A Fragment of the GeoEvent Ontology

Final assignment for the Ontology Engineering class

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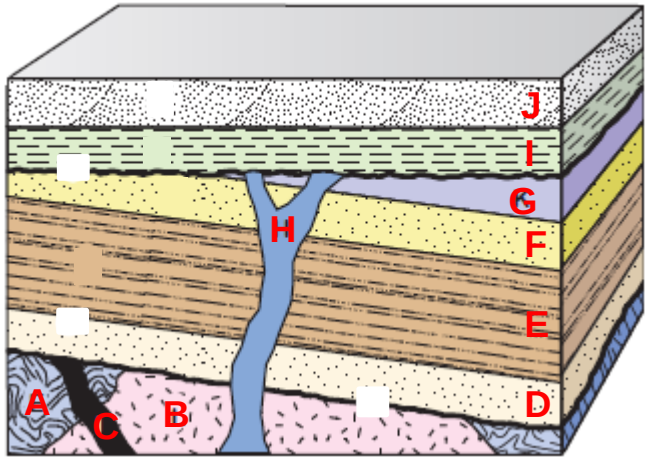
Date: 02/12/2021

Domain

The geological record is formed by a series of mesoscopic geological objects, that can be strata created by deposition events above Earth's surface, or plutons created after magma solidifies under surface. These geological objects (strata and plutons) are constituted by sediments or rock. Rocks can be divided into three main types, sedimentary, igneous, or metamorphic, based on the processes that created them; they also can be classified in clastic or crystalline rocks, based on their primary components. Each of these objects is related to neighbors, and by recognizing the nature of these relationships it is possible to infer the relative age of the events that created the geological objects. Strata are created by deposition and in this event, they overlie one or more objects, creating a depositional contact with them. Plutons are created by intrusion, creating an intrusive contact with the host objects around itself.



Ontologies used

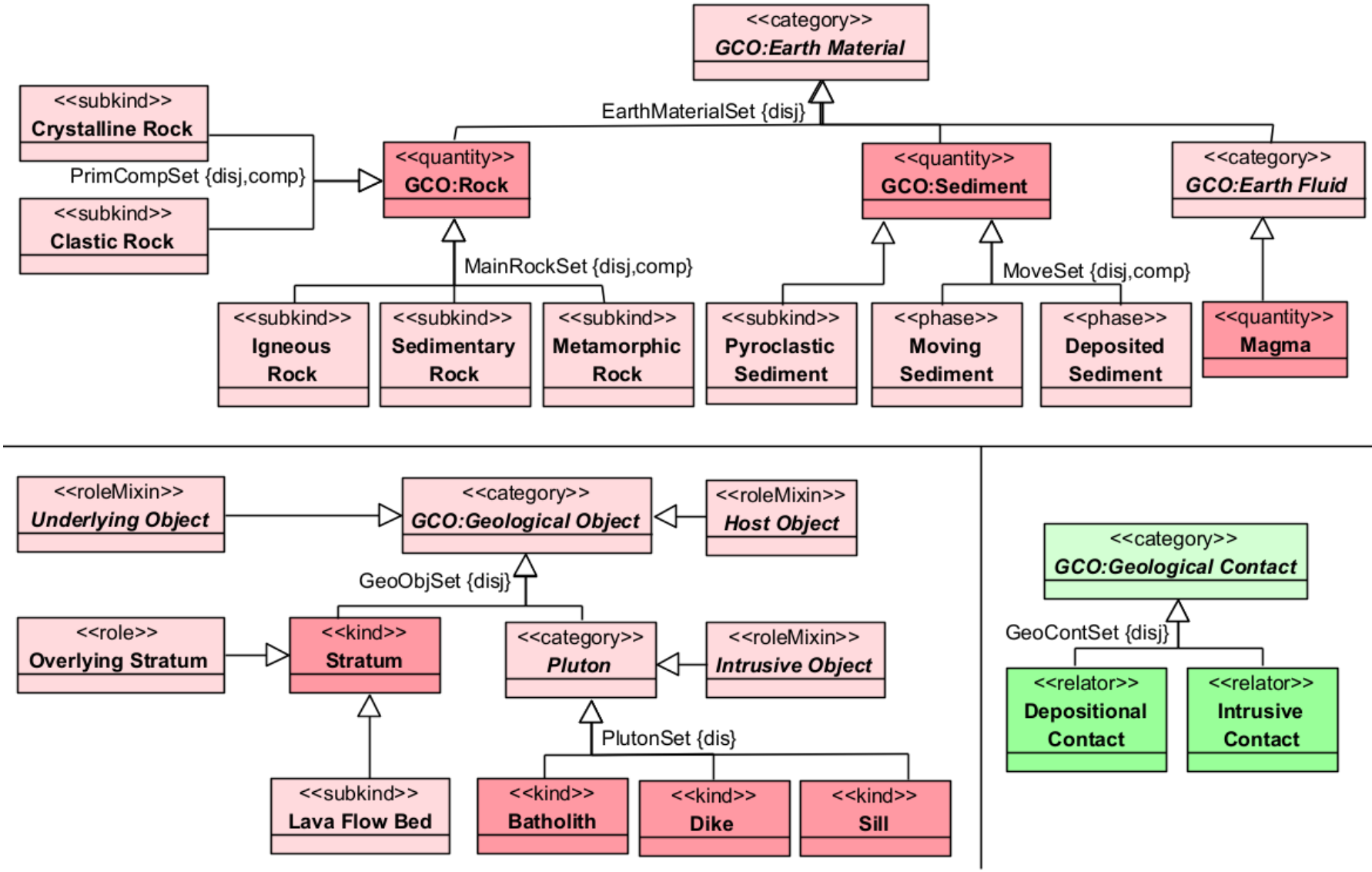
OntoUML
Guizzardi, G. (2005). Ontological foundations for structural conceptual models.

gUFO – A lightweight implementation of UFO, available in OWL.
https://nemo-ufes.github.io/gufo/

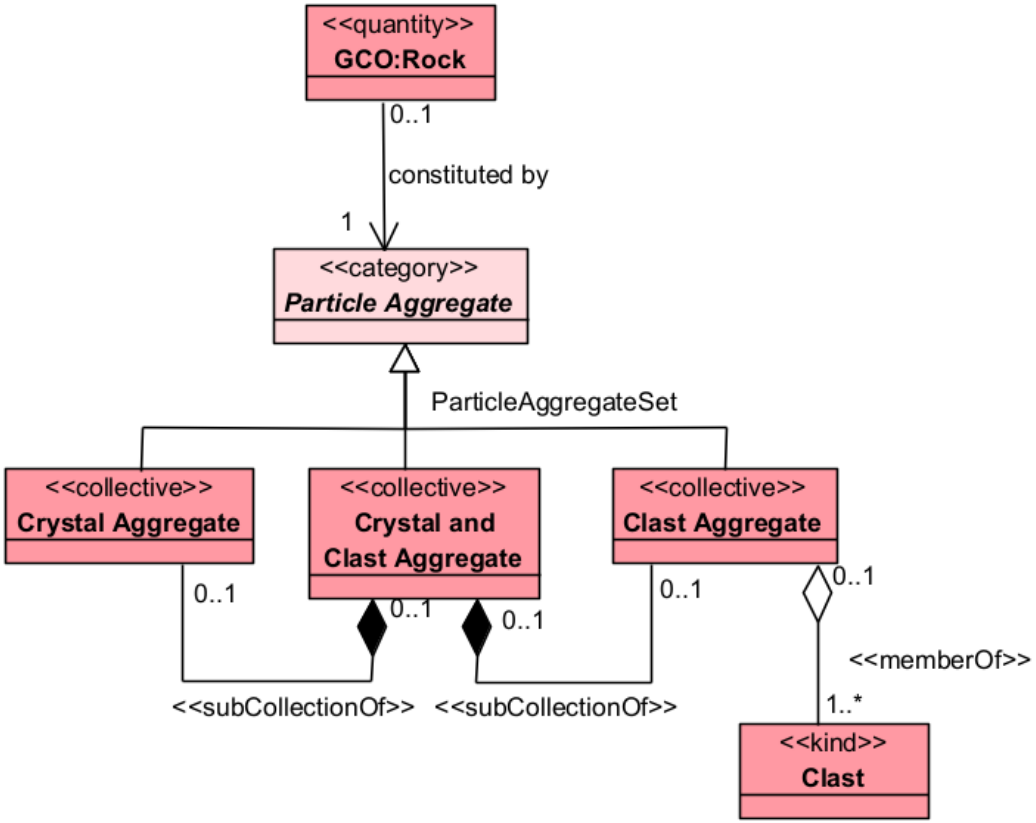
Geo Core Ontology – GCO
Garcia, L. F., Abel, M., Perrin, M., & dos Santos Alvarenga, R. (2020). The GeoCore ontology: A core ontology for general use in Geology. *Computers & Geosciences*, *135*, 104387.

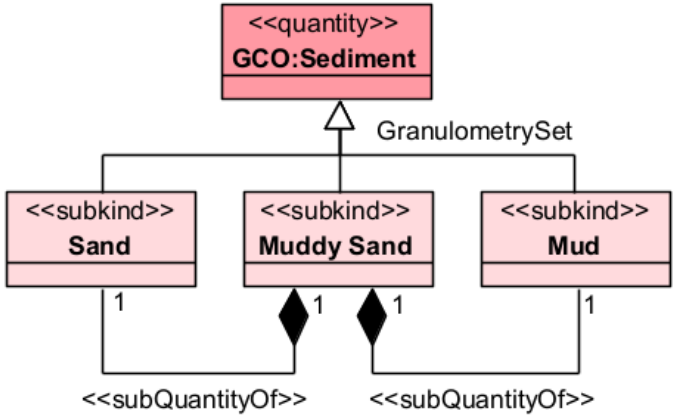
Geological Spatial Relation Ontology – GSRO
Cicconeto, F., Vieira, L. V., Abel, M., dos Santos Alvarenga, R., Carbonera, J. L., & de Janeiro–RJ–Brazil, R. (2020). A Spatial Relation Ontology for Deep-Water Depositional System Description in Geology. In *ONTOBRAS* (pp. 35-47).

Taxonomy of Endurants

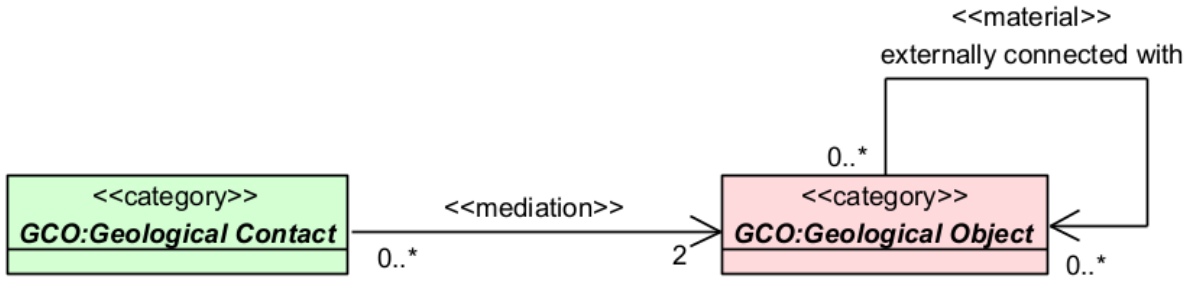


Some mereologic relations





Relators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externally connected with
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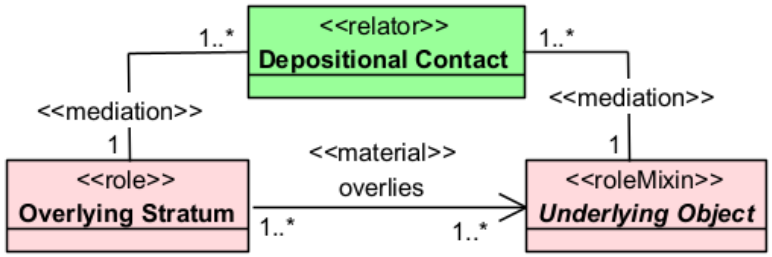
<<category>>
GCO:Geological Contact
<<mediation>>
0..*
2
<<category>>
GCO:Geological Object
0..*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Depositional Contact
1..*
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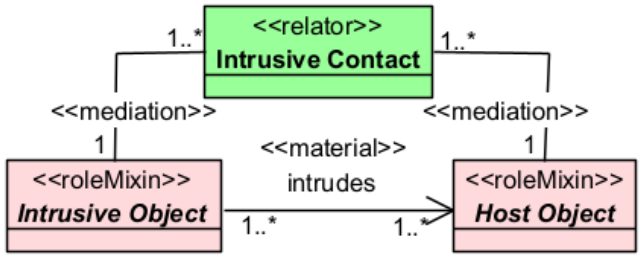
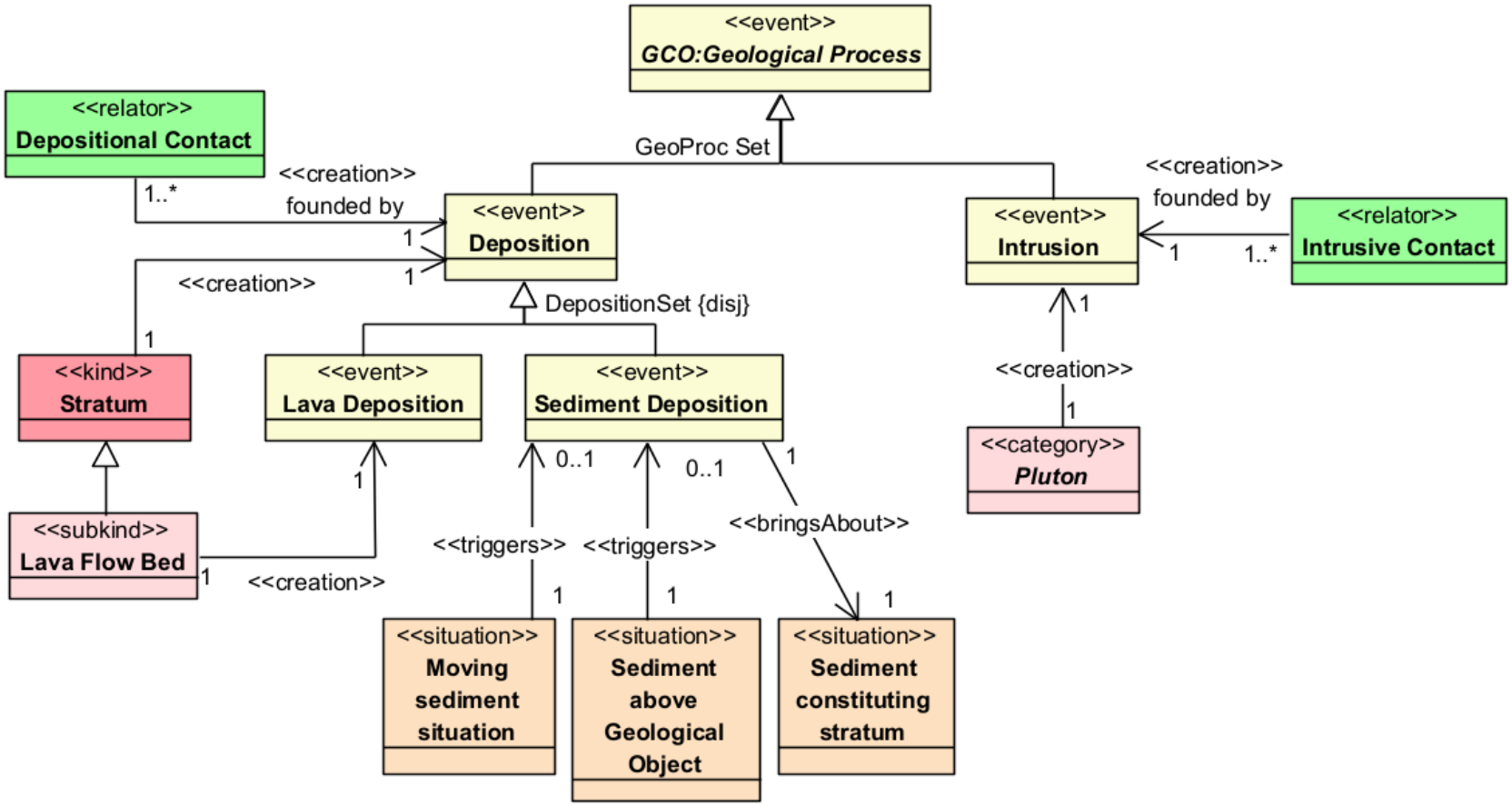
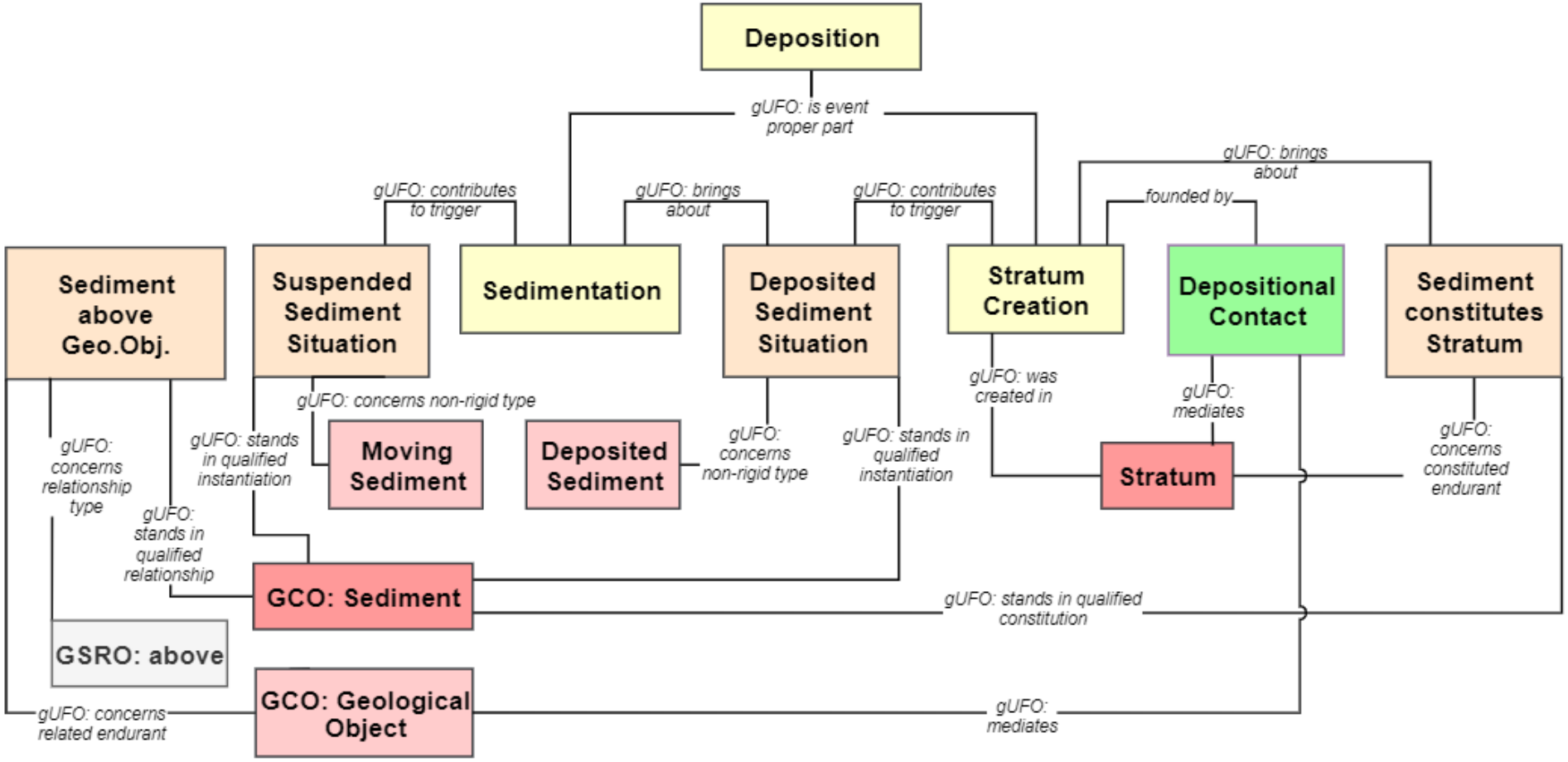
<<role>>
Overlying Stratum
<<material>>
overlies
1..*
1..*
<<mediation>>
1
<<roleMixin>>
Underlying Object


1..*
<<relator>>
Intrusive Contact
1..*
<<mediation>>
1
<<roleMixin>>
Intrusive Object
<<material>>
intrudes
1..*
1..*
<<mediation>>
1
<<roleMixin>>
Host Object

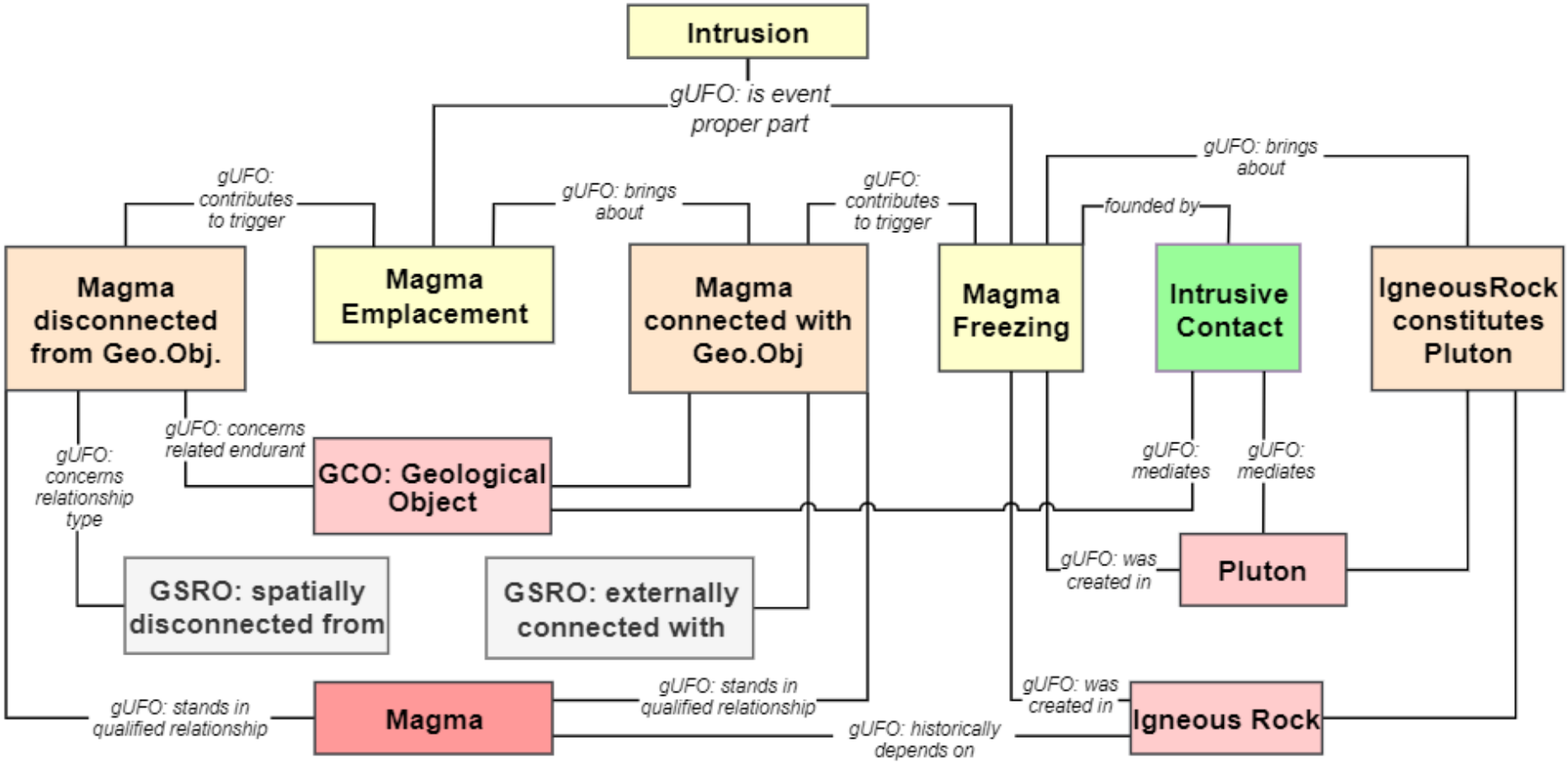
Events, Situations, and things that are created



Detailing Deposition in gUFO



Detailing Intrusion in gUFO



Protege

- Individual
  - AbstractIndividual
  - ConcreteIndividual
    - Endurant
      - Aspect
      - Object
        - Collection
        - FunctionalComplex
          - GCO:Geological Object
            - Clast
            - Host Object
            - Pluton
              - Batholith
              - Dike
              - Intrusive Object
              - Sill
            - Stratum
              - Lava Flow Bed
              - Overlying Stratum
            - Underlying Object
        - Quantity
          - GCO:Earth Material
            - GCO:Earth Fluid
            - GCO:Rock
              - Clastic Rock
                - Pyroclastic Rock
                - Sandstone
              - Crystalline Rock
              - Igneous Rock
                - Pyroclastic Rock
              - MetamorphicRock
              - Sedimentary Rock
                - Sandstone
            - GCO:Sediment
              - Deposited Sediment
              - Moving Sediment
              - Mud
              - Muddy Sand
              - Pyroclastic Sediment
              - Sand
    - Event
      - GCO:Geological Process
        - Deposition
          - Lava Deposition
          - Sediment Deposition
        - Intrusion
      - Participation

Class Hierarchy

Annotations: Pluton

Annotations

rdfs:label [language: en]

Pluton

rdfs:comment [language: en]

Pluton is a geological object that is created by an intrusion and it is constituted by crystalline igneous rock

exampleOfUse [language: en]

The Kozak pluton is located in central western Anatolia, where it crops out in the core of an antiformal culmination. The pluton was emplaced into regionally deformed and metamorphosed basement rocks, during the Late Oligocene-Early Miocene period.

source [language: en]

Winter, J. D. (2014). Principles of igneous and metamorphic petrology (Vol. 2). Harlow, UK: Pearson education.

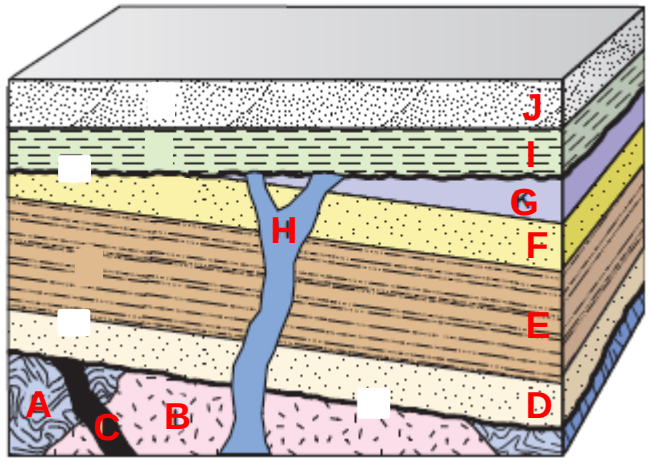
synonym [language: en]

intrusive igneous body

Example of annotation

Application in some instances

- 0A_object_A
- 0A_rock_A
- 0B_object_B
- 0B_rock_B
- 0C_object_C
- 0C_rock_C
- 0D_object_D
- 0D_rock_D
- 0E_object_E
- 0E_rock_E
- 0F_object_F
- 0F_rock_F
- 0G_object_G
- 0G_rock_G
- 0H_object_H
- 0H_rock_H
- 0I_object_I
- 0I_rock_I
- 0J_object_J
- 0J_rock_J
- 1_contact_A_B



Description: 0C_object_C

Types

- Dike
- 'Intrusive Object'
- 'Underlying Object'

Property assertions: 0C_object_C

Object property assertions

- intrudes 0A_object_A
- intrudes 0B_object_B
- 'constituted by' 0C_rock_C