e. fault v. detachment fault v. detachment fault, approximately located)

The work that still remains

- QA/QC
- Cross Sections and Correlation of Map Units
  - Already in ArcGIS format, just need to be transferred
- Get data online
- Legacy data that never was completely migrated to pNCGMP09 schema can be migrated directly to NCGMP09 schema

Highlights of the migration and integration of community resources

- Used CGI vocabulary terms as value for “Type”
  - i.e. detachment fault
- Used Geological Survey of Canada’s symbol naming convention as value for “Symbol” field
  - i.e. 02.10.01
  - Allows to ‘match’ data to symbols in Canada’s style file
- Continued use of Cartographic Representations
  - RuleID corresponds to reference number documented in FGDC Cartographic Standard and the zero-padded version of Canadian Survey’s style file
- Made use of LTYPE and PTTYPE field options in Ralph’s tool
  - i.e. In the case of LTYPE, value that is put in the field corresponds to the convention outlined in the FGDC Digital cartographic Standard. For a detachment fault, this would read “detachment fault, location approximate”

The future…

- Continued development, sharing and integrations of tools and resources
  - In particular, Canadian Geological Survey has map layout tools, the final and missing resources of the geologic mapping resource portfolio

NCGMP09 is THE integrated, community based platform

Conclusion

AZGS Developed Resources

https://github.com/ncgmp09