**Geological Features**

Entities: Geological Observations, Geological Relationships

**Geological Observations (a geological object type?)**

Type: PRIMARY Features (Geologic Entities)

Spatial object: POINT, VOLUME

Location

Bedding

Mineral Assemblage

Lithology

Unit

Fold

Fabric

Site (Geochronology site? Seismic event location?

Geo artifact location, a cumbuston engine embedded in the Mississippi flood plane in 2150 ?

Question: Are contacts geological entities, that is features? OR are they ‘Geological Relationships’ ? OR are they BOTH! yes

**Geological Relationships**

Type: CONTACT Features

Spatial object: SURFACE, POINT

Sub\_Type: Sub\_Level (1,2,3,4,5)

**Sedimentary Contacts**

Depositional on Contact participates in deposition; conformable/unconformatl/disconformable based on time interval separating units at contact.

Is Bedding Plane

Is Conformable on

Is On-lap

Is Overlain by

Erosional on

Is Unconformably on / over

Is Angular unconformably on / over implies deformation and erosion process befor deposition of overlying unit.

Is Disconformably on / over implies time gap, no erosion?

Is Nonconformably on / over

Is Paraconformably on / over

Is Diastemicly on / over

Penecontemporaneous Deformation implies prelithification deformation

Slumped into (Ball and Pillow)

Settled into (Flame structures)

Injected into (Sand dyke)

Erupted through (Mud volcanoes)

**Igneous Contacts**

Intrusive into

Inclusion of (xenoclasts, xenoliths, roof-pendants,) Rock body parts, imply relationship to containing unit.

Lit-par-lit injected into relation is product of process

In-situ melted into protolith > process > product relationship

Cuts Across

Cross-Cuts

Metamorphism

**Metamorphic Contacts**

Syn-tectonic metamorphism

Pre-tectonic metamorphism

Post-tectonic metamorphism

Recrystalized into protolith > process > product relationship

Overprinted by

Penentrative through-out

Transforms

Overgrown by

Overgrows

Baked into (contact alteration) protolith > process > product relationship?

Reset to (retrograde reaction rims) protolith > process > product relationship

(metamorphic Aureole)

Altered to (new mineral assemblages) protolith > process > product relationship

Hydrothermally Alters protolith > process > product relationship

Thermally alters protolith > process > product relationship

Fused with protolith > process > product relationship? Not sure what this one mean

Has Pressure Shadow around Grain scale

Has Foliation Fish Grain scale

Has Foliation Mantle Grain scale? Not sure what it means

D2 Has Foliation wrapped around Porphyroblast B Grain scale

Has Recrystalization Rim from M2 Grain scale; particle role

Crystal A - Is Bent (with undulouse extinction) by D2 Grain scale; particle type—deformed crystal, participates in D2

Unit A Has Kink Bands from event D2 Unit a hosts kink band x, kink band is product of event D2

Unit A Has Micro-Boudinage from D3 Rock body part = layer, type = boudinaged layer; product of D3

Has Deformation Twins Grain scale; at this point don’t have descriptive elements for grain-scale description. Particle type X hosts deformation twins.

**Tectonic Contacts**

Deformation

Structural Feature

Fault Plane

Fault

Normal Faulted

Reverse Faulted

Transcurrent Faulted

Is Sinstrally off-set

Is Dextrally off-set

Shear Zone

Is Sinstral off-set

Is Dextral off-set

Has C-S fabric Composite fabric type

Has L-S fabric Composite fabric type

Rotated

Is Sinstrally rotated by I’m not familiar with this usage—is this like clockwise and anticlockwise rotation? IT would be a movement type associated with a fault or ductile shear zone

Is Dextrally rotated by

Folded

Is Gently folded by Unit A hosts Fold B, fold B hasInterlimbAngle Gentle

Is Open folded by

Is Tightly folded by

Is Overturned by

Is Rotated by

Is Flattened by

Is Strained by participates in ductile deformation

Is Buckled by participates in folding (buckling?)

Fractured

Is Fractured by participates in fractuing

Jointed

Is Jointed by participates in fractuing, product = joint

Foliated

Is overprinted by

Is penentratively Foliated by

Is Foliated with

Lineated

Is Lineated with

Crenulated

Is crenulated by foliation type crenulation cleavage, overprints X

Oriented

Has preferred Lattice Orientation fabric hostedBy (definedBy) preferredLattice orintation

Has preferred Dimensional Orientation fabric hostedBy (definedBy) preferred dimensional orientation

“What clearer evidence could we have had of the different formation of these rocks, and of the long interval which separated their formation, had we actually seen them emerging from the bosom of the deep?...The mind seemed to grow giddy by looking so far into the abyss of time” James Hutton (1726 – 1797 Edinburgh, Scotland)

Volcanic contacts …

Courtesy flickr hivemind

<https://hiveminer.com/Tags/ontario%2Cvolcano>

Xenoliths

*Xenoliths of mafic rock in granite, Victoria, B.C. The fragments of dark rock have been broken off and incorporated into the light-coloured granite.*

[Physical Geology - 2nd Edition](https://opentextbc.ca/physicalgeology2ed/).

[*https://opentextbc.ca/geology/*](https://opentextbc.ca/geology/)

*Gneiss*

*Metamorphic rock (gneiss) of the Okanagan Metamorphic and Igneous Complex at Skaha Lake, B.C. The dark bands are amphibole-rich, the light bands are feldspar-rich.*

Intrusions

For definitions:

<https://www.mindat.org/glossary/>

A **paraconformity** is a type of unconformity in which strata are parallel; there is no apparent erosion and the unconformity surface resembles a simple bedding plane. It is also called nondepositional unconformity or pseudoconformity. Short **paraconformities** are called diastems

Geological Contacts

Journal

1. [**Journal of Geoscience Education**](https://www.tandfonline.com/toc/ujge20/current)
2. Volume 45, 1997 - [Issue 2](https://www.tandfonline.com/toc/ujge20/45/2)

Views

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CrossRef citations to date

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Altmetric

Original Articles

1. **Geologic Contacts**

[Robert Crombie Howe](https://www.tandfonline.com/author/Howe%2C+Robert+Crombie)

Pages 133-136 | Published online: 08 Feb 2018

* [Download citation](https://www.tandfonline.com/action/showCitFormats?doi=10.5408%2F1089-9995-45.2.133)
* <https://doi.org/10.5408/1089-9995-45.2.133>

Crombie Howe, R., 1997, Geologic Contacts, Journal of Geoscience Education, Vol. 45, No. 2 p. 133-136.

Crombie Howe, R., 1987, Treatment of Geological Contacts in Introductory Geology Textbooks, Journal of Geoscience Education, Vol. 35, p. 22-25.

[overgrowth](http://bio-geo-terms.blogspot.com/2006/10/overgrowth.html)

Crystal **overgrowth** involves the partial mantling of a mineral:  
● by material of the same composition, or  
● by material of the same mineral species but different solid-solution composition, or  
● by an unrelated mineral.  
  
Overgrowth implies crystallographic continuity between the two participating minerals so far as permitted by their differing crystal structures. Where the overgrowth forms a more or less continuous *rim* around enclosed mineral, it is termed **a** **mantle**.