KnowWhereGraph Ontology: Fast Forward Through Data Acquisition and Integration

Contributors:

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Contents

List of Figures

1 Overview

We are presenting the ontology which drives the data gathering and integration done as part of the project *Enslaved: People of the Historic Slave Trade*,[1] funded by The Andrew W. Mellon Foundation through Michigan State University's Matrix: The Center for digital Humanities & Social Sciences.

Development of the ontology was a collaborative effort and was carried out using the principles laid out in, e.g., [Krisnadhi et al., 2015, Krisnadhi and Hitzler, 2016, Krisnadhi et al., 2016]. The modeling team included domain experts, data experts, software developers, and ontology engineers.

The ontology has, in particular, be developed as a *modular* ontology [Hitzler et al., 2017] based on ontology design patterns [Hitzler et al., 2016]. This means, in a nutshell, that we first identified key terms relating to the data content and expert perspectives on the domain to be modeled, and then developed ontology modules for these terms. The resulting modules, which were informed by corresponding ontology design patterns, are listed and discussed in Chapter 2. The Enslaved Ontology, assembled from these modules, is then presented in Chapter **??**.

For background regarding Semantic Web standards, in particular the Web Ontology Language OWL, including its relation to description logics, we refer the reader to [Hitzler et al., 2012, Hitzler et al., 2010].

Primer on Ontology Axioms

Logical axioms are presented (mostly) in description logic notation, which can be directly translated into the Web Ontology Language OWL [Hitzler et al., 2010]. We use description logic notation because it is, in the end, easier for humans to read than any of the other serializations.[2]

Logical axioms serve many purposes in ontology modeling and engineering [Hitzler and Krisnadhi, 2016]; in our context, the primary reason why we choose a strong axiomatization is to disambiguate the ontology.

Almost all axioms which are part of the Enslaved Ontology are of the straightforward and local types. We will now describe these types in more detail, as it will make it much easier to understand the axiomatization of the Enslaved Ontology.

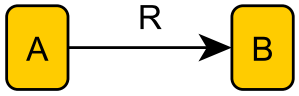

Figure 1.1: Generic node-edge-node schema diagram for explaining systematic axiomatization

[1] `http://enslaved.org/`

[2] Preliminary results supporting this claim can be found in [Shimizu, 2017].

1. $A \sqsubseteq B$
2. $A \sqcap B \sqsubseteq \bot$
3. $\exists R.\top \sqsubseteq A$
4. $\exists R.B \sqsubseteq A$
5. $\top \sqsubseteq \forall R.B$
6. $A \sqsubseteq \forall R.B$
7. $A \sqsubseteq R.B$
8. $B \sqsubseteq R^-.A$
9. $\top \sqsubseteq \leq 1R.\top$
10. $\top \sqsubseteq \leq 1R.B$
11. $A \sqsubseteq \leq 1R.\top$
12. $A \sqsubseteq \leq 1R.B$
13. $\top \sqsubseteq \leq 1R^-.\top$
14. $\top \sqsubseteq \leq 1R^-.A$
15. $B \sqsubseteq \leq 1R^-.\top$
16. $B \sqsubseteq \leq 1R^-.A$
17. $A \sqsubseteq \geq 0R.B$

Figure 1.2: Most common axioms which could be produced from a single edge R between nodes A and B in a schema diagram: description logic notation.

There is a systematic way to look at each node-edge-node triple in a schema diagram in order to decide on some of the axioms which should be added: Given a node-edge-node triple with nodes A and B and edge R from A to B, as depicted in Figure 1.1, we check all of the following axioms whether they should be included.[3] We list them in natural language, see Figure 1.2 for the formal versions in description logic notation, and Figure 1.3 for the same in Manchester syntax, where we also list our names for these axioms.

1. A is a subClass of B.
2. A and B are disjoint.
3. The domain of R is A.
4. For every B which has an inverse R-filler, this inverse R-filler is in A. In other words, the domain of R, scoped by B, is A.
5. The range of R is B.
6. For every A which has an R-filler, this R-filler is in B. In other words, the range of R, scoped by A, is B.
7. For every A there has to be an R-filler in B.
8. For every B there has to be an inverse R-filler in A.
9. R is functional.
10. R has at most one filler in B.
11. For every A there is at most one R-filler.
12. For every A there is at most one R-filler in B.
13. R is inverse functional.
14. R has at most one inverse filler in A.
15. For every B there is at most one inverse R-filler.
16. For every B there is at most one inverse R-filler in A.
17. An A may have an R-filler in B.

Domain and range axoims are items 2–5 in this list. Items 6 and 7 are extistential axioms. Items 8–15 are about variants of functionality and inverse functionality. All axiom types except disjointness and those utilizing inverses also apply to datatype properties.

Structural tautologies are, indeed, tautologies, i.e., they do not carry any formal logical content. However as argued in [Hitzler and Krisnadhi, 2016] they can help humans to understand the ontology, by indicating *possible* relationships, i.e., relationships intended by the modeler which, however, cannot be cast into non-tautological axioms.

[3] The OWLAx Protégé plug-in [Sarker et al., 2016] provides a convenient interface for adding these axioms.

1. A SubClassOf B (subClass)
2. A DisjointWith B (disjointness)
3. R some `owl:Thing` SubClassOf A (domain)
4. R some B SubClassOf A (scoped domain)
5. `owl:Thing` SubClassOf R only B (range)
6. A SubClassOf R only B (scoped range)
7. A SubClassOf R some B (existential)
8. B SubClassOf inverse R some A (inverse existential)
9. `owl:Thing` SubClassOf R max 1 `owl:Thing` (functionality)
10. `owl:Thing` SubClassOf R max 1 B (qualified functionality)
11. A SubClassOf R max 1 `owl:Thing` (scoped functionality)
12. A SubClassOf R max 1 B (qualified scoped functionality)
13. `owl:Thing` SubClassOf inverse R max 1 `owl:Thing` (inverse functionality)
14. `owl:Thing` SubClassOf inverse R max 1 A (inverse qualified functionality)
15. B SubClassOf inverse R max 1 `owl:Thing` (inverse scoped functionality)
16. B SubClassOf inverse R max 1 A (inverse qualified scoped functionality)
17. A SubClassOf R min 0 B (structural tautology)

Figure 1.3: Most common axioms which could be produced from a single edge R between nodes A and B in a schema diagram: Manchester syntax.

Explanations Regarding Schema Diagrams

We utilize schema diagrams to visualize the ontology. In our experience, simple diagrams work best for this purpose. The reader needs to bear in mind, though, that these diagrams are ambiguous and incomplete visualizations of the ontology (or module), as the actual ontology (or module) is constituted by the set of axioms provided.

We use the following visuals in our diagrams:

rectangular box with solid frame and orange fill: a class
rectangual box with dashed frame and blue fill: a module, which is described in more detail elsewhere in the document
rectangular box with dashed frame and purple fill: a set of URIs constituting a controlled vocabulary
oval with solid frame and yellow fill: a data type
arrow with white head and no label: a subClass relationship
arrow with solid tip and label: a relationship (or property) other than a subClass relationship

2 Modules

We list the individual modules of the ontology, together with their axioms and explanations thereof. Each axiom is listed only once (for now), i.e. some axioms pertaining to a module may be found in the axiom set listed for an earlier listed module. Schema diagrams are provided throughout, but the reader should keep in mind that while schema diagrams are very useful for understanding an ontology [Karima et al., 2017], they are also inherently ambiguous.

2.1 Bluesky Forecast Airfire

2.1.1 Overview

I am the overview.

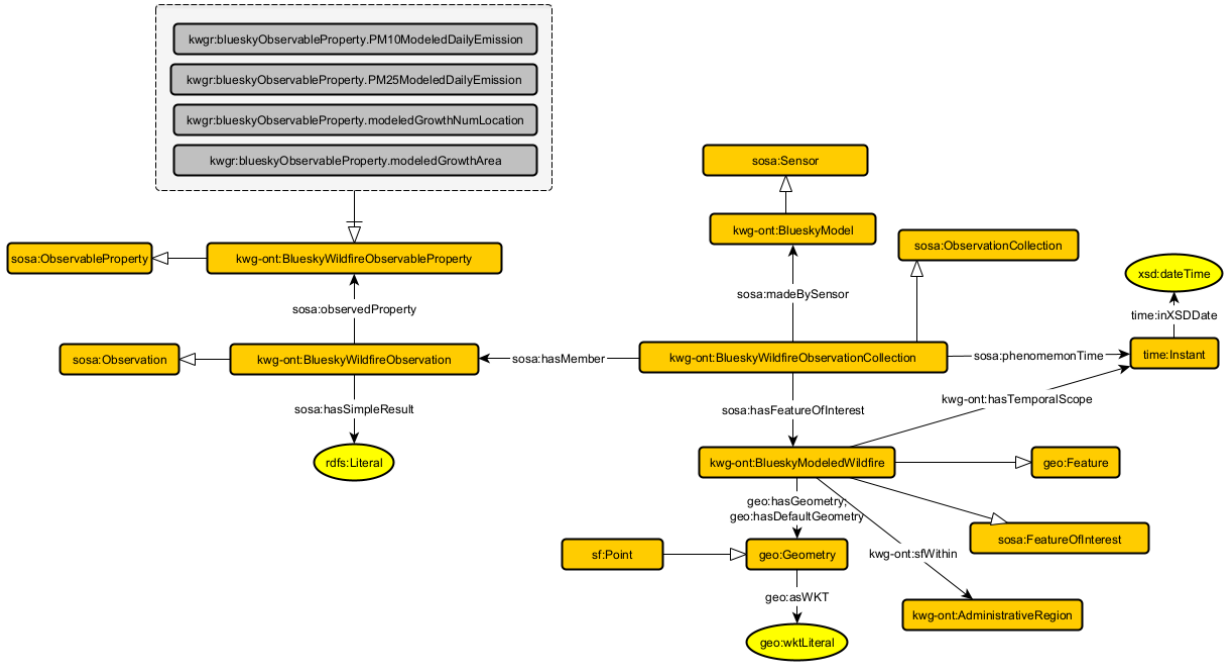

Figure 2.1: The schema diagram for the Bluesky Forecast Airfire.

2.1.2 Axioms

$$AdministrativeRegion subClassOf : Region \quad (1)$$

$$AdministrativeRegion subClassOf : geo : Feature \quad (2)$$

$$AdministrativeRegion_3 subClassOf : AdministrativeRegion \quad (3)$$

$$AdministrativeRegion_3 subClassOf : AdministrativeRegion \quad (4)$$
$$BlueskyModel subClassOf : Sensor \quad (5)$$
$$BlueskyModeledWildfire subClassOf : geo : Feature \quad (6)$$
$$BlueskyModeledWildfire subClassOf : FeatureOfInterest \quad (7)$$
$$BlueskyWildfireObservableProperty subClassOf : ObservableProperty \quad (8)$$
$$BlueskyWildfireObservation subClassOf : Observation \quad (9)$$
$$BlueskyWildfireObservationCollection subClassOf : ObservationCollection \quad (10)$$
$$S2Cell subClassOf : Cell \quad (11)$$
$$AdministrativeRegion subClassOf : Region \quad (12)$$
$$S2Cell subClassOf : Cell \quad (13)$$
$$AdministrativeRegion subClassOf : geo : Feature \quad (14)$$
$$BlueskyModeledWildfire subClassOf : geo : Feature \quad (15)$$
$$BlueskyModeledWildfire subClassOf : FeatureOfInterest \quad (16)$$
$$BlueskyWildfireObservableProperty subClassOf : ObservableProperty \quad (17)$$
$$BlueskyWildfireObservation subClassOf : Observation \quad (18)$$
$$BlueskyWildfireObservationCollection subClassOf : ObservationCollection \quad (19)$$
$$BlueskyModel subClassOf : Sensor \quad (20)$$
$$hasTemporalScope some time : Instant \quad (21)$$
$$geo : hasDefaultGeometry some geo : Geometry \quad (22)$$
$$geo : hasGeometry some geo : Geometry \quad (23)$$
$$spatialRelation only AdministrativeRegion_3 \quad (24)$$
$$spatialRelation only S2Cell \quad (25)$$
$$observedProperty some BlueskyWildfireObservableProperty \quad (26)$$
$$hasSimpleResult some rdfs : Literal \quad (27)$$
$$hasFeatureOfInterest some BlueskyModeledWildfire \quad (28)$$
$$hasMember some BlueskyWildfireObservation \quad (29)$$
$$madeBySensor some BlueskyModel \quad (30)$$
$$phenomenonTime some time : Instant \quad (31)$$

2.2 Soil Ssurgo Usda

2.2.1 Overview

I am the overview.

2.2.2 Axioms

$$GeometryCollection subClassOf : geo : SpatialObject \quad (1)$$
$$S2Cell subClassOf : geo : SpatialObject \quad (2)$$
$$SoilMapUnit subClassOf : geo : Feature \quad (3)$$

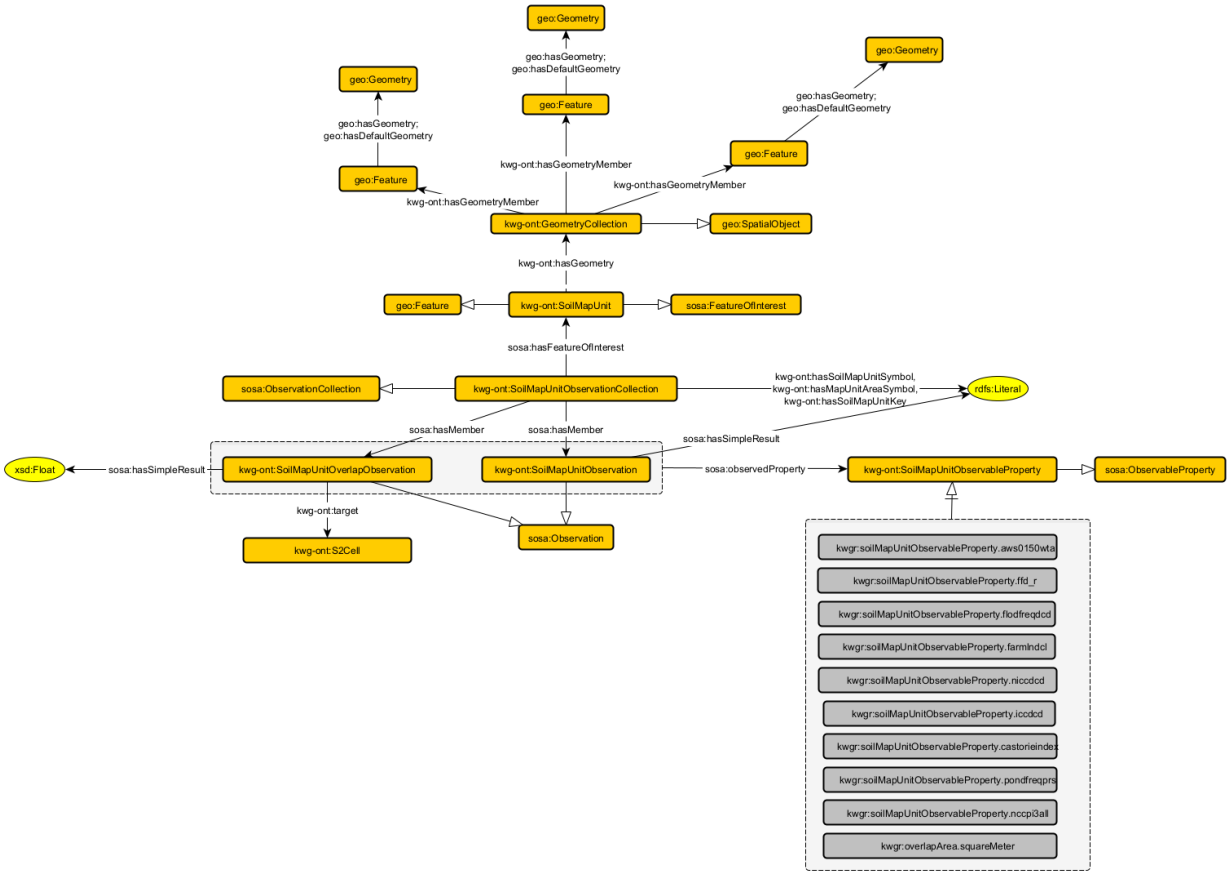

Figure 2.2: The schema diagram for the Soil Ssurgo Usda.

$$SoilMapUnitsubClassOf : FeatureOfInterest \tag{4}$$
$$SoilMapUnitObservablePropertysubClassOf : ObservableProperty \tag{5}$$
$$SoilMapUnitObservationsubClassOf : Observation \tag{6}$$
$$SoilMapUnitObservationCollectionsubClassOf : ObservationCollection \tag{7}$$
$$SoilMapUnitOverlapObservationsubClassOf : Observation \tag{8}$$
$$SoilMapUnitsubClassOf : geo : Feature \tag{9}$$
$$GeometryCollectionsubClassOf : geo : SpatialObject \tag{10}$$
$$S2CellsubClassOf : geo : SpatialObject \tag{11}$$
$$SoilMapUnitsubClassOf : FeatureOfInterest \tag{12}$$
$$SoilMapUnitObservablePropertysubClassOf : ObservableProperty \tag{13}$$
$$SoilMapUnitObservationsubClassOf : Observation \tag{14}$$
$$SoilMapUnitOverlapObservationsubClassOf : Observation \tag{15}$$
$$SoilMapUnitObservationCollectionsubClassOf : ObservationCollection \tag{16}$$
$$hasGeometryMembersomegeo : Feature \tag{17}$$
$$hasGeometrysomeGeometryCollection \tag{18}$$

$$observedPropertysomeSoilMapUnitObservableProperty \quad (19)$$
$$hasSimpleResultsomerdfs : Literal \quad (20)$$
$$hasFeatureOfInterestsomeSoilMapUnit \quad (21)$$
$$hasMembersomeSoilMapUnitObservation \quad (22)$$
$$hasMembersomeSoilMapUnitOverlapObservation \quad (23)$$
$$hasMapUnitAreaSymbolsomerdfs : Literal \quad (24)$$
$$hasSoilMapUnitKeysomerdfs : Literal \quad (25)$$
$$hasSoilMapUnitSymbolsomerdfs : Literal \quad (26)$$
$$targetsomeS2Cell \quad (27)$$
$$observedPropertysomeSoilMapUnitObservableProperty \quad (28)$$
$$geo : hasGeometrysomegeo : Geometry \quad (29)$$

2.3 Meta Description

2.3.1 Overview

I am the overview.

2.3.2 Axioms

$$GeometryCollectionsubClassOf : geo : SpatialObject \quad (1)$$
$$S2CellsubClassOf : geo : SpatialObject \quad (2)$$
$$SoilMapUnitsubClassOf : geo : Feature \quad (3)$$
$$SoilMapUnitsubClassOf : FeatureOfInterest \quad (4)$$
$$SoilMapUnitObservablePropertysubClassOf : ObservableProperty \quad (5)$$
$$SoilMapUnitObservationsubClassOf : Observation \quad (6)$$
$$SoilMapUnitObservationCollectionsubClassOf : ObservationCollection \quad (7)$$
$$SoilMapUnitOverlapObservationsubClassOf : Observation \quad (8)$$
$$SoilMapUnitsubClassOf : geo : Feature \quad (9)$$
$$GeometryCollectionsubClassOf : geo : SpatialObject \quad (10)$$
$$S2CellsubClassOf : geo : SpatialObject \quad (11)$$
$$SoilMapUnitsubClassOf : FeatureOfInterest \quad (12)$$
$$SoilMapUnitObservablePropertysubClassOf : ObservableProperty \quad (13)$$
$$SoilMapUnitObservationsubClassOf : Observation \quad (14)$$
$$SoilMapUnitOverlapObservationsubClassOf : Observation \quad (15)$$
$$SoilMapUnitObservationCollectionsubClassOf : ObservationCollection \quad (16)$$
$$hasGeometryMembersomegeo : Feature \quad (17)$$
$$hasGeometrysomeGeometryCollection \quad (18)$$
$$observedPropertysomeSoilMapUnitObservableProperty \quad (19)$$
$$hasSimpleResultsomerdfs : Literal \quad (20)$$

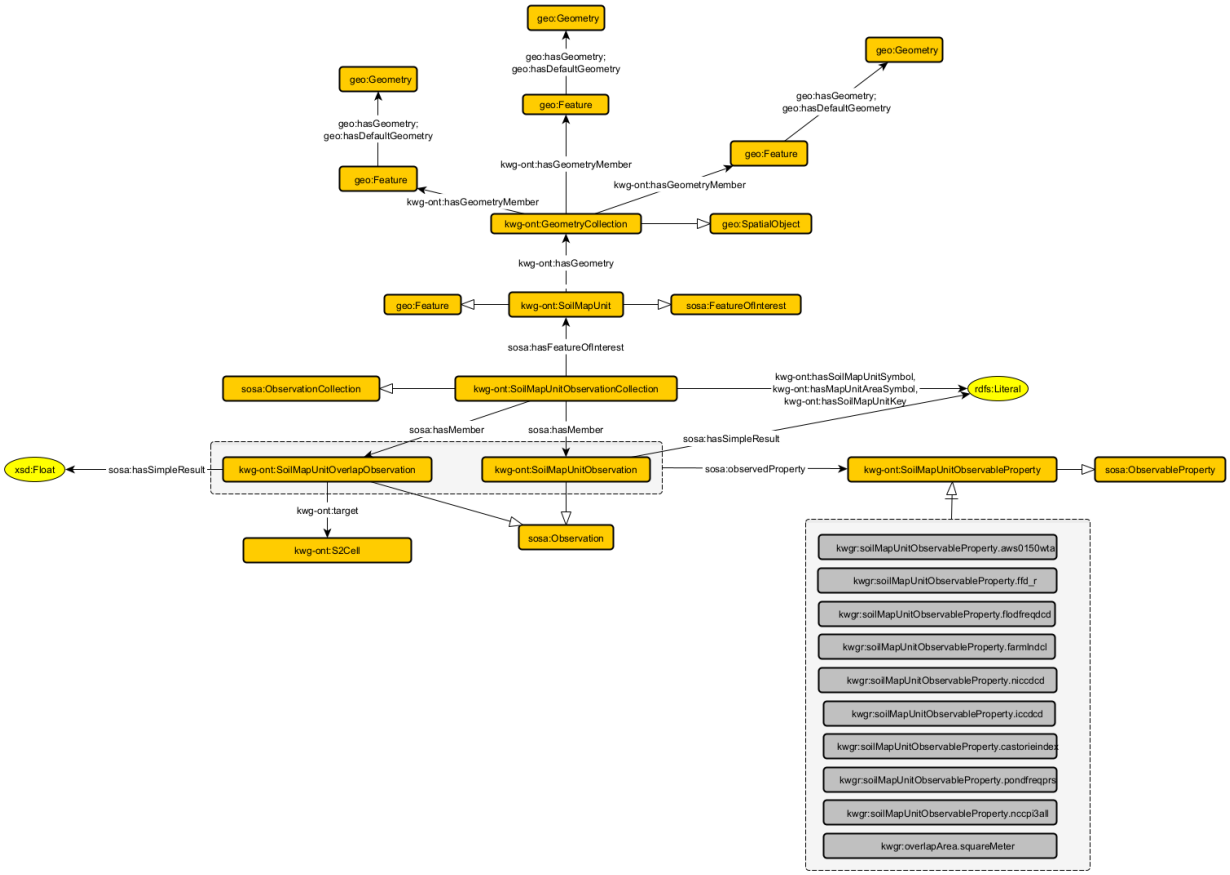

Figure 2.3: The schema diagram for the Meta Description.

$$hasFeatureOfInterestsomeSoilMapUnit \tag{21}$$
$$hasMembersomeSoilMapUnitObservation \tag{22}$$
$$hasMembersomeSoilMapUnitOverlapObservation \tag{23}$$
$$hasMapUnitAreaSymbolsomerdfs:Literal \tag{24}$$
$$hasSoilMapUnitKeysomerdfs:Literal \tag{25}$$
$$hasSoilMapUnitSymbolsomerdfs:Literal \tag{26}$$
$$targetsomeS2Cell \tag{27}$$
$$observedPropertysomeSoilMapUnitObservableProperty \tag{28}$$
$$geo:hasGeometrysomegeo:Geometry \tag{29}$$

2.4 Federal Judicial District Doj

2.4.1 Overview

I am the overview.

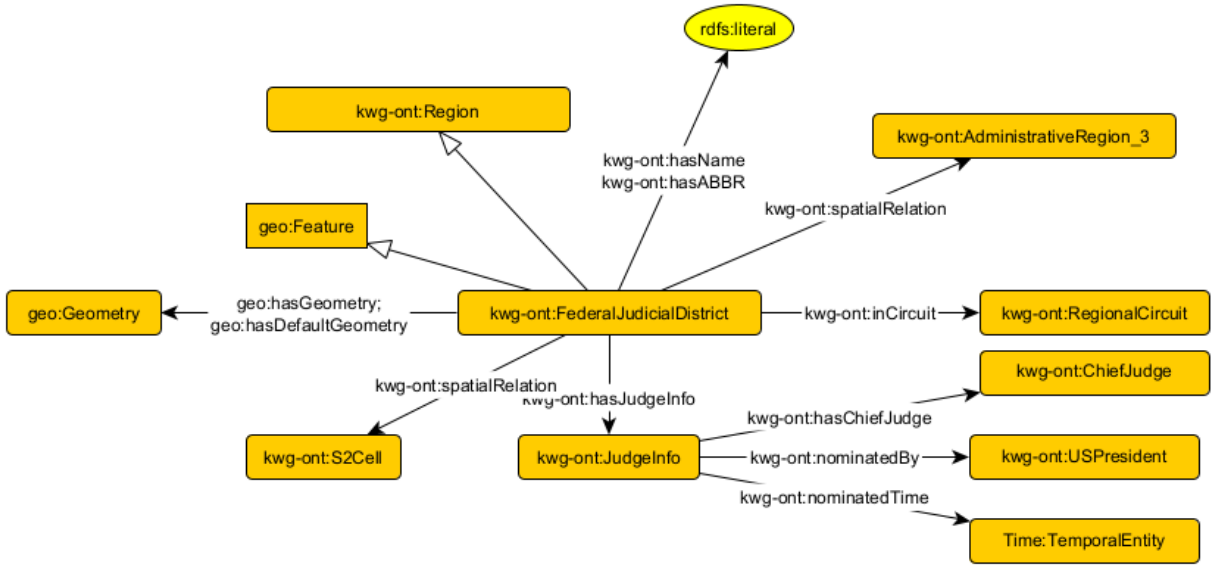

Figure 2.4: The schema diagram for the Federal Judicial District Doj.

2.4.2 Axioms

$$AdministrativeRegion_3 subClassOf : AdministrativeRegion \quad (1)$$
$$AdministrativeRegion_3 subClassOf : AdministrativeRegion \quad (2)$$
$$FederalJudicalDistrict subClassOf : geo : Feature \quad (3)$$
$$FederalJudicalDistrict subClassOf : geo : Feature \quad (4)$$
$$geo : hasDefaultGeometry some geo : Geometry \quad (5)$$
$$geo : hasGeometry some geo : Geometry \quad (6)$$
$$hasJudgeInfo only JudegeInfo \quad (7)$$
$$inCircuit only RegionalCircuit \quad (8)$$
$$nominatedBy only USPresident \quad (9)$$
$$nominatedTime only time : TemporalEntity \quad (10)$$
$$geo : spatialRelation only AdministrativeRegion_3 \quad (11)$$
$$geo : spatialRelation only S2Cell \quad (12)$$
$$geo : hasName some rdfs : Literal \quad (13)$$
$$hasABBR some rdfs : Literal \quad (14)$$
$$hasChiefJudge some ChiefJudge \quad (15)$$
$$nominatedBy some USPresident \quad (16)$$
$$nominatedTime some time : TemporalEntity \quad (17)$$

2.5 Climate Divisions Observations Noaa

2.5.1 Overview

I am the overview.

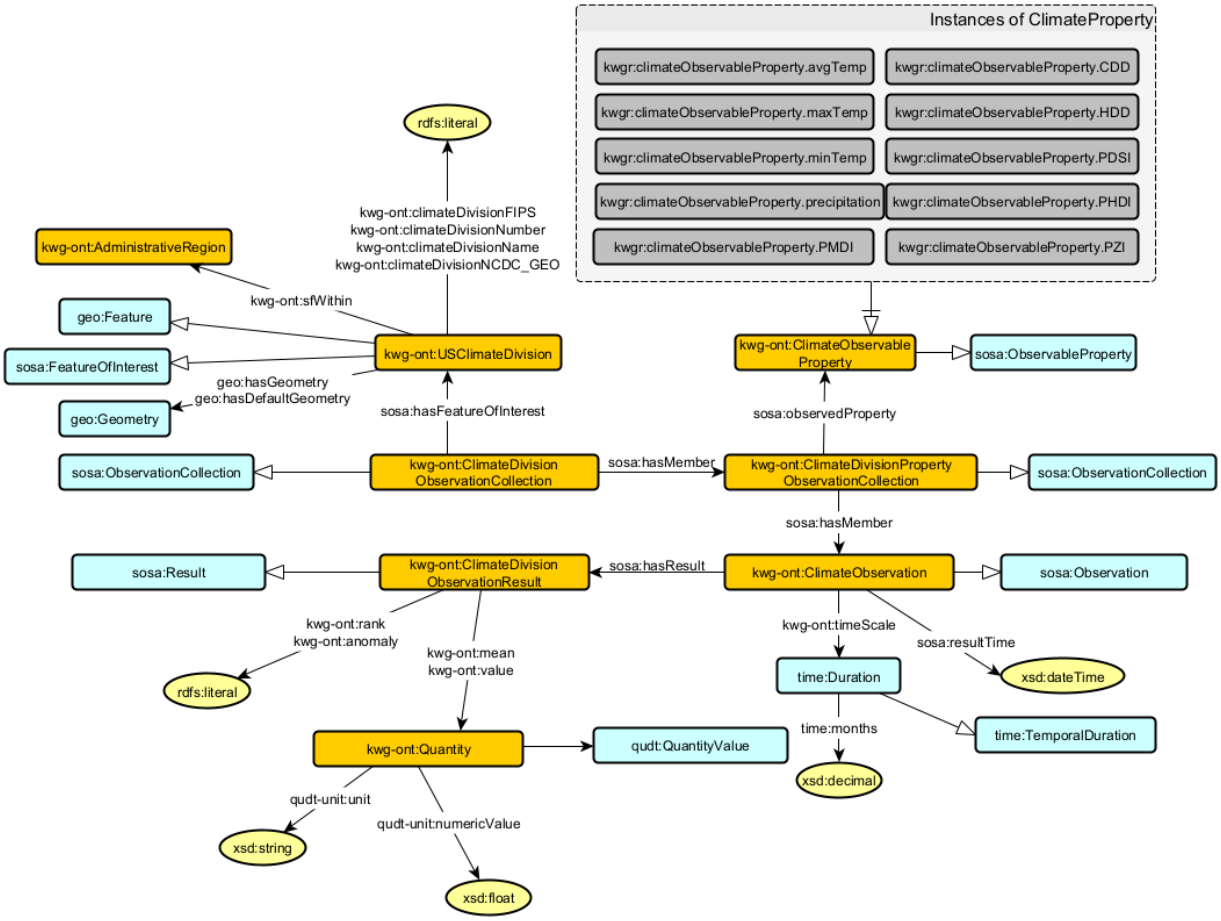

Figure 2.5: The schema diagram for the Climate Divisions Observations Noaa.

2.5.2 Axioms

$$QuantitysubClassOf : qudt : QuantityValue \quad (1)$$

$$AdministrativeRegionsubClassOf : Region \quad (2)$$

$$AdministrativeRegionsubClassOf : geo : Feature \quad (3)$$

$$AdministrativeRegion_3subClassOf : AdministrativeRegion \quad (4)$$

$$AdministrativeRegion_3subClassOf : AdministrativeRegion \quad (5)$$

$$S2CellsubClassOf : Cell \quad (6)$$

$$ClimateDivisionObservationCollectionsubClassOf : ObservationCollection \quad (7)$$

$$ClimateDivisionObservationResultsubClassOf : Result \quad (8)$$
$$ClimateDivisionPropertyObservationCollectionsubClassOf : ObservationCollection \quad (9)$$
$$ClimateObservablePropertysubClassOf : ObservableProperty \quad (10)$$
$$ClimateObservationsubClassOf : Observation \quad (11)$$
$$QuantitysubClassOf : qudt : QuantityValue \quad (12)$$
$$AdministrativeRegionsubClassOf : Region \quad (13)$$
$$USClimateDivisionsubClassOf : Region \quad (14)$$
$$S2CellsubClassOf : Cell \quad (15)$$
$$USClimateDivisionsubClassOf : Region \quad (16)$$
$$USClimateDivisionsubClassOf : geo : Feature \quad (17)$$
$$USClimateDivisionsubClassOf : FeatureOfInterest \quad (18)$$
$$AdministrativeRegionsubClassOf : geo : Feature \quad (19)$$
$$USClimateDivisionsubClassOf : geo : Feature \quad (20)$$
$$time : DurationsubClassOf : time : TemporalDuration \quad (21)$$
$$time : DurationsubClassOf : time : TemporalDuration \quad (22)$$
$$USClimateDivisionsubClassOf : FeatureOfInterest \quad (23)$$
$$ClimateObservablePropertysubClassOf : ObservableProperty \quad (24)$$
$$ClimateObservationsubClassOf : Observation \quad (25)$$
$$ClimateDivisionObservationCollectionsubClassOf : ObservationCollection \quad (26)$$
$$ClimateDivisionPropertyObservationCollectionsubClassOf : ObservationCollection \quad (27)$$
$$ClimateDivisionObservationResultsubClassOf : Result \quad (28)$$
$$hasFeatureOfInterestsomeUSClimateDivision \quad (29)$$
$$hasMembersomeClimateDivisionPropertyObservationCollection \quad (30)$$
$$meansomeQuantity \quad (31)$$
$$valuesomeQuantity \quad (32)$$
$$anomalysomerdfs : Literal \quad (33)$$
$$ranksomerdfs : Literal \quad (34)$$
$$hasMembersomeClimateObservation \quad (35)$$
$$observedPropertysomeClimateObservableProperty \quad (36)$$
$$timeScalesometime : Duration \quad (37)$$
$$hasResultsomeClimateDivisionObservationResult \quad (38)$$
$$hasDefaultGeometrysomeGeometry \quad (39)$$
$$geo : hasGeometrysomeGeometry \quad (40)$$
$$spatialRelationonlyAdministrativeRegion_3 \quad (41)$$
$$spatialRelationonlyS2Cell \quad (42)$$
$$time : monthssomexsd : decimal \quad (43)$$

2.6 Kwg Lite

2.6.1 Overview

I am the overview.

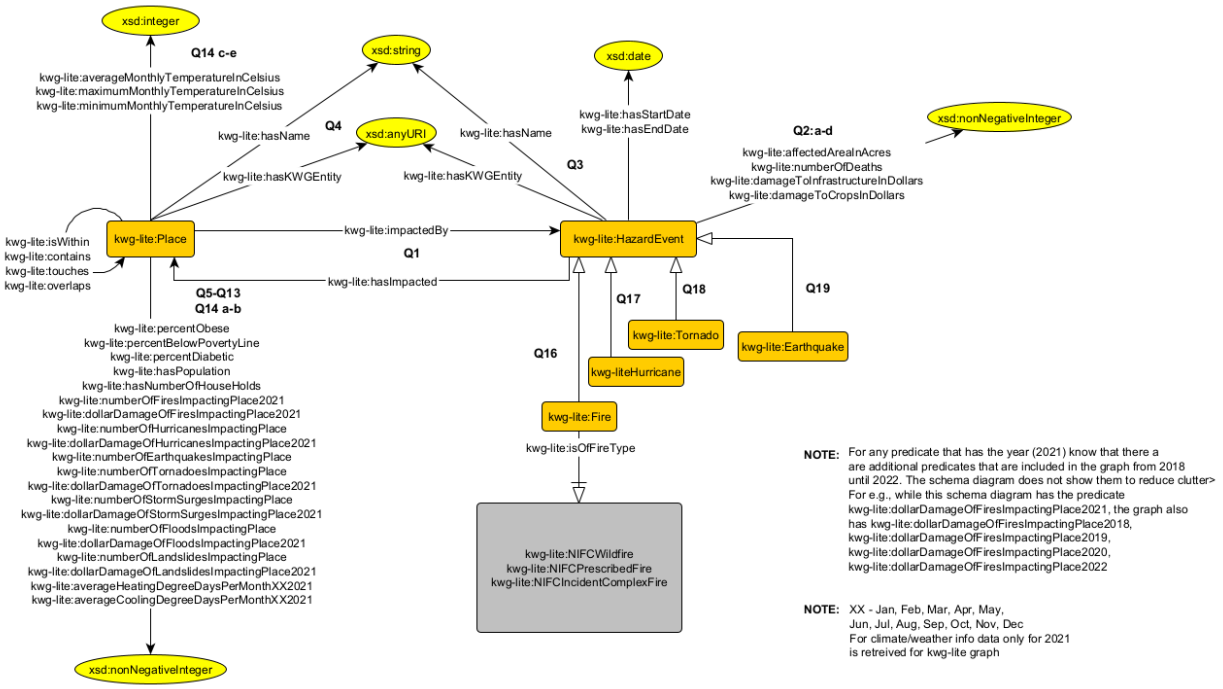

Figure 2.6: The schema diagram for the Kwg Lite.

2.6.2 Axioms

$$Quantity subClassOf : qudt : QuantityValue \quad (1)$$

$$AdministrativeRegion subClassOf : Region \quad (2)$$

$$AdministrativeRegion subClassOf : geo : Feature \quad (3)$$

$$AdministrativeRegion_3 subClassOf : AdministrativeRegion \quad (4)$$

$$AdministrativeRegion_3 subClassOf : AdministrativeRegion \quad (5)$$

$$S2Cell subClassOf : Cell \quad (6)$$

$$ClimateDivisionObservationCollection subClassOf : ObservationCollection \quad (7)$$

$$ClimateDivisionObservationResult subClassOf : Result \quad (8)$$

$$ClimateDivisionPropertyObservationCollection subClassOf : ObservationCollection \quad (9)$$

$$ClimateObservableProperty subClassOf : ObservableProperty \quad (10)$$

$$ClimateObservation subClassOf : Observation \quad (11)$$

$$Quantity subClassOf : qudt : QuantityValue \quad (12)$$

$$AdministrativeRegion subClassOf : Region \quad (13)$$
$$USClimateDivision subClassOf : Region \quad (14)$$
$$S2Cell subClassOf : Cell \quad (15)$$
$$USClimateDivision subClassOf : Region \quad (16)$$
$$USClimateDivision subClassOf : geo : Feature \quad (17)$$
$$USClimateDivision subClassOf : FeatureOfInterest \quad (18)$$
$$AdministrativeRegion subClassOf : geo : Feature \quad (19)$$
$$USClimateDivision subClassOf : geo : Feature \quad (20)$$
$$time : Duration subClassOf : time : TemporalDuration \quad (21)$$
$$time : Duration subClassOf : time : TemporalDuration \quad (22)$$
$$USClimateDivision subClassOf : FeatureOfInterest \quad (23)$$
$$ClimateObservableProperty subClassOf : ObservableProperty \quad (24)$$
$$ClimateObservation subClassOf : Observation \quad (25)$$
$$ClimateDivisionObservationCollection subClassOf : ObservationCollection \quad (26)$$
$$ClimateDivisionPropertyObservationCollection subClassOf : ObservationCollection \quad (27)$$
$$ClimateDivisionObservationResult subClassOf : Result \quad (28)$$
$$hasFeatureOfInterest someUSClimateDivision \quad (29)$$
$$hasMember someClimateDivisionPropertyObservationCollection \quad (30)$$
$$mean someQuantity \quad (31)$$
$$value someQuantity \quad (32)$$
$$anomaly somerdfs : Literal \quad (33)$$
$$rank somerdfs : Literal \quad (34)$$
$$hasMember someClimateObservation \quad (35)$$
$$observedProperty someClimateObservableProperty \quad (36)$$
$$timeScale sometime : Duration \quad (37)$$
$$hasResult someClimateDivisionObservationResult \quad (38)$$
$$hasDefaultGeometry someGeometry \quad (39)$$
$$geo : hasGeometry someGeometry \quad (40)$$
$$spatialRelation only AdministrativeRegion_3 \quad (41)$$
$$spatialRelation only S2Cell \quad (42)$$
$$time : months somexsd : decimal \quad (43)$$

2.7 Admin Regions Gadm

2.7.1 Overview

I am the overview.

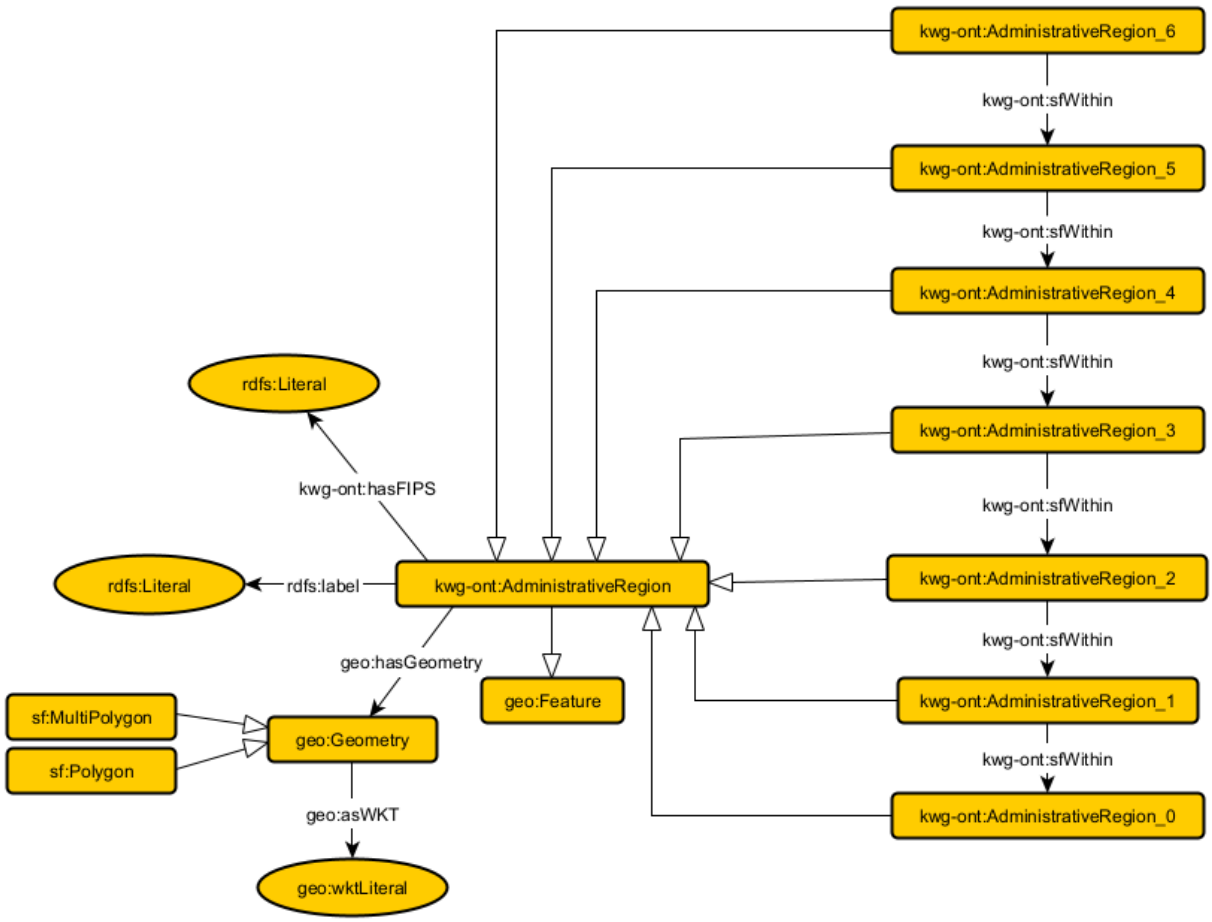

Figure 2.7: The schema diagram for the Admin Regions Gadm.

2.7.2 Axioms

$$AdministrativeRegion subClassOf : geo : Feature \quad (1)$$
$$AdministrativeRegion_0 subClassOf : AdministrativeRegion \quad (2)$$
$$AdministrativeRegion_1 subClassOf : AdministrativeRegion \quad (3)$$
$$AdministrativeRegion_2 subClassOf : AdministrativeRegion \quad (4)$$
$$AdministrativeRegion_3 subClassOf : AdministrativeRegion \quad (5)$$
$$AdministrativeRegion_4 subClassOf : AdministrativeRegion \quad (6)$$
$$AdministrativeRegion_5 subClassOf : AdministrativeRegion \quad (7)$$
$$AdministrativeRegion_6 subClassOf : AdministrativeRegion \quad (8)$$
$$AdministrativeRegion_0 subClassOf : AdministrativeRegion \quad (9)$$
$$AdministrativeRegion_1 subClassOf : AdministrativeRegion \quad (10)$$
$$AdministrativeRegion_2 subClassOf : AdministrativeRegion \quad (11)$$
$$AdministrativeRegion_3 subClassOf : AdministrativeRegion \quad (12)$$

$$AdministrativeRegion_4 subClassOf : AdministrativeRegion \quad (13)$$
$$AdministrativeRegion_5 subClassOf : AdministrativeRegion \quad (14)$$
$$AdministrativeRegion_6 subClassOf : AdministrativeRegion \quad (15)$$
$$AdministrativeRegion subClassOf : geo : Feature \quad (16)$$
$$geo : haDefaultGeometry somegeo : Geometry \quad (17)$$
$$geo : hasGeometry somegeo : Geometry geo : hasGeometryonly geo : Geometry \quad (18)$$
$$geo : hasGeometry somegeo : Geometry geo : hasGeometryonly geo : Geometry \quad (19)$$
$$geo : hasGeometry somegeo : Geometry geo : hasGeometryonly geo : Geometry \quad (20)$$
$$geo : hasGeometry somegeo : Geometry geo : hasGeometryonly geo : Geometry \quad (21)$$
$$geo : hasGeometry somegeo : Geometry geo : hasGeometryonly geo : Geometry \quad (22)$$
$$geo : hasGeometry somegeo : Geometry geo : hasGeometryonly geo : Geometry \quad (23)$$
$$geo : hasGeometry somegeo : Geometry geo : hasGeometryonly geo : Geometry \quad (24)$$
$$geo : hasGeometry somegeo : Geometry \quad (25)$$

2.8 Drought Ndmc

2.8.1 Overview

I am the overview.

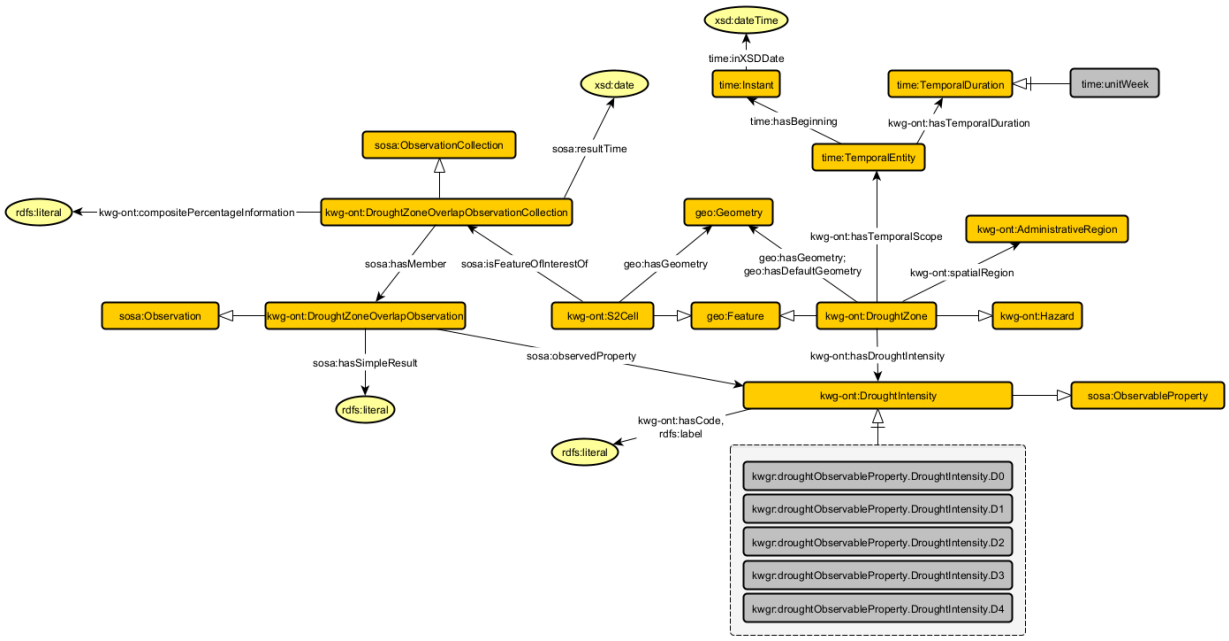

Figure 2.8: The schema diagram for the Drought Ndmc.

2.8.2 Axioms

$$coversWeekonlytime : TemporalEntity \tag{1}$$
$$hasDroughtIntensityonlyDroughtIntensity \tag{2}$$
$$NoneonlyNone \tag{3}$$
$$hasCodeonlyrdfs : Literal \tag{4}$$
$$hasLabelonlyrdfs : Literal \tag{5}$$
$$coversWeeksometime : TemporalEntity \tag{6}$$
$$hasDroughtIntensitysomeDroughtIntensity \tag{7}$$

2.9 Storms Impacts Noaa

2.9.1 Overview

I am the overview.

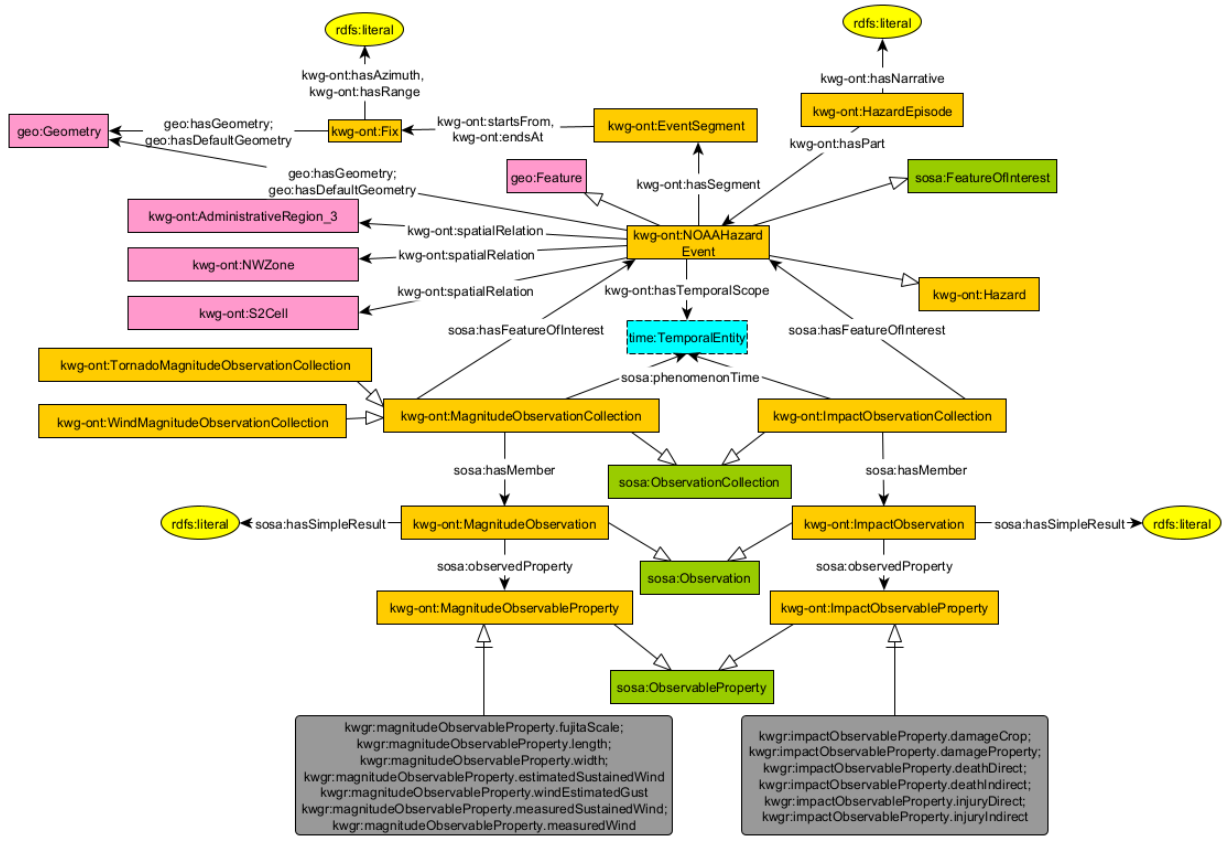

Figure 2.9: The schema diagram for the Storms Impacts Noaa.

2.9.2 Axioms

$$AdministrativeRegion subClassOf : Region \quad (1)$$

$$AdministrativeRegion subClassOf : geo : Feature \quad (2)$$

$$AdministrativeRegion_3 subClassOf : AdministrativeRegion \quad (3)$$

$$AdministrativeRegion_3 subClassOf : AdministrativeRegion \quad (4)$$

$$S2Cell subClassOf : Cell \quad (5)$$

$$Fire subClassOf : Hazard \quad (6)$$

$$Wildfire subClassOf : Fire \quad (7)$$

$$Fire subClassOf : Hazard \quad (8)$$

$$NOAAHazard subClassOf : Hazard \quad (9)$$

$$ImpactObservableProperty subClassOf : ObservableProperty \quad (10)$$

$$ImpactObservation subClassOf : Observation \quad (11)$$

$$ImpactObservationCollection subClassOf : ObservationCollection \quad (12)$$

$$MagnitudeObservableProperty subClassOf : ObservableProperty \quad (13)$$

$$MagnitudeObservation subClassOf : Observation \quad (14)$$

$$MagnitudeObservationCollection subClassOf : ObservationCollection \quad (15)$$

$$TornadoMagnitudeObservationCollection subClassOf : MagnitudeObservationCollection \quad (16)$$

$$WindMagnitudeObservationCollection subClassOf : MagnitudeObservationCollection \quad (17)$$

$$NOAAAstronomicalLowTide subClassOf : NOAAHazard \quad (18)$$

$$NOAAAvalanche subClassOf : NOAAHazard \quad (19)$$

$$NOAABlizzard subClassOf : NOAAHazard \quad (20)$$

$$NOAACoastalFlood subClassOf : NOAAHazard \quad (21)$$

$$NOAAColdWindChill subClassOf : NOAAHazard \quad (22)$$

$$NOAADebrisFlow subClassOf : NOAAHazard \quad (23)$$

$$NOAADenseFog subClassOf : NOAAHazard \quad (24)$$

$$NOAADenseSmokesubClassOf : NOAAHazard \tag{25}$$

$$NOAADroughtsubClassOf : NOAAHazard \tag{26}$$

$$NOAADustDevilsubClassOf : NOAAHazard \tag{27}$$

$$NOAADustStormsubClassOf : NOAAHazard \tag{28}$$

$$NOAAExcessiveHeatsubClassOf : NOAAHazard \tag{29}$$

$$NOAAExtremeColdWindChillsubClassOf : NOAAHazard \tag{30}$$

$$NOAAFlashFloodsubClassOf : NOAAHazard \tag{31}$$

$$NOAAFloodsubClassOf : NOAAHazard \tag{32}$$

$$NOAAFreezingFogsubClassOf : NOAAHazard \tag{33}$$

$$NOAAFrostFreezesubClassOf : NOAAHazard \tag{34}$$

$$NOAAFunnelCloudsubClassOf : NOAAHazard \tag{35}$$

$$NOAAHailsubClassOf : NOAAHazard \tag{36}$$

$$NOAAHazardsubClassOf : Hazard \tag{37}$$

$$NOAAHazardsubClassOf : geo : Feature \tag{38}$$

$$NOAAHazardsubClassOf : FeatureOfInterest \tag{39}$$

$$NOAAAstronomicalLowTidesubClassOf : NOAAHazard \tag{40}$$

$$NOAAAvalanchesubClassOf : NOAAHazard \tag{41}$$

$$NOAABlizzardsubClassOf : NOAAHazard \tag{42}$$

$$NOAACoastalFloodsubClassOf : NOAAHazard \tag{43}$$

$$NOAAColdWindChillsubClassOf : NOAAHazard \tag{44}$$

$$NOAADebrisFlowsubClassOf : NOAAHazard \tag{45}$$

$$NOAADenseFogsubClassOf : NOAAHazard \tag{46}$$

$$NOAADenseSmokesubClassOf : NOAAHazard \tag{47}$$

$$NOAADroughtsubClassOf : NOAAHazard \tag{48}$$

$$NOAADustDevilsubClassOf : NOAAHazard \tag{49}$$

$$NOAADustStormsubClassOf : NOAAHazard \tag{50}$$

$$NOAAExcessiveHeatsubClassOf : NOAAHazard \tag{51}$$

$$NOAAExtremeColdWindChillsubClassOf : NOAAHazard \tag{52}$$

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$$NOAAFloodsubClassOf : NOAAHazard \tag{54}$$

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$$NOAAIceStormsubClassOf : NOAAHazard \tag{65}$$

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$$NOAALakeshoreFloodsubClassOf : NOAAHazard \tag{67}$$

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$$NOAAMarineHailsubClassOf : NOAAHazard \tag{69}$$

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$$NOAAMarineHurricaneTyphoonsubClassOf : NOAAHazard \tag{71}$$

$$NOAAMarineStrongWindsubClassOf : NOAAHazard \tag{72}$$

$$NOAAMarineThunderstormWindsubClassOf : NOAAHazard \tag{73}$$

$$NOAAMarineTropicalDepressionsubClassOf : NOAAHazard \tag{74}$$

$$NOAAMarineTropicalStormsubClassOf : NOAAHazard \tag{75}$$

$$NOAARipCurrentsubClassOf : NOAAHazard \tag{76}$$

$$NOAASleetsubClassOf : NOAAHazard \tag{77}$$

$$NOAASneakerwavesubClassOf : NOAAHazard \tag{78}$$

$$NOAAStormSurgeTidesubClassOf : NOAAHazard \tag{79}$$

$$NOAAStrongWindsubClassOf : NOAAHazard \tag{80}$$

$$NOAAThunderstormWindsubClassOf : NOAAHazard \tag{81}$$

$$NOAATornadosubClassOf : NOAAHazard \tag{82}$$

$$NOAATropicalDepressionsubClassOf : NOAAHazard \tag{83}$$

$$NOAATropicalStormsubClassOf : NOAAHazard \tag{84}$$

$$NOAAWaterspoutsubClassOf : NOAAHazard \tag{85}$$

$$NOAAWildfiresubClassOf : NOAAHazard \tag{86}$$

$$NOAAWinterStormsubClassOf : NOAAHazard \tag{87}$$

$$NOAAWinterWeathersubClassOf : NOAAHazard \tag{88}$$

$$NOAAHeatsubClassOf : NOAAHazard \tag{89}$$

$$NOAAHeavyRainsubClassOf : NOAAHazard \tag{90}$$

$$NOAAHeavySnowsubClassOf : NOAAHazard \tag{91}$$

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$$NOAAHighWindsubClassOf : NOAAHazard \tag{93}$$

$$NOAAHurricanesubClassOf : NOAAHazard \tag{94}$$

$$NOAAIceStormsubClassOf : NOAAHazard \tag{95}$$

$$NOAALake - EffectSnowsubClassOf : NOAAHazard \tag{96}$$

$$NOAALakeshoreFloodsubClassOf : NOAAHazard \tag{97}$$

$$NOAALightningsubClassOf : NOAAHazard \tag{98}$$

$$NOAAMarineHailsubClassOf : NOAAHazard \tag{99}$$

$$NOAAMarineHighWindsubClassOf : NOAAHazard \tag{100}$$

$$NOAAMarineHurricaneTyphoonsubClassOf : NOAAHazard \tag{101}$$

$$NOAAMarineStrongWindsubClassOf : NOAAHazard \tag{102}$$

$$NOAAMarineThunderstormWindsubClassOf : NOAAHazard \tag{103}$$

$$NOAAMarineTropicalDepressionsubClassOf : NOAAHazard \tag{104}$$

$$NOAAMarineTropicalStormsubClassOf : NOAAHazard \tag{105}$$

$$NOAARipCurrentsubClassOf : NOAAHazard \tag{106}$$

$$NOAASleetsubClassOf : NOAAHazard \tag{107}$$

$$NOAASneakerwavesubClassOf : NOAAHazard \tag{108}$$

$$NOAAStormSurgeTidesubClassOf : NOAAHazard \tag{109}$$

$$NOAAStrongWindsubClassOf : NOAAHazard \tag{110}$$

$$NOAAThunderstormWindsubClassOf : NOAAHazard \tag{111}$$

$$NOAATornadosubClassOf : NOAAHazard \tag{112}$$

$$NOAATropicalDepressionsubClassOf : NOAAHazard \tag{113}$$

$$NOAATropicalStormsubClassOf : NOAAHazard \tag{114}$$

$$NOAAWaterspoutsubClassOf : NOAAHazard \tag{115}$$

$$NOAAWildfiresubClassOf : NOAAHazard \tag{116}$$

$$NOAAWildfiresubClassOf : Wildfire \tag{117}$$

$$NOAAWinterStormsubClassOf : NOAAHazard \tag{118}$$

$$NOAAWinterWeathersubClassOf : NOAAHazard \tag{119}$$

$$NWZonesubClassOf : geo : Feature \tag{120}$$

$$AdministrativeRegionsubClassOf : Region \tag{121}$$

$$S2CellsubClassOf : Cell \tag{122}$$

$$TornadoMagnitudeObservationCollectionsubClassOf : MagnitudeObservationCollection \tag{123}$$

$$WildfiresubClassOf : Fire \tag{124}$$

$$NOAAWildfiresubClassOf : Wildfire \tag{125}$$

$$WindMagnitudeObservationCollectionsubClassOf : MagnitudeObservationCollection \tag{126}$$

$$AdministrativeRegionsubClassOf : geo : Feature \tag{127}$$

$$NOAAHazardsubClassOf : geo : Feature \tag{128}$$

$$NWZonesubClassOf : geo : Feature \tag{129}$$

$$time : InstantsubClassOf : time : TemporalEntity \tag{130}$$

$$time : InstantsubClassOf : time : TemporalEntity \tag{131}$$

$$NOAAHazardsubClassOf : FeatureOfInterest \tag{132}$$

$$ImpactObservablePropertysubClassOf : ObservableProperty \tag{133}$$

$$MagnitudeObservablePropertysubClassOf : ObservableProperty \tag{134}$$

$$ImpactObservationsubClassOf : Observation \tag{135}$$

$$MagnitudeObservationsubClassOf : Observation \tag{136}$$

$$ImpactObservationCollectionsubClassOf : ObservationCollection \tag{137}$$

$$MagnitudeObservationCollectionsubClassOf : ObservationCollection \tag{138}$$

$$endsAtsomeFix \tag{139}$$

$$startsFromsomeFix \tag{140}$$

$$geo : hasDefaultGeometrysomegeo : Geometry \tag{141}$$

$$geo : hasGeometrysomegeo : Geometry \tag{142}$$

$$hasAzimuthsomerdfs : Literal \tag{143}$$

$$hasRangesomerdfs : Literal \tag{144}$$

$$hasPartsomeNOAAHazard \tag{145}$$

$$hasNarrativesomerdfs : Literal \tag{146}$$

$$observedPropertysomeImpactObservableProperty \tag{147}$$

$$hasSimpleResultsomerdfs : Literal \tag{148}$$

$$hasFeatureOfInterestsomeNOAAHazard \tag{149}$$

$$hasMembersomeImpactObservation \tag{150}$$

$$phenomenonTimesometime : TemporalEntity \tag{151}$$

$$observedPropertysomeMagnitudeObservableProperty \tag{152}$$

$$hasSimpleResultsomerdfs : Literal \tag{153}$$

$$hasFeatureOfInterestsomeNOAAHazard \tag{154}$$

$$hasMembersomeMagnitudeObservation \tag{155}$$

$$phenomenonTimesometime : TemporalEntity \tag{156}$$

$$hasSegmentsomeEventSegment \tag{157}$$

$$hasTemporalScopesometime : TemporalEntity \tag{158}$$

$$spatialRelationsomeNone \tag{159}$$

$$geo : hasDefaultGeometrysomegeo : Geometry \tag{160}$$

$$geo : hasGeometrysomegeo : Geometry \tag{161}$$

$$geo : asWKTonlygeo : wktLiteral \tag{162}$$

$$geo : asWKTsomegeo : wktLiteral \tag{163}$$

$$time : inXSDDateTimeonlyxsd : dateTime \tag{164}$$

$$time : inXSDDateTimesomexsd : dateTime \tag{165}$$

2.10 S2cells

2.10.1 Overview

I am the overview.

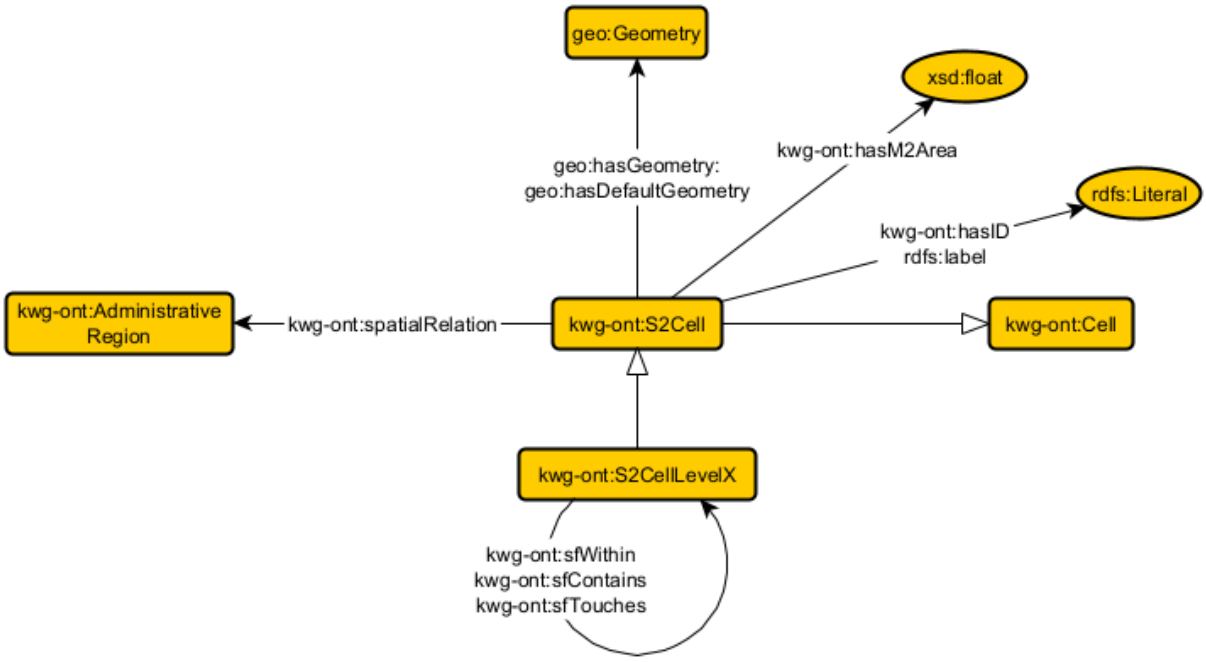

Figure 2.10: The schema diagram for the S2cells.

2.10.2 Axioms

$$AdministrativeRegionsubClassOf : Region \tag{1}$$
$$AdministrativeRegionsubClassOf : geo : Feature \tag{2}$$
$$AdministrativeRegion_3subClassOf : AdministrativeRegion \tag{3}$$
$$AdministrativeRegion_3subClassOf : AdministrativeRegion \tag{4}$$
$$S2CellsubClassOf : Cell \tag{5}$$
$$FiresubClassOf : Hazard \tag{6}$$
$$WildfiresubClassOf : Fire \tag{7}$$
$$FiresubClassOf : Hazard \tag{8}$$
$$NOAAHazardsubClassOf : Hazard \tag{9}$$

$$ImpactObservablePropertysubClassOf : ObservableProperty \tag{10}$$

$$ImpactObservationsubClassOf : Observation \tag{11}$$

$$ImpactObservationCollectionsubClassOf : ObservationCollection \tag{12}$$

$$MagnitudeObservablePropertysubClassOf : ObservableProperty \tag{13}$$

$$MagnitudeObservationsubClassOf : Observation \tag{14}$$

$$MagnitudeObservationCollectionsubClassOf : ObservationCollection \tag{15}$$

$$TornadoMagnitudeObservationCollectionsubClassOf : MagnitudeObservationCollection \tag{16}$$

$$WindMagnitudeObservationCollectionsubClassOf : MagnitudeObservationCollection \tag{17}$$

$$NOAAAstronomicalLowTidesubClassOf : NOAAHazard \tag{18}$$

$$NOAAAvalanchesubClassOf : NOAAHazard \tag{19}$$

$$NOAABlizzardsubClassOf : NOAAHazard \tag{20}$$

$$NOAACoastalFloodsubClassOf : NOAAHazard \tag{21}$$

$$NOAAColdWindChillsubClassOf : NOAAHazard \tag{22}$$

$$NOAADebrisFlowsubClassOf : NOAAHazard \tag{23}$$

$$NOAADenseFogsubClassOf : NOAAHazard \tag{24}$$

$$NOAADenseSmokesubClassOf : NOAAHazard \tag{25}$$

$$NOAADroughtsubClassOf : NOAAHazard \tag{26}$$

$$NOAADustDevilsubClassOf : NOAAHazard \tag{27}$$

$$NOAADustStormsubClassOf : NOAAHazard \tag{28}$$

$$NOAAExcessiveHeatsubClassOf : NOAAHazard \tag{29}$$

$$NOAAExtremeColdWindChillsubClassOf : NOAAHazard \tag{30}$$

$$NOAAFlashFloodsubClassOf : NOAAHazard \tag{31}$$

$$NOAAFloodsubClassOf : NOAAHazard \tag{32}$$

$$NOAAFreezingFogsubClassOf : NOAAHazard \tag{33}$$

$$NOAAFrostFreezesubClassOf : NOAAHazard \tag{34}$$

$$NOAAFunnelCloudsubClassOf : NOAAHazard \tag{35}$$

$$NOAAHailsubClassOf : NOAAHazard \tag{36}$$

$$NOAAHazardsubClassOf : Hazard \tag{37}$$

$$NOAAHazardsubClassOf : geo : Feature \tag{38}$$

$$NOAAHazardsubClassOf : FeatureOfInterest \tag{39}$$

$$NOAAAstronomicalLowTidesubClassOf : NOAAHazard \tag{40}$$

$$NOAAAvalanchesubClassOf : NOAAHazard \tag{41}$$

$$NOAABlizzardsubClassOf : NOAAHazard \tag{42}$$

$$NOAACoastalFloodsubClassOf : NOAAHazard \tag{43}$$

$$NOAAColdWindChillsubClassOf : NOAAHazard \tag{44}$$

$$NOAADebrisFlowsubClassOf : NOAAHazard \tag{45}$$

$$NOAADenseFogsubClassOf : NOAAHazard \tag{46}$$

$$NOAADenseSmokesubClassOf : NOAAHazard \tag{47}$$

$$NOAADroughtsubClassOf : NOAAHazard \tag{48}$$

$$NOAADustDevilsubClassOf : NOAAHazard \tag{49}$$

$$NOAADustStormsubClassOf : NOAAHazard \tag{50}$$

$$NOAAExcessiveHeatsubClassOf : NOAAHazard \tag{51}$$

$$NOAAExtremeColdWindChillsubClassOf : NOAAHazard \tag{52}$$

$$NOAAFlashFloodsubClassOf : NOAAHazard \tag{53}$$

$$NOAAFloodsubClassOf : NOAAHazard \tag{54}$$

$$NOAAFreezingFogsubClassOf : NOAAHazard \tag{55}$$

$$NOAAFrostFreezesubClassOf : NOAAHazard \tag{56}$$

$$NOAAFunnelCloudsubClassOf : NOAAHazard \tag{57}$$

$$NOAAHailsubClassOf : NOAAHazard \tag{58}$$

$$NOAAHeatsubClassOf : NOAAHazard \tag{59}$$

$$NOAAHeavyRainsubClassOf : NOAAHazard \tag{60}$$

$$NOAAHeavySnowsubClassOf : NOAAHazard \tag{61}$$

$$NOAAHighSurfsubClassOf : NOAAHazard \tag{62}$$

$$NOAAHighWindsubClassOf : NOAAHazard \tag{63}$$

$$NOAAHurricanesubClassOf : NOAAHazard \tag{64}$$

$$NOAAIceStormsubClassOf : NOAAHazard \tag{65}$$

$$NOAALake - EffectSnowsubClassOf : NOAAHazard \tag{66}$$

$$NOAALakeshoreFloodsubClassOf : NOAAHazard \tag{67}$$

$$NOAALightningsubClassOf : NOAAHazard \tag{68}$$

$$NOAAMarineHailsubClassOf : NOAAHazard \tag{69}$$

$$NOAAMarineHighWindsubClassOf : NOAAHazard \tag{70}$$

$$NOAAMarineHurricaneTyphoonsubClassOf : NOAAHazard \tag{71}$$

$$NOAAMarineStrongWindsubClassOf : NOAAHazard \tag{72}$$

$$NOAAMarineThunderstormWindsubClassOf : NOAAHazard \tag{73}$$

$$NOAAMarineTropicalDepressionsubClassOf : NOAAHazard \tag{74}$$

$$NOAAMarineTropicalStormsubClassOf : NOAAHazard \tag{75}$$

$$NOAARipCurrentsubClassOf : NOAAHazard \tag{76}$$

$$NOAASleetsubClassOf : NOAAHazard \tag{77}$$

$$NOAASneakerwavesubClassOf : NOAAHazard \tag{78}$$

$$NOAAStormSurgeTidesubClassOf : NOAAHazard \tag{79}$$

$$NOAAStrongWindsubClassOf : NOAAHazard \tag{80}$$

$$NOAAThunderstormWindsubClassOf : NOAAHazard \tag{81}$$

$$NOAATornadosubClassOf : NOAAHazard \tag{82}$$

$$NOAATropicalDepressionsubClassOf : NOAAHazard \tag{83}$$

$$NOAATropicalStormsubClassOf : NOAAHazard \tag{84}$$

$$NOAAWaterspoutsubClassOf : NOAAHazard \tag{85}$$

$$NOAAWildfiresubClassOf : NOAAHazard \tag{86}$$

$$NOAAWinterStormsubClassOf : NOAAHazard \tag{87}$$

$$NOAAWinterWeathersubClassOf : NOAAHazard \tag{88}$$

$$NOAAHeatsubClassOf : NOAAHazard \tag{89}$$

$$NOAAHeavyRainsubClassOf : NOAAHazard \tag{90}$$

$$NOAAHeavySnowsubClassOf : NOAAHazard \tag{91}$$

$$NOAAHighSurfsubClassOf : NOAAHazard \tag{92}$$

$$NOAAHighWindsubClassOf : NOAAHazard \tag{93}$$

$$NOAAHurricanesubClassOf : NOAAHazard \tag{94}$$

$$NOAAIceStormsubClassOf : NOAAHazard \tag{95}$$

$$NOAALake - EffectSnowsubClassOf : NOAAHazard \tag{96}$$

$$NOAALakeshoreFloodsubClassOf : NOAAHazard \tag{97}$$

$$NOAALightningsubClassOf : NOAAHazard \tag{98}$$

$$NOAAMarineHailsubClassOf : NOAAHazard \tag{99}$$

$$NOAAMarineHighWindsubClassOf : NOAAHazard \tag{100}$$

$$NOAAMarineHurricaneTyphoonsubClassOf : NOAAHazard \tag{101}$$

$$NOAAMarineStrongWindsubClassOf : NOAAHazard \tag{102}$$

$$NOAAMarineThunderstormWindsubClassOf : NOAAHazard \tag{103}$$

$$NOAAMarineTropicalDepressionsubClassOf : NOAAHazard \tag{104}$$

$$NOAAMarineTropicalStormsubClassOf : NOAAHazard \tag{105}$$

$$NOAARipCurrentsubClassOf : NOAAHazard \tag{106}$$

$$NOAASleetsubClassOf : NOAAHazard \tag{107}$$

$$NOAASneakerwavesubClassOf : NOAAHazard \tag{108}$$

$$NOAAStormSurgeTidesubClassOf : NOAAHazard \tag{109}$$

$$NOAAStrongWindsubClassOf : NOAAHazard \tag{110}$$

$$NOAAThunderstormWindsubClassOf : NOAAHazard \tag{111}$$

$$NOAATornadosubClassOf : NOAAHazard \tag{112}$$

$$NOAATropicalDepressionsubClassOf : NOAAHazard \tag{113}$$

$$NOAATropicalStormsubClassOf : NOAAHazard \tag{114}$$

$$NOAAWaterspoutsubClassOf : NOAAHazard \tag{115}$$

$$NOAAWildfiresubClassOf : NOAAHazard \tag{116}$$

$$NOAAWildfiresubClassOf : Wildfire \tag{117}$$

$$NOAAWinterStormsubClassOf : NOAAHazard \tag{118}$$

$$NOAAWinterWeathersubClassOf : NOAAHazard \tag{119}$$

$$NWZonesubClassOf : geo : Feature \tag{120}$$

$$AdministrativeRegionsubClassOf : Region \tag{121}$$

$$S2CellsubClassOf : Cell \tag{122}$$

$$TornadoMagnitudeObservationCollectionsubClassOf : MagnitudeObservationCollection \tag{123}$$

$$WildfiresubClassOf : Fire \tag{124}$$

$$NOAAWildfiresubClassOf : Wildfire \tag{125}$$

$$WindMagnitudeObservationCollectionsubClassOf : MagnitudeObservationCollection \tag{126}$$

$$AdministrativeRegionsubClassOf : geo : Feature \tag{127}$$

$$NOAAHazardsubClassOf : geo : Feature \tag{128}$$

$$NWZonesubClassOf : geo : Feature \tag{129}$$

$$time : InstantsubClassOf : time : TemporalEntity \tag{130}$$

$$time : InstantsubClassOf : time : TemporalEntity \tag{131}$$

$$NOAAHazardsubClassOf : FeatureOfInterest \tag{132}$$

$$ImpactObservablePropertysubClassOf : ObservableProperty \tag{133}$$

$$MagnitudeObservablePropertysubClassOf : ObservableProperty \tag{134}$$

$$ImpactObservationsubClassOf : Observation \tag{135}$$

$$MagnitudeObservationsubClassOf : Observation \tag{136}$$

$$ImpactObservationCollectionsubClassOf : ObservationCollection \tag{137}$$

$$MagnitudeObservationCollectionsubClassOf : ObservationCollection \tag{138}$$

$$endsAtsomeFix \tag{139}$$

$$startsFromsomeFix \tag{140}$$

$$geo : hasDefaultGeometrysomegeo : Geometry \tag{141}$$

$$geo : hasGeometrysomegeo : Geometry \tag{142}$$

$$hasAzimuthsomerdfs : Literal \tag{143}$$

$$hasRangesomerdfs : Literal \tag{144}$$

$$hasPartsomeNOAAHazard \tag{145}$$

$$hasNarrativesomerdfs : Literal \tag{146}$$

$$observedPropertysomeImpactObservableProperty \tag{147}$$

$$hasSimpleResultsomerdfs : Literal \tag{148}$$

$$hasFeatureOfInterestsomeNOAAHazard \tag{149}$$

$$hasMembersomeImpactObservation \tag{150}$$

$$phenomenonTimesometime : TemporalEntity \tag{151}$$

$$observedPropertysomeMagnitudeObservableProperty \tag{152}$$

$$hasSimpleResultsomerdfs : Literal \tag{153}$$

$$hasFeatureOfInterestsomeNOAAHazard \tag{154}$$

$$hasMembersomeMagnitudeObservation \tag{155}$$

$$phenomenonTimesometime : TemporalEntity \tag{156}$$

$$hasSegmentsomeEventSegment \tag{157}$$

$$hasTemporalScopesometime : TemporalEntity \tag{158}$$

$$spatialRelationsomeNone \tag{159}$$

$$geo : hasDefaultGeometrysomegeo : Geometry \tag{160}$$

$$geo : hasGeometrysomegeo : Geometry \tag{161}$$

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$$geo : asWKTsomegeo : wktLiteral \tag{163}$$

$$time : inXSDDateTimeonlyxsd : dateTime \tag{164}$$

$$time : inXSDDateTimesomexsd : dateTime \tag{165}$$

2.11 National Weather Zone Noaa

2.11.1 Overview

I am the overview.

2.11.2 Axioms

$$AdministrativeRegionsubClassOf : Region \tag{1}$$

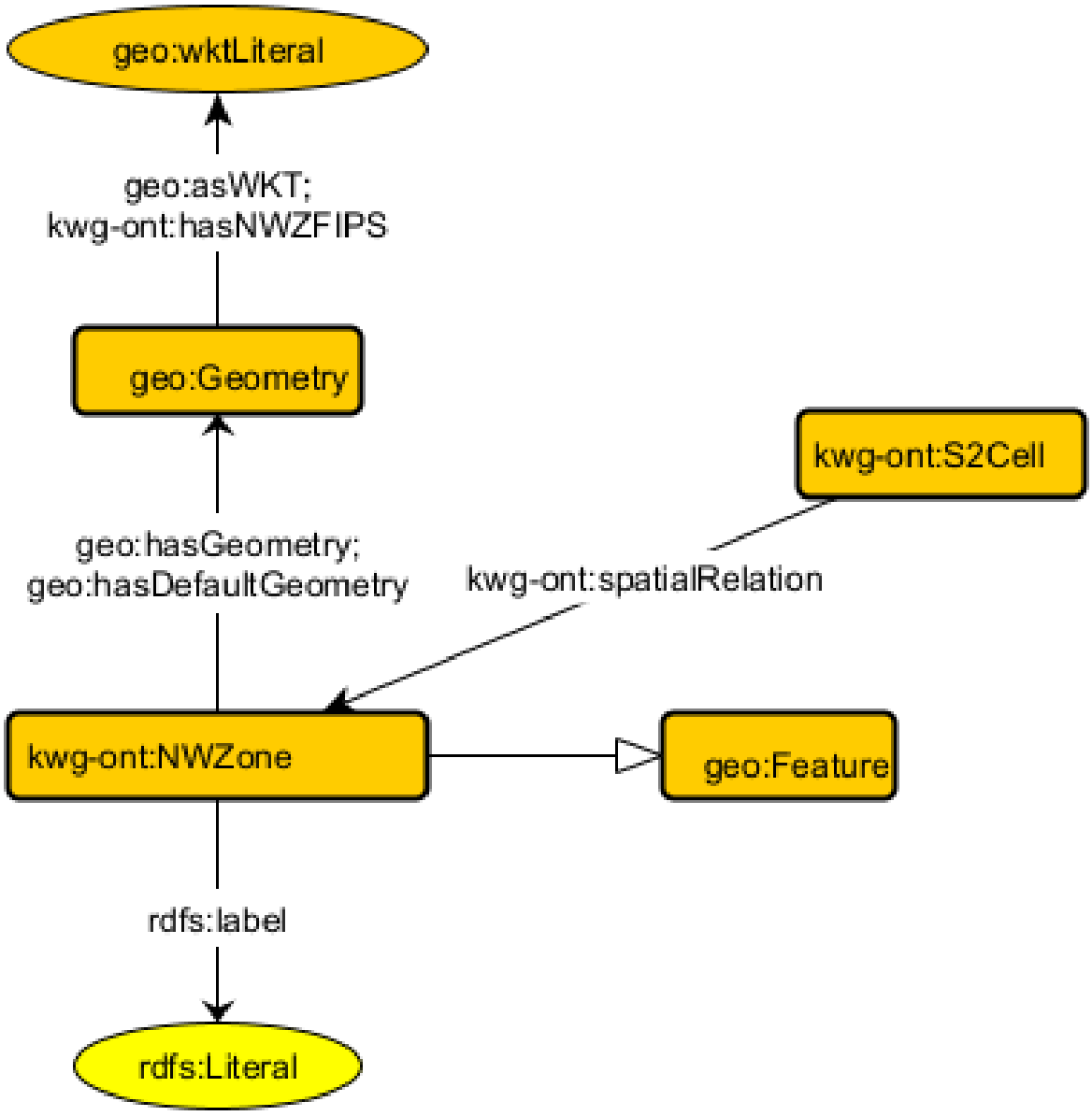

Figure 2.11: The schema diagram for the National Weather Zone Noaa.

$$AdministrativeRegion subClassOf : geo : Feature \quad (2)$$

$$AdministrativeRegion_3 subClassOf : AdministrativeRegion \quad (3)$$

$$AdministrativeRegion_3 subClassOf : AdministrativeRegion \quad (4)$$

$$NW Zone subClassOf : Region \quad (5)$$

$$NW Zone subClassOf : geo : Feature \quad (6)$$

$$AdministrativeRegion subClassOf : Region \quad (7)$$

$$NWZonesubClassOf : Region \quad (8)$$
$$AdministrativeRegionsubClassOf : geo : Feature \quad (9)$$
$$NWZonesubClassOf : geo : Feature \quad (10)$$
$$geo : hasDefaultGeometrysomegeo : Geometry \quad (11)$$
$$geo : hasGeometrysomegeo : Geometry \quad (12)$$
$$spatialRelationonlyAdministrativeRegion_3 \quad (13)$$
$$spatialRelationonlyS2Cell \quad (14)$$
$$hasNWZFIPSsomerdfs : Literal \quad (15)$$

2.12 External Ontology Dependencies

2.12.1 Overview

I am the overview.

2.12.2 Axioms

(1)

2.13 Disaster Declaration Fema

2.13.1 Overview

I am the overview.

2.13.2 Axioms

$$AdministrativeRegionsubClassOf : Region \quad (1)$$
$$AdministrativeRegionsubClassOf : geo : Feature \quad (2)$$
$$AdministrativeRegion_3subClassOf : AdministrativeRegion \quad (3)$$
$$AdministrativeRegion_3subClassOf : AdministrativeRegion \quad (4)$$
$$CrisisCounsellingsubClassOf : Program \quad (5)$$
$$DebrisRemoval - PA - AsubClassOf : PublicAssistance \quad (6)$$
$$EmergencyDeclarationsubClassOf : Declaration \quad (7)$$
$$FireManagementDeclarationsubClassOf : Declaration \quad (8)$$
$$MajorDisasterDeclarationsubClassOf : Declaration \quad (9)$$
$$DirectFederalAssistancesubClassOf : Program \quad (10)$$
$$DisastersubClassOf : Hazard \quad (11)$$
$$DisastersubClassOf : geo : Feature \quad (12)$$
$$DisasterHousingsubClassOf : Program \quad (13)$$
$$DisasterUnemploymentAssistancesubClassOf : Program \quad (14)$$
$$DoDsubClassOf : Program \quad (15)$$

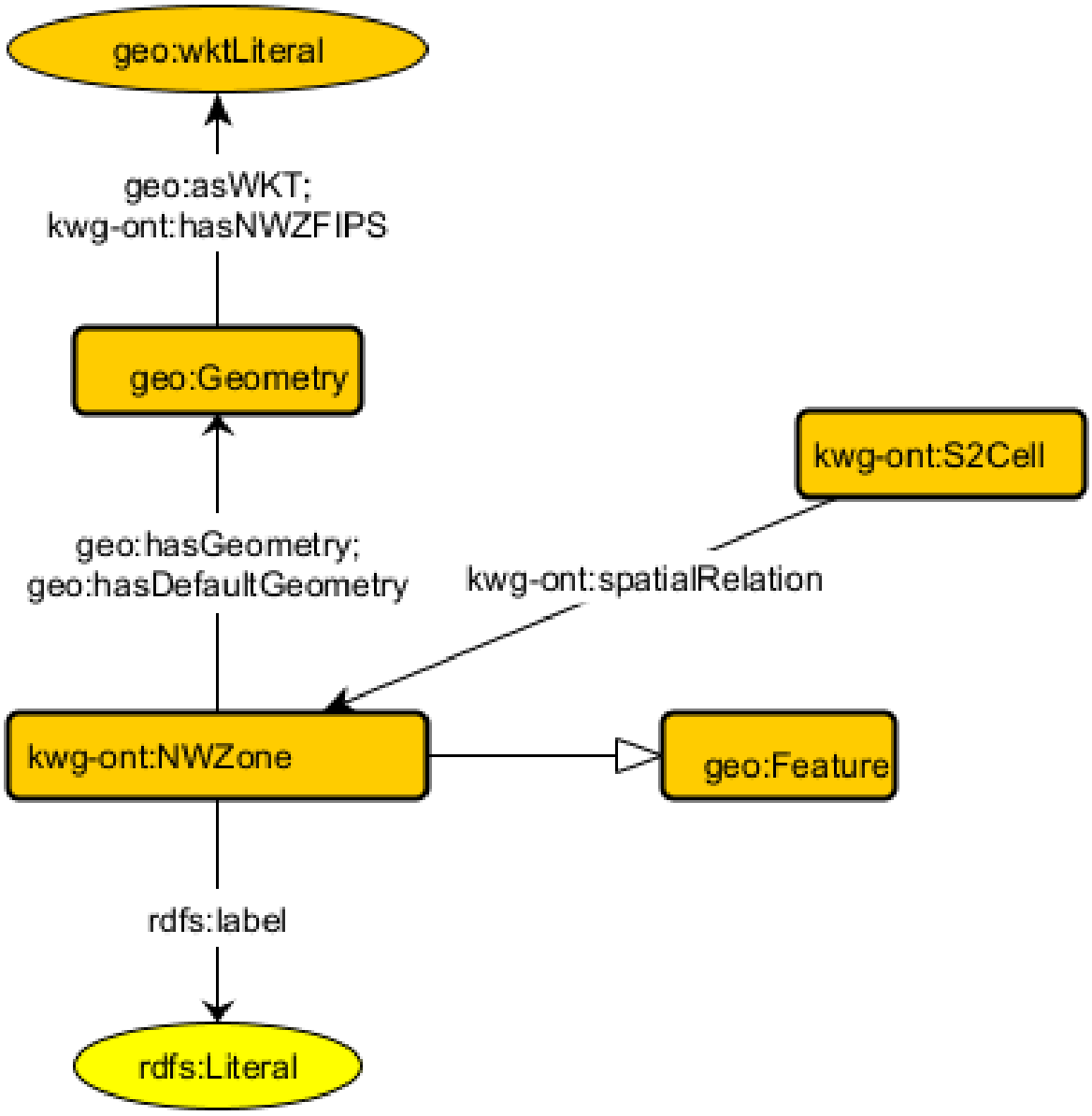

Figure 2.12: The schema diagram for the External Ontology Dependencies.

$$EmergencyDeclarationsubClassOf : Declaration \tag{16}$$
$$FireManagementAssistance - PA - IsubClassOf : PublicAssistance \tag{17}$$
$$FireManagementDeclarationsubClassOf : Declaration \tag{18}$$
$$DisastersubClassOf : Hazard \tag{19}$$
$$HazardMitigationsubClassOf : Program \tag{20}$$
$$HousingAssistancesubClassOf : Program \tag{21}$$

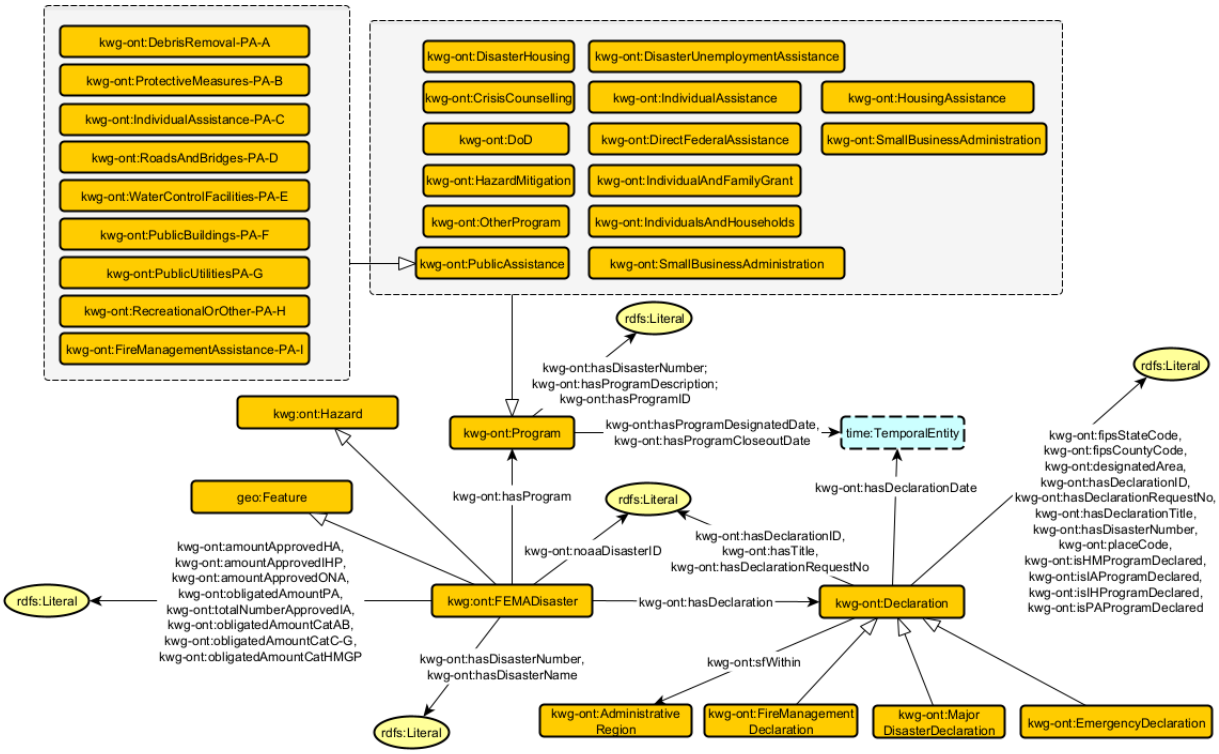

Figure 2.13: The schema diagram for the Disaster Declaration Fema.

$$IndividualAndFamilyGrantsubClassOf : Program \quad (22)$$
$$IndividualAssistancesubClassOf : Program \quad (23)$$
$$IndividualAssistance - PA - CsubClassOf : PublicAssistance \quad (24)$$
$$IndividualsAndHouseholdssubClassOf : Program \quad (25)$$
$$MajorDisasterDeclarationsubClassOf : Declaration \quad (26)$$
$$OthersubClassOf : Program \quad (27)$$
$$CrisisCounsellingsubClassOf : Program \quad (28)$$
$$DirectFederalAssistancesubClassOf : Program \quad (29)$$
$$DisasterHousingsubClassOf : Program \quad (30)$$
$$DisasterUnemploymentAssistancesubClassOf : Program \quad (31)$$
$$DoDsubClassOf : Program \quad (32)$$
$$HazardMitigationsubClassOf : Program \quad (33)$$
$$HousingAssistancesubClassOf : Program \quad (34)$$
$$IndividualAndFamilyGrantsubClassOf : Program \quad (35)$$
$$IndividualAssistancesubClassOf : Program \quad (36)$$
$$IndividualsAndHouseholdssubClassOf : Program \quad (37)$$
$$OthersubClassOf : Program \quad (38)$$

$$PublicAssistancesubClassOf : Program \quad (39)$$
$$SmallBusinessAdministrationsubClassOf : Program \quad (40)$$
$$ProtectiveMeasures - PA - BsubClassOf : PublicAssistance \quad (41)$$
$$PublicAssistancesubClassOf : Program \quad (42)$$
$$DebrisRemoval - PA - AsubClassOf : PublicAssistance \quad (43)$$
$$FireManagementAssistance - PA - IsubClassOf : PublicAssistance \quad (44)$$
$$IndividualAssistance - PA - CsubClassOf : PublicAssistance \quad (45)$$
$$ProtectiveMeasures - PA - BsubClassOf : PublicAssistance \quad (46)$$
$$PublicBuildings - PA - FsubClassOf : PublicAssistance \quad (47)$$
$$PublicUtilitiesPA - GsubClassOf : PublicAssistance \quad (48)$$
$$RecreationalOrOther - PA - HsubClassOf : PublicAssistance \quad (49)$$
$$RoadsAndBridges - PA - DsubClassOf : PublicAssistance \quad (50)$$
$$WaterControlFacilities - PA - EsubClassOf : PublicAssistance \quad (51)$$
$$PublicBuildings - PA - FsubClassOf : PublicAssistance \quad (52)$$
$$PublicUtilitiesPA - GsubClassOf : PublicAssistance \quad (53)$$
$$RecreationalOrOther - PA - HsubClassOf : PublicAssistance \quad (54)$$
$$AdministrativeRegionsubClassOf : Region \quad (55)$$
$$RoadsAndBridges - PA - DsubClassOf : PublicAssistance \quad (56)$$
$$SmallBusinessAdministrationsubClassOf : Program \quad (57)$$
$$WaterControlFacilities - PA - EsubClassOf : PublicAssistance \quad (58)$$
$$AdministrativeRegionsubClassOf : geo : Feature \quad (59)$$
$$DisastersubClassOf : geo : Feature \quad (60)$$
$$time : InstantsubClassOf : time : TemporalEntity \quad (61)$$
$$time : InstantsubClassOf : time : TemporalEntity \quad (62)$$
$$sfWithinonlyAdministrativeRegion \quad (63)$$
$$hasDeclarationIDsomerdfs : Literal \quad (64)$$
$$hasDeclarationsomeDeclaration \quad (65)$$
$$hasProgramsomeProgram \quad (66)$$
$$hasProgramIDsomerdfs : Literal \quad (67)$$
$$time : inXSDDateTimeonlyxsd : dateTime \quad (68)$$

2.14 Census Uscb

2.14.1 Overview

I am the overview.

2.14.2 Axioms

$$AdministrativeRegionsubClassOf : geo : Feature \quad (1)$$

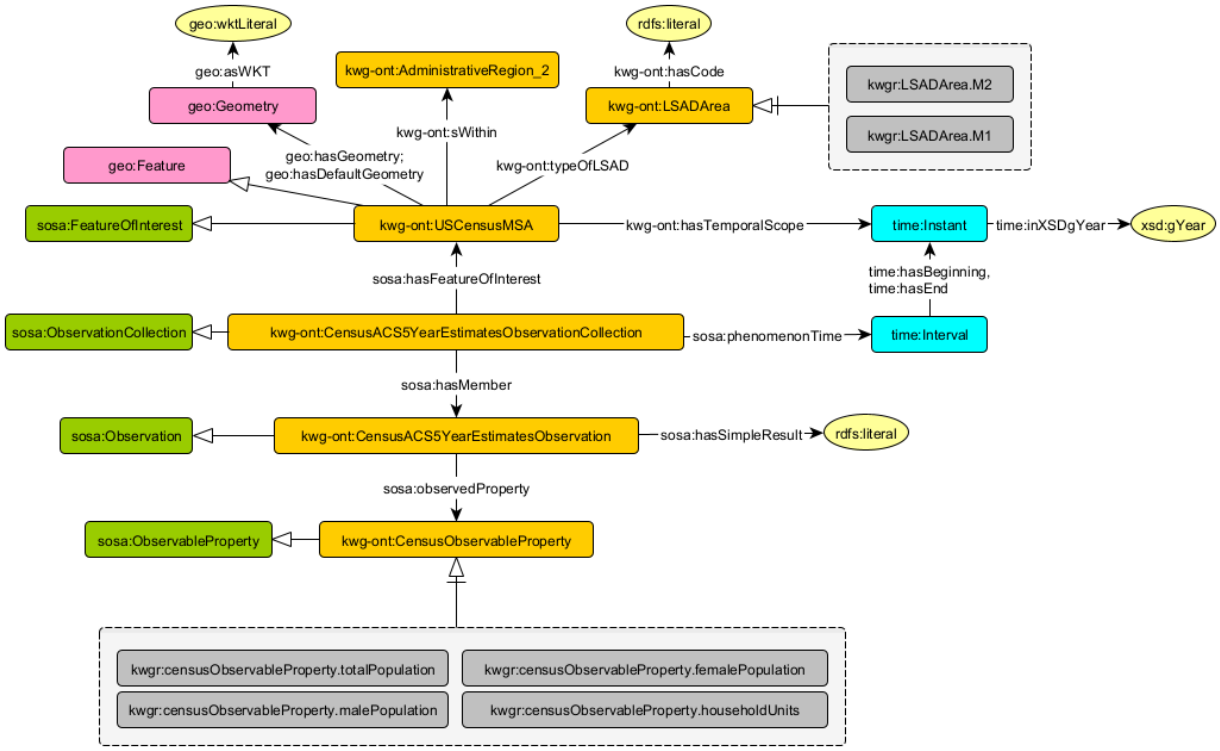

Figure 2.14: The schema diagram for the Census Uscb.

$$AdministrativeRegion_2 subClassOf : AdministrativeRegion \quad (2)$$

$$AdministrativeRegion_2 subClassOf : AdministrativeRegion \quad (3)$$

$$S2Cell subClassOf : Cell \quad (4)$$

$$CensusACS5YearEstimatesObservation subClassOf : Observation \quad (5)$$

$$CensusACS5YearEstimatesObservationCollection subClassOf : ObservationCollection \quad (6)$$

$$CensusObservableProperty subClassOf : ObservableProperty \quad (7)$$

$$USCensusMSA subClassOf : Region \quad (8)$$

$$S2Cell subClassOf : Cell \quad (9)$$

$$USCensusMSA subClassOf : Region \quad (10)$$

$$USCensusMSA subClassOf : geo : Feature \quad (11)$$

$$USCensusMSA subClassOf : FeatureOfInterest \quad (12)$$

$$AdministrativeRegion subClassOf : geo : Feature \quad (13)$$

$$USCensusMSA subClassOf : geo : Feature \quad (14)$$

$$time : Instant subClassOf : time : TemporalEntity \quad (15)$$

$$time : Interval subClassOf : time : TemporalEntity \quad (16)$$

$$time : Instant subClassOf : time : TemporalEntity \quad (17)$$

$$time : Interval subClassOf : time : TemporalEntity \quad (18)$$

$$USCensusMSAsubClassOf : FeatureOfInterest \quad (19)$$
$$CensusObservablePropertysubClassOf : ObservableProperty \quad (20)$$
$$CensusACS5YearEstimatesObservationsubClassOf : Observation \quad (21)$$
$$CensusACS5YearEstimatesObservationCollectionsubClassOf : ObservationCollection \quad (22)$$
$$observedPropertysomeCensusObservableProperty \quad (23)$$
$$hasFeatureOfInterestsomeUSCensusMSA \quad (24)$$
$$hasMembersomeCensusACS5YearEstimatesObservation \quad (25)$$
$$phenomenonTimesometime : Interval \quad (26)$$
$$hasCodesomerdfs : Literal \quad (27)$$
$$hasTemporalScopesometime : Instant \quad (28)$$
$$typeOfLSADsomeLSADArea \quad (29)$$
$$geo : hasDefaultGeometrysomegeo : Geometry \quad (30)$$
$$geo : hasGeometrysomegeo : Geometry \quad (31)$$
$$spatialRelationonlyAdministrativeRegion_2 \quad (32)$$
$$spatialRelationonlyS2Cell \quad (33)$$

2.15 Distributed Market Zones Nielsen

2.15.1 Overview

I am the overview.

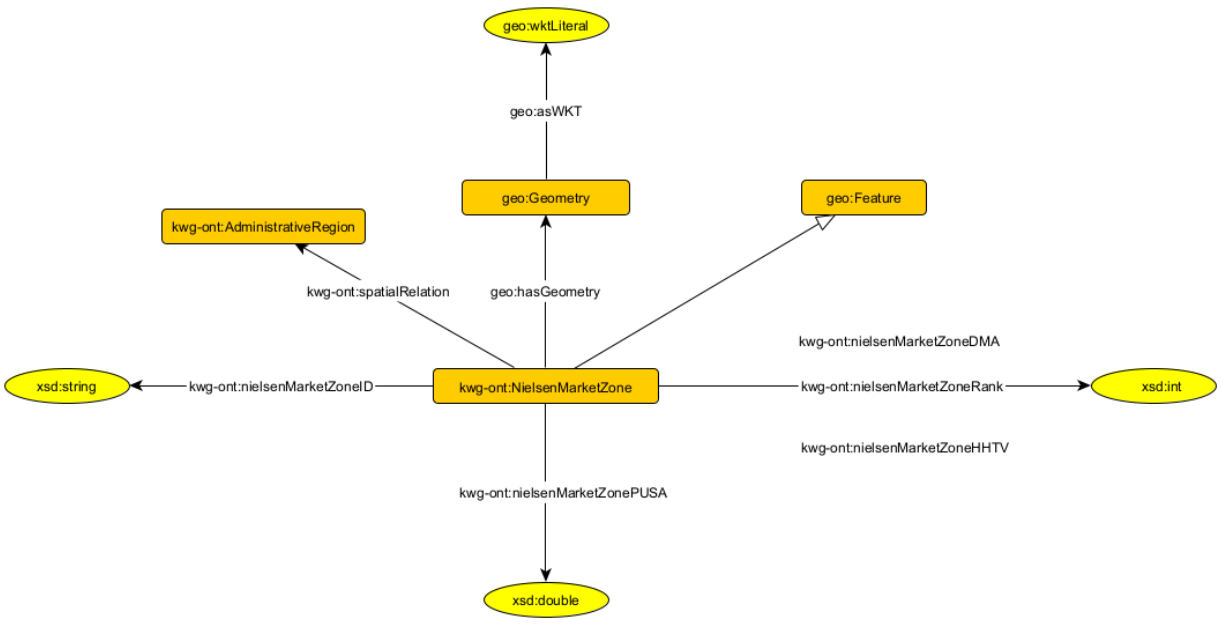

Figure 2.15: The schema diagram for the Distributed Market Zones Nielsen.

2.15.2 Axioms

$$AdministrativeRegion subClassOf : Region \quad (1)$$
$$AdministrativeRegion subClassOf : geo : Feature \quad (2)$$
$$AdministrativeRegion_3 subClassOf : AdministrativeRegion \quad (3)$$
$$AdministrativeRegion_3 subClassOf : AdministrativeRegion \quad (4)$$
$$S2Cell subClassOf : Cell \quad (5)$$
$$NielsenMarketZone subClassOf : Region \quad (6)$$
$$NielsenMarketZone subClassOf : geo : Feature \quad (7)$$
$$AdministrativeRegion subClassOf : Region \quad (8)$$
$$NielsenMarketZone subClassOf : Region \quad (9)$$
$$S2Cell subClassOf : Cell \quad (10)$$
$$AdministrativeRegion subClassOf : geo : Feature \quad (11)$$
$$NielsenMarketZone subClassOf : geo : Feature \quad (12)$$
$$geo : hasDefaultGeometry some geo : Geometry \quad (13)$$
$$geo : hasGeometry some geo : Geometry \quad (14)$$
$$spatialRelationonly AdministrativeRegion_3 \quad (15)$$
$$spatialRelationonly S2Cell \quad (16)$$
$$nielsenMarketZoneDMA some xsd : int \quad (17)$$
$$nielsenMarketZoneHHTV some xsd : int \quad (18)$$
$$nielsenMarketZoneID some xsd : double \quad (19)$$
$$nielsenMarketZonePUSA some xsd : string \quad (20)$$
$$nielsenMarketZoneRank some xsd : int \quad (21)$$

2.16 Historical Fires Mtbs

2.16.1 Overview

I am the overview.

2.16.2 Axioms

$$AdministrativeRegion subClassOf : Region \quad (1)$$
$$AdministrativeRegion subClassOf : geo : Feature \quad (2)$$
$$AdministrativeRegion_3 subClassOf : AdministrativeRegion \quad (3)$$
$$AdministrativeRegion_3 subClassOf : AdministrativeRegion \quad (4)$$
$$S2Cell subClassOf : Cell \quad (5)$$
$$ComplexFire subClassOf : Fire \quad (6)$$
$$MTBSComplexFire subClassOf : ComplexFire \quad (7)$$
$$Fire subClassOf : Hazard \quad (8)$$

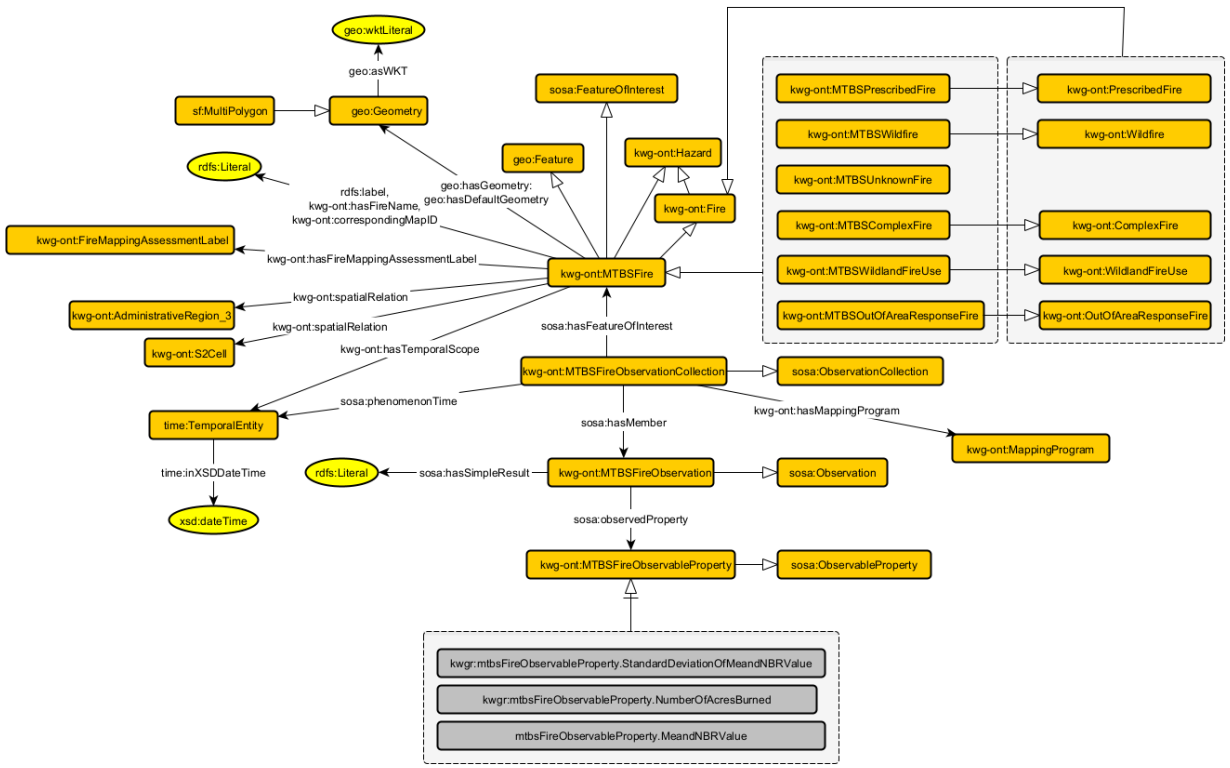

Figure 2.16: The schema diagram for the Historical Fires Mtbs.

$$ComplexFiresubClassOf : Fire \tag{9}$$
$$MTBSFiresubClassOf : Fire \tag{10}$$
$$OutOfAreaResponseFiresubClassOf : Fire \tag{11}$$
$$PrescribedFiresubClassOf : Fire \tag{12}$$
$$WildfiresubClassOf : Fire \tag{13}$$
$$WildlandFireUsesubClassOf : Fire \tag{14}$$
$$FiresubClassOf : Hazard \tag{15}$$
$$MTBSComplexFiresubClassOf : ComplexFire \tag{16}$$
$$MTBSComplexFiresubClassOf : MTBSFire \tag{17}$$
$$MTBSFiresubClassOf : Fire \tag{18}$$
$$MTBSFiresubClassOf : geo : Feature \tag{19}$$
$$MTBSFiresubClassOf : FeatureOfInterest \tag{20}$$
$$MTBSComplexFiresubClassOf : MTBSFire \tag{21}$$
$$MTBSOutOfAreaResponseFiresubClassOf : MTBSFire \tag{22}$$
$$MTBSPrescribedFiresubClassOf : MTBSFire \tag{23}$$
$$MTBSUnknownFiresubClassOf : MTBSFire \tag{24}$$
$$MTBSWildFiresubClassOf : MTBSFire \tag{25}$$

$$MTBSWildlandFireUsesubClassOf : MTBSFire \quad (26)$$
$$MTBSFireObservablePropertysubClassOf : ObservableProperty \quad (27)$$
$$MTBSFireObservationsubClassOf : Observation \quad (28)$$
$$MTBSFireObservationCollectionsubClassOf : ObservationCollection \quad (29)$$
$$MTBSOutOfAreaResponseFiresubClassOf : MTBSFire \quad (30)$$
$$MTBSOutOfAreaResponseFiresubClassOf : OutOfAreaResponseFire \quad (31)$$
$$MTBSPrescribedFiresubClassOf : MTBSFire \quad (32)$$
$$MTBSPrescribedFiresubClassOf : PrescribedFire \quad (33)$$
$$MTBSUnknownFiresubClassOf : MTBSFire \quad (34)$$
$$MTBSWildFiresubClassOf : MTBSFire \quad (35)$$
$$MTBSWildFiresubClassOf : Wildfire \quad (36)$$
$$MTBSWildlandFireUsesubClassOf : MTBSFire \quad (37)$$
$$MTBSWildlandFireUsesubClassOf : WildlandFireUse \quad (38)$$
$$OutOfAreaResponseFiresubClassOf : Fire \quad (39)$$
$$MTBSOutOfAreaResponseFiresubClassOf : OutOfAreaResponseFire \quad (40)$$
$$PrescribedFiresubClassOf : Fire \quad (41)$$
$$MTBSPrescribedFiresubClassOf : PrescribedFire \quad (42)$$
$$AdministrativeRegionsubClassOf : Region \quad (43)$$
$$S2CellsubClassOf : Cell \quad (44)$$
$$WildfiresubClassOf : Fire \quad (45)$$
$$MTBSWildFiresubClassOf : Wildfire \quad (46)$$
$$WildlandFireUsesubClassOf : Fire \quad (47)$$
$$MTBSWildlandFireUsesubClassOf : WildlandFireUse \quad (48)$$
$$AdministrativeRegionsubClassOf : geo : Feature \quad (49)$$
$$MTBSFiresubClassOf : geo : Feature \quad (50)$$
$$MTBSFiresubClassOf : FeatureOfInterest \quad (51)$$
$$MTBSFireObservablePropertysubClassOf : ObservableProperty \quad (52)$$
$$MTBSFireObservationsubClassOf : Observation \quad (53)$$
$$MTBSFireObservationCollectionsubClassOf : ObservationCollection \quad (54)$$
$$hasTemporalScopesometime : TemporalEntity \quad (55)$$
$$geo : hasDefaultGeometrysomegeo : Geometry \quad (56)$$
$$geo : hasGeometrysomegeo : Geometry \quad (57)$$
$$hasFireMappingAssessmentLabelonlyFireMappingAssessmentLabel \quad (58)$$
$$spatialRelationonlyAdministrativeRegion_3 \quad (59)$$
$$spatialRelationonlyS2Cell \quad (60)$$
$$correspondingMapIDonlyrdfs : Literal \quad (61)$$
$$hasFireNameonlyrdfs : Literal \quad (62)$$
$$observedPropertysomeMTBSFireObservableProperty \quad (63)$$

$$hasSimpleResultonlyrdfs : Literal \quad (64)$$
$$hasFeatureOfInterestsomeMTBSFire \quad (65)$$
$$hasMembersomeMTBSFireObservation \quad (66)$$
$$phenomenonTimesometime : TemporalEntity \quad (67)$$
$$hasMappingProgramonlyMappingProgram \quad (68)$$

2.17 Meta Description

2.17.1 Overview

I am the overview.

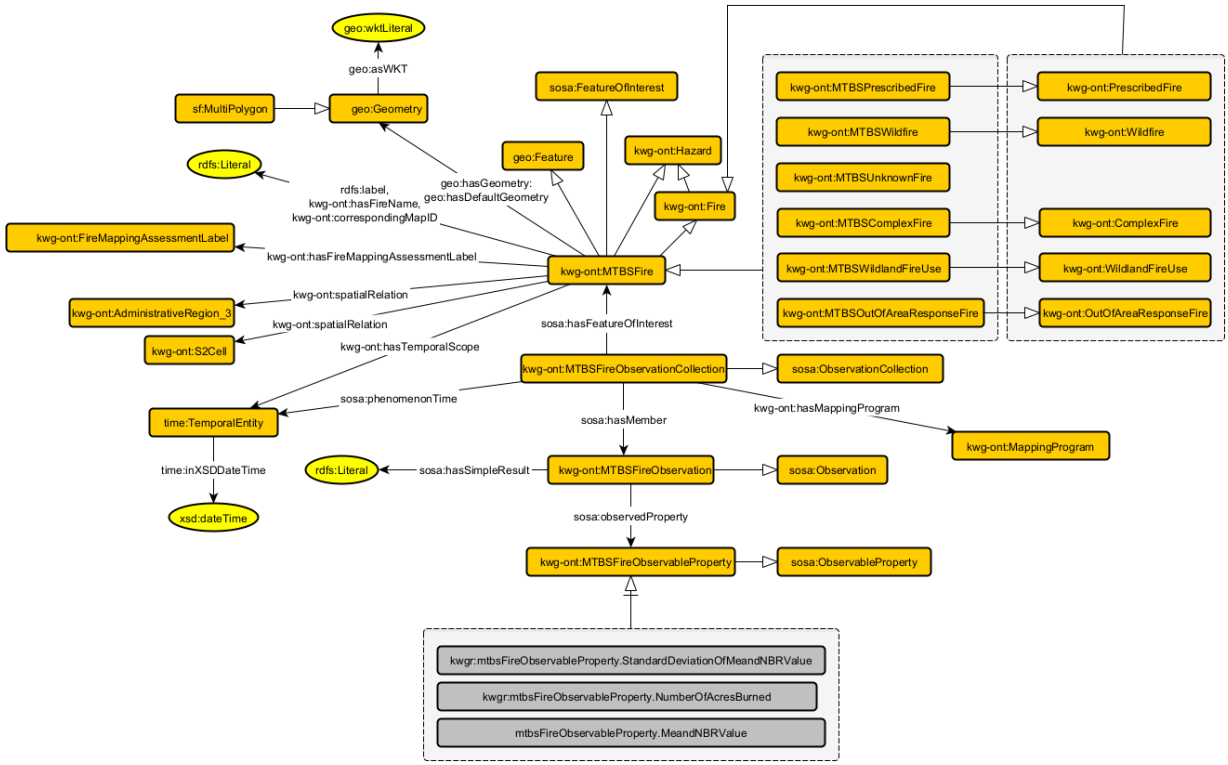

Figure 2.17: The schema diagram for the Meta Description.

2.17.2 Axioms

$$AdministrativeRegionsubClassOf : Region \quad (1)$$
$$AdministrativeRegionsubClassOf : geo : Feature \quad (2)$$
$$AdministrativeRegion_3subClassOf : AdministrativeRegion \quad (3)$$
$$AdministrativeRegion_3subClassOf : AdministrativeRegion \quad (4)$$
$$S2CellsubClassOf : Cell \quad (5)$$

$$ComplexFiresubClassOf : Fire \quad (6)$$
$$MTBSComplexFiresubClassOf : ComplexFire \quad (7)$$
$$FiresubClassOf : Hazard \quad (8)$$
$$ComplexFiresubClassOf : Fire \quad (9)$$
$$MTBSFiresubClassOf : Fire \quad (10)$$
$$OutOfAreaResponseFiresubClassOf : Fire \quad (11)$$
$$PrescribedFiresubClassOf : Fire \quad (12)$$
$$WildfiresubClassOf : Fire \quad (13)$$
$$WildlandFireUsesubClassOf : Fire \quad (14)$$
$$FiresubClassOf : Hazard \quad (15)$$
$$MTBSComplexFiresubClassOf : ComplexFire \quad (16)$$
$$MTBSComplexFiresubClassOf : MTBSFire \quad (17)$$
$$MTBSFiresubClassOf : Fire \quad (18)$$
$$MTBSFiresubClassOf : geo : Feature \quad (19)$$
$$MTBSFiresubClassOf : FeatureOfInterest \quad (20)$$
$$MTBSComplexFiresubClassOf : MTBSFire \quad (21)$$
$$MTBSOutOfAreaResponseFiresubClassOf : MTBSFire \quad (22)$$
$$MTBSPrescribedFiresubClassOf : MTBSFire \quad (23)$$
$$MTBSUnknownFiresubClassOf : MTBSFire \quad (24)$$
$$MTBSWildFiresubClassOf : MTBSFire \quad (25)$$
$$MTBSWildlandFireUsesubClassOf : MTBSFire \quad (26)$$
$$MTBSFireObservablePropertysubClassOf : ObservableProperty \quad (27)$$
$$MTBSFireObservationsubClassOf : Observation \quad (28)$$
$$MTBSFireObservationCollectionsubClassOf : ObservationCollection \quad (29)$$
$$MTBSOutOfAreaResponseFiresubClassOf : MTBSFire \quad (30)$$
$$MTBSOutOfAreaResponseFiresubClassOf : OutOfAreaResponseFire \quad (31)$$
$$MTBSPrescribedFiresubClassOf : MTBSFire \quad (32)$$
$$MTBSPrescribedFiresubClassOf : PrescribedFire \quad (33)$$
$$MTBSUnknownFiresubClassOf : MTBSFire \quad (34)$$
$$MTBSWildFiresubClassOf : MTBSFire \quad (35)$$
$$MTBSWildFiresubClassOf : Wildfire \quad (36)$$
$$MTBSWildlandFireUsesubClassOf : MTBSFire \quad (37)$$
$$MTBSWildlandFireUsesubClassOf : WildlandFireUse \quad (38)$$
$$OutOfAreaResponseFiresubClassOf : Fire \quad (39)$$
$$MTBSOutOfAreaResponseFiresubClassOf : OutOfAreaResponseFire \quad (40)$$
$$PrescribedFiresubClassOf : Fire \quad (41)$$
$$MTBSPrescribedFiresubClassOf : PrescribedFire \quad (42)$$
$$AdministrativeRegionsubClassOf : Region \quad (43)$$

$$S2CellsubClassOf : Cell \quad (44)$$
$$WildfiresubClassOf : Fire \quad (45)$$
$$MTBSWildFiresubClassOf : Wildfire \quad (46)$$
$$WildlandFireUsesubClassOf : Fire \quad (47)$$
$$MTBSWildlandFireUsesubClassOf : WildlandFireUse \quad (48)$$
$$AdministrativeRegionsubClassOf : geo : Feature \quad (49)$$
$$MTBSFiresubClassOf : geo : Feature \quad (50)$$
$$MTBSFiresubClassOf : FeatureOfInterest \quad (51)$$
$$MTBSFireObservablePropertysubClassOf : ObservableProperty \quad (52)$$
$$MTBSFireObservationsubClassOf : Observation \quad (53)$$
$$MTBSFireObservationCollectionsubClassOf : ObservationCollection \quad (54)$$
$$hasTemporalScopesometime : TemporalEntity \quad (55)$$
$$geo : hasDefaultGeometrysomegeo : Geometry \quad (56)$$
$$geo : hasGeometrysomegeo : Geometry \quad (57)$$
$$hasFireMappingAssessmentLabelonlyFireMappingAssessmentLabel \quad (58)$$
$$spatialRelationonlyAdministrativeRegion_3 \quad (59)$$
$$spatialRelationonlyS2Cell \quad (60)$$
$$correspondingMapIDonlyrdfs : Literal \quad (61)$$
$$hasFireNameonlyrdfs : Literal \quad (62)$$
$$observedPropertysomeMTBSFireObservableProperty \quad (63)$$
$$hasSimpleResultonlyrdfs : Literal \quad (64)$$
$$hasFeatureOfInterestsomeMTBSFire \quad (65)$$
$$hasMembersomeMTBSFireObservation \quad (66)$$
$$phenomenonTimesometime : TemporalEntity \quad (67)$$
$$hasMappingProgramonlyMappingProgram \quad (68)$$

2.18 Air Pollutant Epa

2.18.1 Overview

I am the overview.

2.18.2 Axioms

$$AdministrativeRegionsubClassOf : Region \quad (1)$$
$$AdministrativeRegionsubClassOf : geo : Feature \quad (2)$$
$$AdministrativeRegion_3subClassOf : AdministrativeRegion \quad (3)$$
$$AdministrativeRegion_3subClassOf : AdministrativeRegion \quad (4)$$
$$AirPollutantsubClassOf : ObservableProperty \quad (5)$$
$$AirQualityInstrumentsubClassOf : Sensor \quad (6)$$

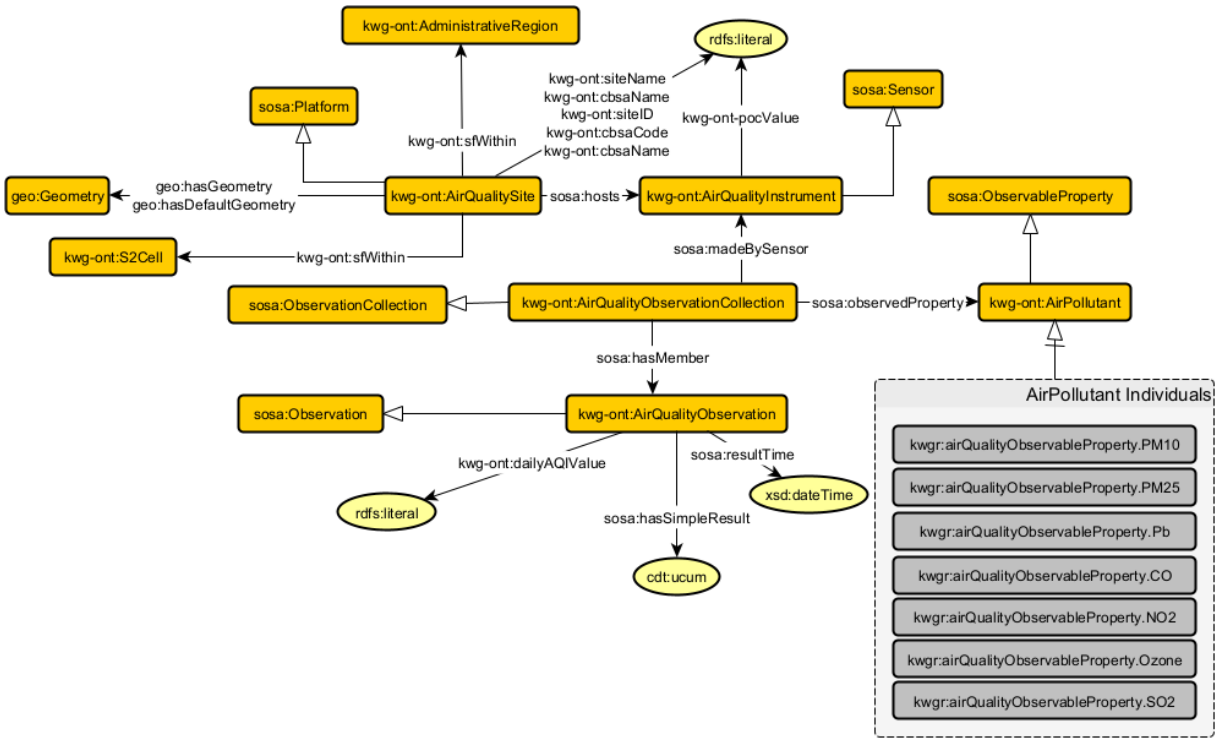

Figure 2.18: The schema diagram for the Air Pollutant Epa.

$$AirQualityObservationsubClassOf : Observation \tag{7}$$
$$AirQualityObservationCollectionsubClassOf : ObservationCollection \tag{8}$$
$$AirQualitySitesubClassOf : Platform \tag{9}$$
$$S2CellsubClassOf : Cell \tag{10}$$
$$AdministrativeRegionsubClassOf : Region \tag{11}$$
$$S2CellsubClassOf : Cell \tag{12}$$
$$AdministrativeRegionsubClassOf : geo : Feature \tag{13}$$
$$AirPollutantsubClassOf : ObservableProperty \tag{14}$$
$$AirQualityObservationsubClassOf : Observation \tag{15}$$
$$AirQualityObservationCollectionsubClassOf : ObservationCollection \tag{16}$$
$$AirQualitySitesubClassOf : Platform \tag{17}$$
$$AirQualityInstrumentsubClassOf : Sensor \tag{18}$$
$$pocValueonlyrdfs : Literal \tag{19}$$
$$dailyAQIValuesomerdfs : Literal \tag{20}$$
$$resultTimesomexsd : dateTime \tag{21}$$
$$hasMembersomeAirQualityObservation \tag{22}$$
$$madeBySensorsomeAirQualityInstrument \tag{23}$$

$$observedPropertysomeAirPollutant \quad (24)$$
$$sfWithinsomeS2Cell \quad (25)$$
$$geo : hasDefaultGeometrysomegeo : Geometry \quad (26)$$
$$geo : hasGeometrysomegeo : Geometry \quad (27)$$
$$hostssomeAirQualityInstrument \quad (28)$$
$$sfWithinonlyAdministrativeRegion \quad (29)$$
$$cbsaCodesomerdfs : Literal \quad (30)$$
$$cbsaNamesomerdfs : Literal \quad (31)$$
$$siteIDsomerdfs : Literal \quad (32)$$
$$siteNamesomerdfs : Literal \quad (33)$$

2.19 Public Health

2.19.1 Overview

I am the overview.

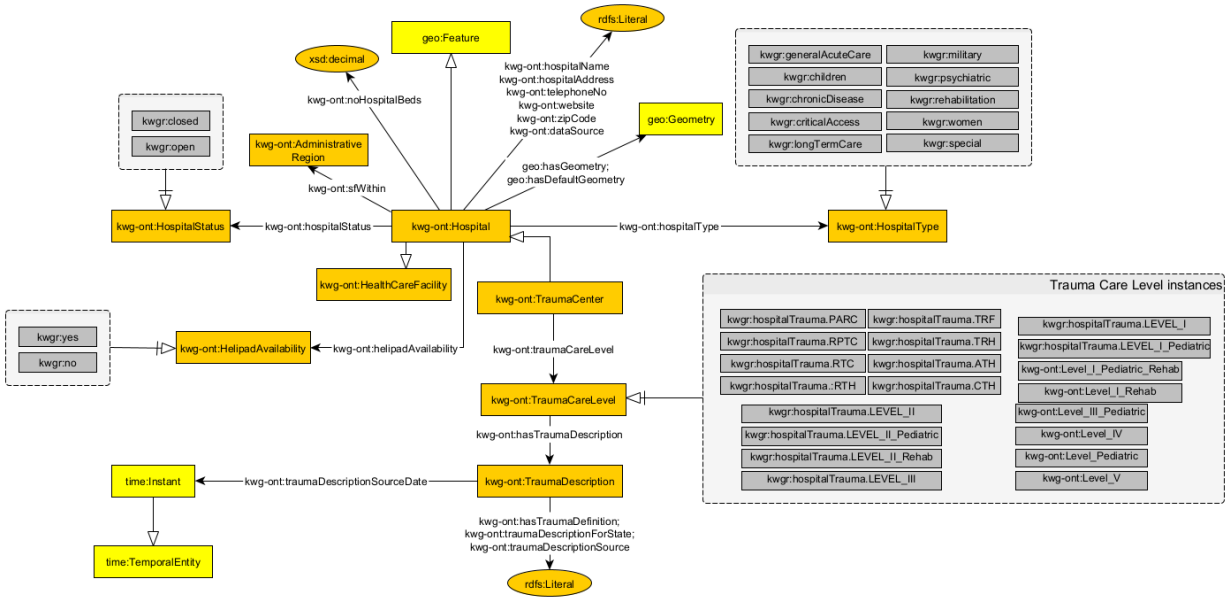

Figure 2.19: The schema diagram for the Public Health.

2.19.2 Axioms

$$AdministrativeRegionsubClassOf : Region \quad (1)$$
$$AdministrativeRegionsubClassOf : geo : Feature \quad (2)$$
$$AdministrativeRegion_3subClassOf : AdministrativeRegion \quad (3)$$

$$AdministrativeRegion_3 subClassOf : AdministrativeRegion \quad (4)$$
$$AdministrativeRegion_3 subClassOf : FeatureOfInterest \quad (5)$$
$$S2Cell subClassOf : Cell \quad (6)$$
$$HealthCareFacility subClassOf : geo : Feature \quad (7)$$
$$Hospital subClassOf : HealthCareFacility \quad (8)$$
$$Pharmacy subClassOf : HealthCareFacility \quad (9)$$
$$PublicHealthDepartment subClassOf : HealthCareFacility \quad (10)$$
$$Hospital subClassOf : HealthCareFacility \quad (11)$$
$$TraumaCenter subClassOf : Hospital \quad (12)$$
$$Pharmacy subClassOf : HealthCareFacility \quad (13)$$
$$PublicHealthDepartment subClassOf : HealthCareFacility \quad (14)$$
$$PublicHealthObservableProperty subClassOf : ObservableProperty \quad (15)$$
$$PublicHealthObservation subClassOf : Observation \quad (16)$$
$$PublicHealthObservationCollection subClassOf : ObservationCollection \quad (17)$$
$$AdministrativeRegion subClassOf : Region \quad (18)$$
$$S2Cell subClassOf : Cell \quad (19)$$
$$TraumaCenter subClassOf : Hospital \quad (20)$$
$$VulnerabilityObservableProperty subClassOf : ObservableProperty \quad (21)$$
$$VulnerabilityObservation subClassOf : Observation \quad (22)$$
$$AdministrativeRegion subClassOf : geo : Feature \quad (23)$$
$$HealthCareFacility subClassOf : geo : Feature \quad (24)$$
$$time : Instant subClassOf : time : TemporalEntity \quad (25)$$
$$time : Instant subClassOf : time : TemporalEntity \quad (26)$$
$$AdministrativeRegion_3 subClassOf : FeatureOfInterest \quad (27)$$
$$PublicHealthObservableProperty subClassOf : ObservableProperty \quad (28)$$
$$VulnerabilityObservableProperty subClassOf : ObservableProperty \quad (29)$$
$$PublicHealthObservation subClassOf : Observation \quad (30)$$
$$VulnerabilityObservation subClassOf : Observation \quad (31)$$
$$PublicHealthObservationCollection subClassOf : ObservationCollection \quad (32)$$
$$helipadAvailability some HelipadAvailability \quad (33)$$
$$hospitalStatus some HospitalStatus \quad (34)$$
$$hospitalType some HospitalType \quad (35)$$
$$geo : hasDefaultGeometry some geo : Geometry \quad (36)$$
$$geo : hasGeometry some geo : Geometry \quad (37)$$
$$sfWithin only AdministrativeRegion \quad (38)$$
$$sfWithin only S2Cell \quad (39)$$
$$hospitalName some rdfs : Literal \quad (40)$$
$$hospitalAddress only rdfs : Literal \quad (41)$$

$$noHospitalBedsonlyxsd : decimal \quad (42)$$
$$telephoneNoonlyrdfs : Literal \quad (43)$$
$$websiteonlyrdfs : Literal \quad (44)$$
$$zipCodeonlyrdfs : Literal \quad (45)$$
$$pharmacyTypesomePharmacyType \quad (46)$$
$$spatialRelationsomeAdministrativeRegion \quad (47)$$
$$spatialRelationsomeS2Cell \quad (48)$$
$$geo : hasDefaultGeometrysomegeo : Geometry \quad (49)$$
$$geo : hasGeometrysomegeo : Geometry \quad (50)$$
$$addresssomerdfs : Literal \quad (51)$$
$$telephoneNosomerdfs : Literal \quad (52)$$
$$zipCodesomerdfs : Literal \quad (53)$$
$$pharmacyNameonlyrdfs : Literal \quad (54)$$
$$administrativeLevelsomeAdministrativeLevel \quad (55)$$
$$spatialRelationsomeAdministrativeRegion \quad (56)$$
$$spatialRelationsomeS2Cell \quad (57)$$
$$geo : hasDefaultGeometrysomegeo : Geometry \quad (58)$$
$$geo : hasGeometrysomegeo : Geometry \quad (59)$$
$$addresssomerdfs : Literal \quad (60)$$
$$telephoneNosomerdfs : Literal \quad (61)$$
$$zipCodesomerdfs : Literal \quad (62)$$
$$publicHealthDepartmentNameonlyrdfs : Literal \quad (63)$$
$$observedPropertysomePublicHealthObservableProperty \quad (64)$$
$$hasSimpleResultsomerdfs : LiteralhasFeatureOfInterestsomeAdministrativeRegion_3 \quad (65)$$
$$hasMembersomePublicHealthObservation \quad (66)$$
$$phenomenonTimesometime : TemporalEntity \quad (67)$$
$$hasTraumaDescriptionsomeTraumaDescription \quad (68)$$
$$traumaCareLevelsomeTraumaCareLevel \quad (69)$$
$$traumaDescriptionSourceDatesometime : Instant \quad (70)$$
$$traumaDescriptionForStatesomerdfs : Literal \quad (71)$$
$$traumaDescriptionSourcesomerdfs : Literal \quad (72)$$
$$observedPropertysomeVulnerabilityObservableProperty \quad (73)$$
$$phenomenonTimesometime : TemporalEntity \quad (74)$$
$$hasSimpleResultsomerdfs : Literal \quad (75)$$

2.20 Fqhc

2.20.1 Overview

I am the overview.

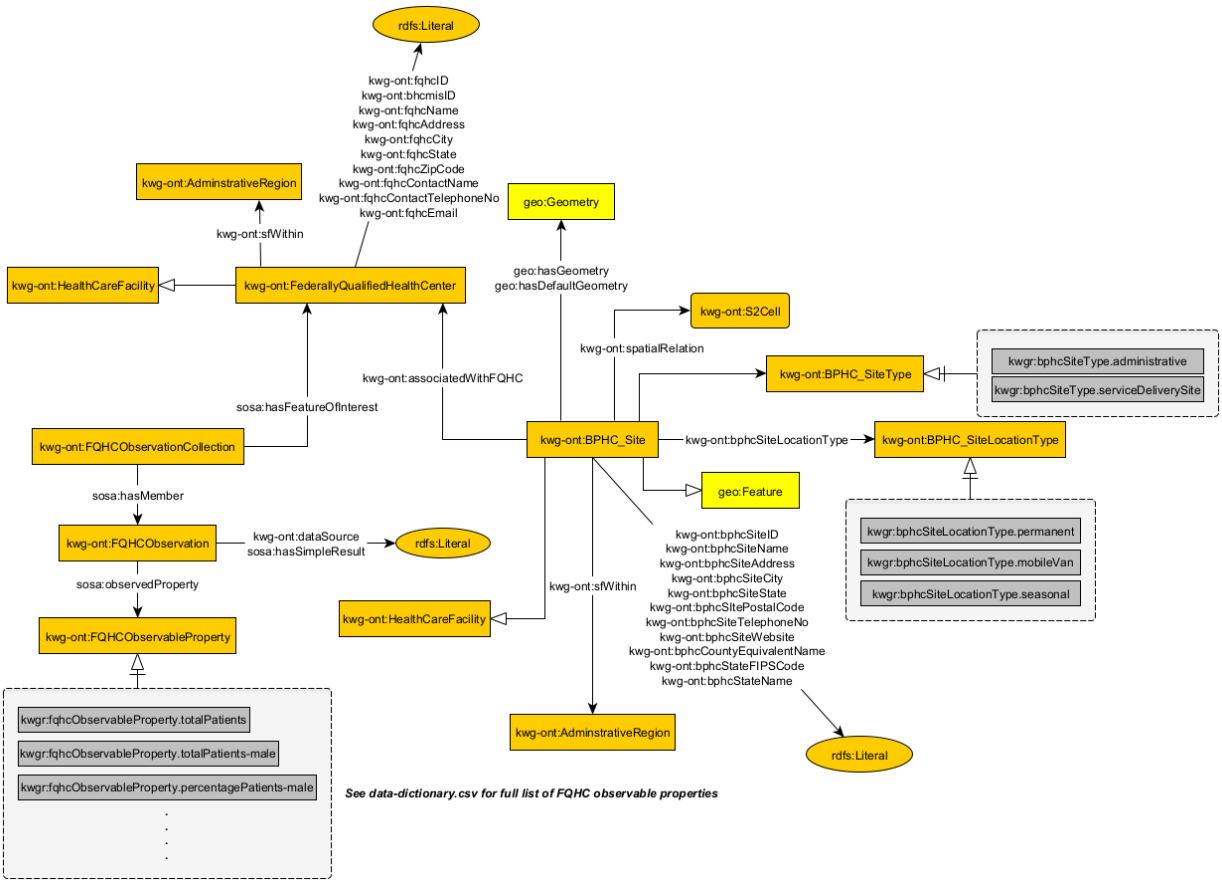

Figure 2.20: The schema diagram for the Fqhc.

2.20.2 Axioms

$$AdministrativeRegion subClassOf : Region \quad (1)$$
$$AdministrativeRegion subClassOf : geo : Feature \quad (2)$$
$$AdministrativeRegion_3 subClassOf : AdministrativeRegion \quad (3)$$
$$AdministrativeRegion_3 subClassOf : AdministrativeRegion \quad (4)$$
$$AdministrativeRegion_3 subClassOf : FeatureOfInterest \quad (5)$$
$$S2Cell subClassOf : Cell \quad (6)$$
$$HealthCareFacility subClassOf : geo : Feature \quad (7)$$
$$Hospital subClassOf : HealthCareFacility \quad (8)$$

$$PharmacysubClassOf : HealthCareFacility \quad (9)$$
$$PublicHealthDepartmentsubClassOf : HealthCareFacility \quad (10)$$
$$HospitalsubClassOf : HealthCareFacility \quad (11)$$
$$TraumaCentersubClassOf : Hospital \quad (12)$$
$$PharmacysubClassOf : HealthCareFacility \quad (13)$$
$$PublicHealthDepartmentsubClassOf : HealthCareFacility \quad (14)$$
$$PublicHealthObservablePropertysubClassOf : ObservableProperty \quad (15)$$
$$PublicHealthObservationsubClassOf : Observation \quad (16)$$
$$PublicHealthObservationCollectionsubClassOf : ObservationCollection \quad (17)$$
$$AdministrativeRegionsubClassOf : Region \quad (18)$$
$$S2CellsubClassOf : Cell \quad (19)$$
$$TraumaCentersubClassOf : Hospital \quad (20)$$
$$VulnerabilityObservablePropertysubClassOf : ObservableProperty \quad (21)$$
$$VulnerabilityObservationsubClassOf : Observation \quad (22)$$
$$AdministrativeRegionsubClassOf : geo : Feature \quad (23)$$
$$HealthCareFacilitysubClassOf : geo : Feature \quad (24)$$
$$time : InstantsubClassOf : time : TemporalEntity \quad (25)$$
$$time : InstantsubClassOf : time : TemporalEntity \quad (26)$$
$$AdministrativeRegion_3subClassOf : FeatureOfInterest \quad (27)$$
$$PublicHealthObservablePropertysubClassOf : ObservableProperty \quad (28)$$
$$VulnerabilityObservablePropertysubClassOf : ObservableProperty \quad (29)$$
$$PublicHealthObservationsubClassOf : Observation \quad (30)$$
$$VulnerabilityObservationsubClassOf : Observation \quad (31)$$
$$PublicHealthObservationCollectionsubClassOf : ObservationCollection \quad (32)$$
$$helipadAvailabilitysomeHelipadAvailability \quad (33)$$
$$hospitalStatussomeHospitalStatus \quad (34)$$
$$hospitalTypesomeHospitalType \quad (35)$$
$$geo : hasDefaultGeometrysomegeo : Geometry \quad (36)$$
$$geo : hasGeometrysomegeo : Geometry \quad (37)$$
$$sfWithinonlyAdministrativeRegion \quad (38)$$
$$sfWithinonlyS2Cell \quad (39)$$
$$hospitalNamesomerdfs : Literal \quad (40)$$
$$hospitalAddressonlyrdfs : Literal \quad (41)$$
$$noHospitalBedsonlyxsd : decimal \quad (42)$$
$$telephoneNoonlyrdfs : Literal \quad (43)$$
$$websiteonlyrdfs : Literal \quad (44)$$
$$zipCodeonlyrdfs : Literal \quad (45)$$
$$pharmacyTypesomePharmacyType \quad (46)$$

$$spatialRelationsomeAdministrativeRegion \quad (47)$$
$$spatialRelationsomeS2Cell \quad (48)$$
$$geo : hasDefaultGeometrysomegeo : Geometry \quad (49)$$
$$geo : hasGeometrysomegeo : Geometry \quad (50)$$
$$addresssomerdfs : Literal \quad (51)$$
$$telephoneNosomerdfs : Literal \quad (52)$$
$$zipCodesomerdfs : Literal \quad (53)$$
$$pharmacyNameonlyrdfs : Literal \quad (54)$$
$$administrativeLevelsomeAdministrativeLevel \quad (55)$$
$$spatialRelationsomeAdministrativeRegion \quad (56)$$
$$spatialRelationsomeS2Cell \quad (57)$$
$$geo : hasDefaultGeometrysomegeo : Geometry \quad (58)$$
$$geo : hasGeometrysomegeo : Geometry \quad (59)$$
$$addresssomerdfs : Literal \quad (60)$$
$$telephoneNosomerdfs : Literal \quad (61)$$
$$zipCodesomerdfs : Literal \quad (62)$$
$$publicHealthDepartmentNameonlyrdfs : Literal \quad (63)$$
$$observedPropertysomePublicHealthObservableProperty \quad (64)$$
$$hasSimpleResultsomerdfs : LiteralhasFeatureOfInterestsomeAdministrativeRegion_3 \quad (65)$$
$$hasMembersomePublicHealthObservation \quad (66)$$
$$phenomenonTimesometime : TemporalEntity \quad (67)$$
$$hasTraumaDescriptionsomeTraumaDescription \quad (68)$$
$$traumaCareLevelsomeTraumaCareLevel \quad (69)$$
$$traumaDescriptionSourceDatesometime : Instant \quad (70)$$
$$traumaDescriptionForStatesomerdfs : Literal \quad (71)$$
$$traumaDescriptionSourcesomerdfs : Literal \quad (72)$$
$$observedPropertysomeVulnerabilityObservableProperty \quad (73)$$
$$phenomenonTimesometime : TemporalEntity \quad (74)$$
$$hasSimpleResultsomerdfs : Literal \quad (75)$$

2.21 Smoke Plumes Noaa

2.21.1 Overview

I am the overview.

2.21.2 Axioms

$$AdministrativeRegionsubClassOf : Region \quad (1)$$
$$AdministrativeRegionsubClassOf : geo : Feature \quad (2)$$

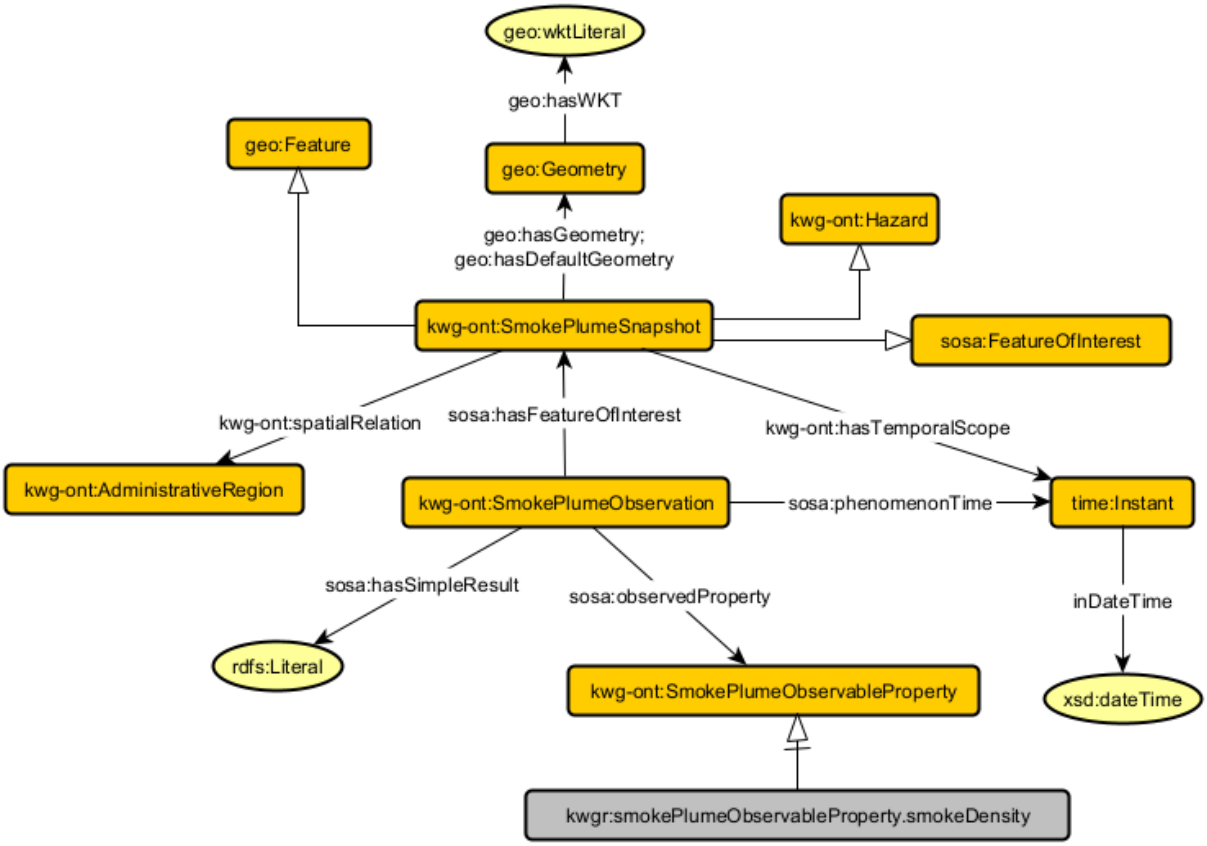

Figure 2.21: The schema diagram for the Smoke Plumes Noaa.

$$AdministrativeRegion_3 subClassOf : AdministrativeRegion \quad (3)$$
$$AdministrativeRegion_3 subClassOf : AdministrativeRegion \quad (4)$$
$$S2Cell subClassOf : Cell \quad (5)$$
$$SmokePlumeSnapshot subClassOf : Hazard \quad (6)$$
$$AdministrativeRegion subClassOf : Region \quad (7)$$
$$S2Cell subClassOf : Cell \quad (8)$$
$$SmokePlumeObservableProperty subClassOf : ObservableProperty \quad (9)$$
$$SmokePlumeObservation subClassOf : Observation \quad (10)$$
$$SmokePlumeSnapshot subClassOf : Hazard \quad (11)$$
$$SmokePlumeSnapshot subClassOf : geo : Feature \quad (12)$$
$$SmokePlumeSnapshot subClassOf : FeatureOfInterest \quad (13)$$
$$AdministrativeRegion subClassOf : geo : Feature \quad (14)$$
$$SmokePlumeSnapshot subClassOf : geo : Feature \quad (15)$$
$$time : Instant subClassOf : time : TemporalEntity \quad (16)$$
$$time : Instant subClassOf : time : TemporalEntity \quad (17)$$

$$SmokePlumeSnapshotsubClassOf : FeatureOfInterest \quad (18)$$
$$SmokePlumeObservablePropertysubClassOf : ObservableProperty \quad (19)$$
$$SmokePlumeObservationsubClassOf : Observation \quad (20)$$
$$hasFeatureOfInterestsomeSmokePlumeSnapshot \quad (21)$$
$$observedPropertysomeSmokePlumeObservableProperty \quad (22)$$
$$phenomenonTimesometime : TemporalEntity \quad (23)$$
$$hasSimpleResultsomerdfs : Literal \quad (24)$$
$$hasTemporalScopesometime : TemporalEntity \quad (25)$$
$$geo : hasDefaultGeometrysomegeo : Geometry \quad (26)$$
$$geo : hasGeometrysomegeo : Geometry \quad (27)$$
$$spatialRelationonlyAdministrativeRegion_3 \quad (28)$$
$$spatialRelationonlyS2Cell \quad (29)$$

2.22 Earthquake Usgs

2.22.1 Overview

I am the overview.

2.22.2 Axioms

$$AdministrativeRegionsubClassOf : Region \quad (1)$$
$$AdministrativeRegionsubClassOf : geo : Feature \quad (2)$$
$$AdministrativeRegion_3subClassOf : AdministrativeRegion \quad (3)$$
$$AdministrativeRegion_3subClassOf : AdministrativeRegion \quad (4)$$
$$EarthquakesubClassOf : Hazard \quad (5)$$
$$EarthquakesubClassOf : geo : Feature \quad (6)$$
$$EarthquakesubClassOf : FeatureOfInterest \quad (7)$$
$$EarthquakeObservablePropertysubClassOf : ObservableProperty \quad (8)$$
$$EarthquakeObservationCollectionsubClassOf : ObservationCollection \quad (9)$$
$$EarthquakesubClassOf : Hazard \quad (10)$$
$$AdministrativeRegionsubClassOf : Region \quad (11)$$
$$AdministrativeRegionsubClassOf : geo : Feature \quad (12)$$
$$EarthquakesubClassOf : geo : Feature \quad (13)$$
$$time : InstantsubClassOf : time : TemporalEntity \quad (14)$$
$$time : InstantsubClassOf : time : TemporalEntity \quad (15)$$
$$EarthquakeObservationsubClassOf : Observation \quad (16)$$
$$EarthquakesubClassOf : FeatureOfInterest \quad (17)$$
$$EarthquakeObservablePropertysubClassOf : ObservableProperty \quad (18)$$
$$EarthquakeObservationsubClassOf : Observation \quad (19)$$

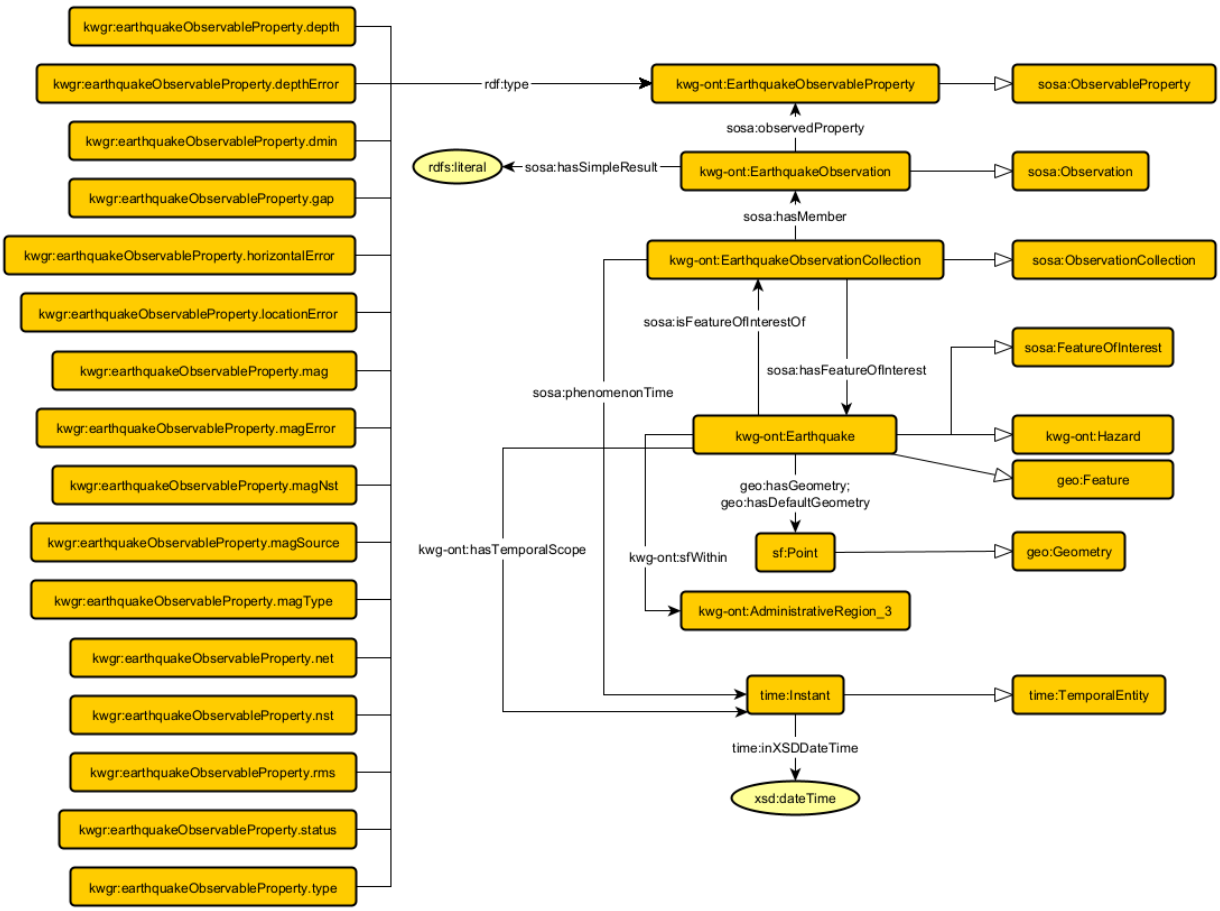

Figure 2.22: The schema diagram for the Earthquake Usgs.

$$EarthquakeObservationCollection \; subClassOf \; : \; ObservationCollection \tag{20}$$

$$geo : hasDefaultGeometry \; some \; geo : Geometry \tag{21}$$

$$geo : hasGeometry \; some \; geo : Geometry \tag{22}$$

$$sfWithin \; only \; AdministrativeRegion_3 \tag{23}$$

$$hasFeatureOfInterest \; some \; Earthquake \tag{24}$$

$$hasMember \; some \; EarthquakeObservation \tag{25}$$

$$geo : asWKT \; only \; geo : wktLiteral \tag{26}$$

$$geo : asWKT \; some \; geo : wktLiteral \tag{27}$$

$$time : inXSDDateTime \; only \; xsd : dateTime \tag{28}$$

$$time : inXSDDateTime \; some \; xsd : dateTime \tag{29}$$

$$observedProperty \; some \; EarthquakeObservableProperty \tag{30}$$

$$hasSimpleResult \; some \; rdfs : Literal \tag{31}$$

2.23 Undrr Hazard Classification

2.23.1 Overview

I am the overview.

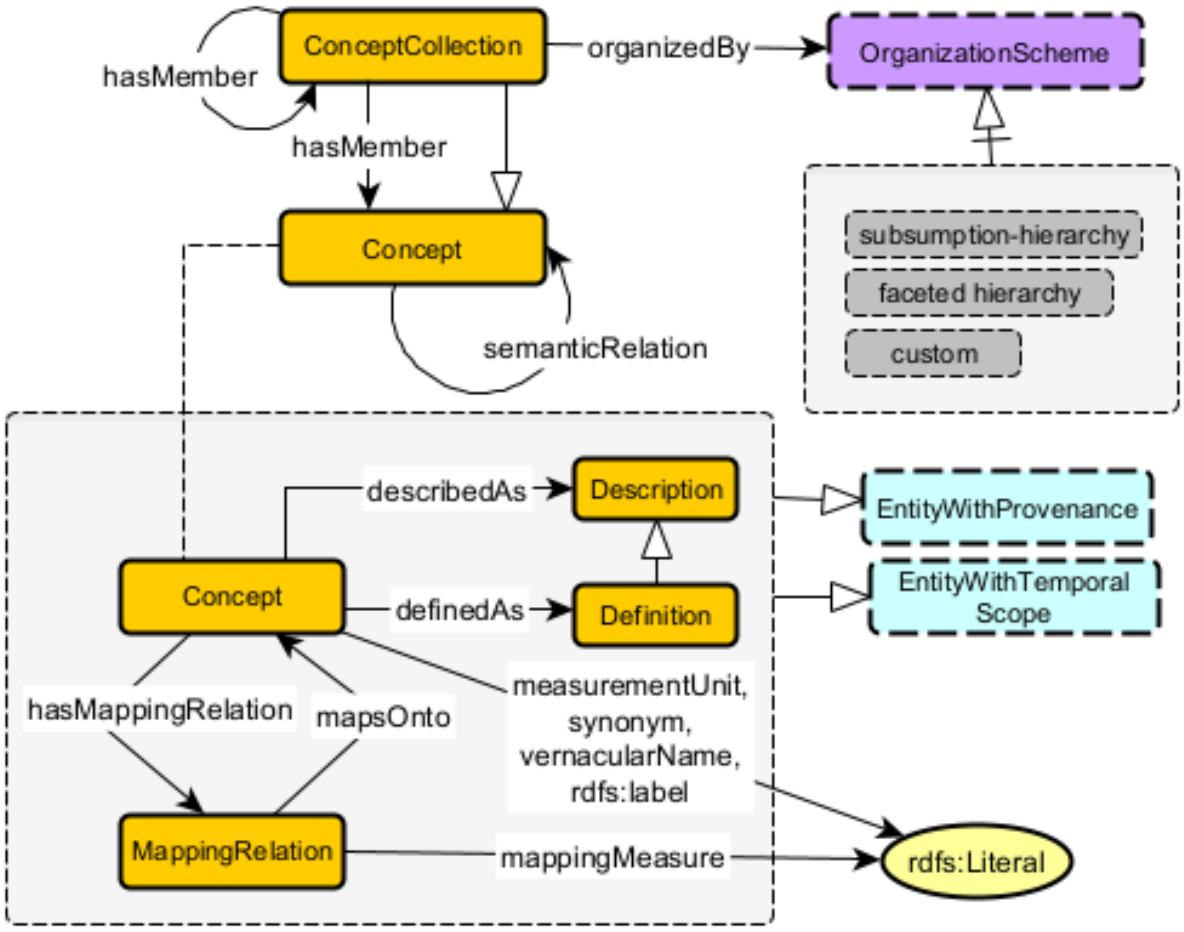

Figure 2.23: The schema diagram for the Undrr Hazard Classification.

2.23.2 Axioms

$$NonesomeNoneNonesomeNoneNonesomeNoneNonesomeNoneNonesomeNoneNonesomeNoneNonesomeNo \tag{1}$$

2.24 Wildfire Nifc

2.24.1 Overview

I am the overview.

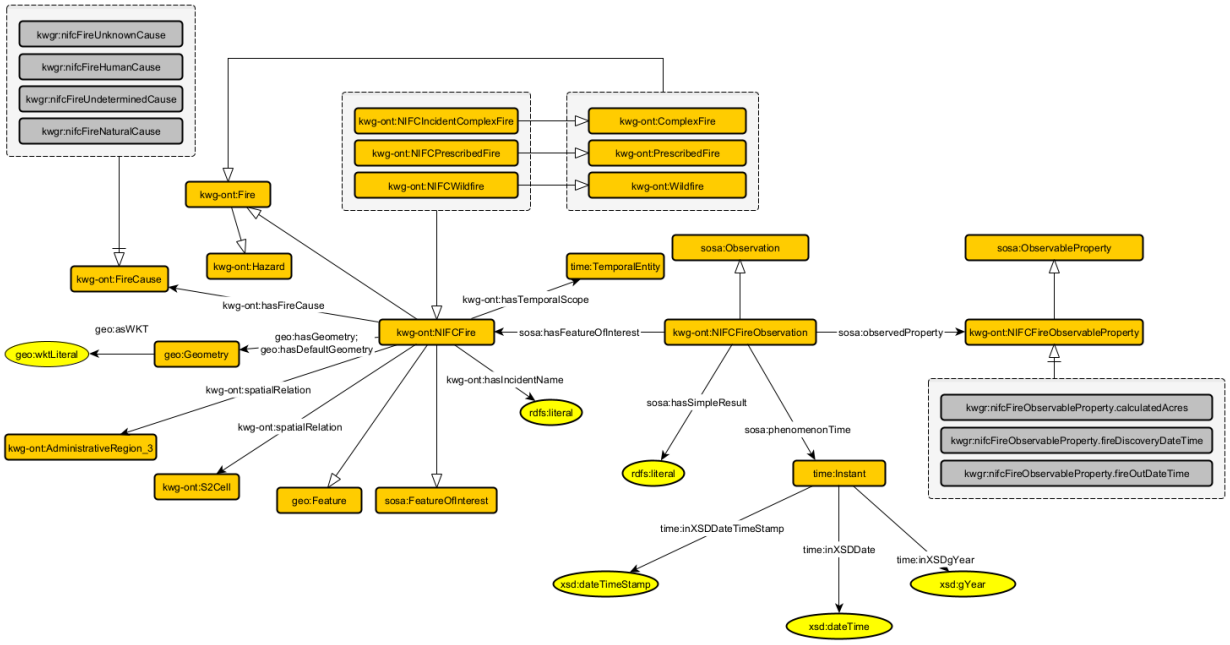

Figure 2.24: The schema diagram for the Wildfire Nifc.

2.24.2 Axioms

$$AdministrativeRegion subClassOf : Region \tag{1}$$
$$AdministrativeRegion subClassOf : geo : Feature \tag{2}$$
$$AdministrativeRegion_3 subClassOf : AdministrativeRegion \tag{3}$$
$$AdministrativeRegion_3 subClassOf : AdministrativeRegion \tag{4}$$
$$S2Cell subClassOf : Cell \tag{5}$$
$$ComplexFire subClassOf : Fire \tag{6}$$
$$NIFC_IncidentComplexFire subClassOf : ComplexFire \tag{7}$$
$$Fire subClassOf : Hazard \tag{8}$$
$$ComplexFire subClassOf : Fire \tag{9}$$
$$NIFC_Fire subClassOf : Fire \tag{10}$$
$$PrescribedFire subClassOf : Fire \tag{11}$$
$$Wildfire subClassOf : Fire \tag{12}$$
$$Fire subClassOf : Hazard \tag{13}$$
$$NIFCFireObservableProperty subClassOf : ObservableProperty \tag{14}$$
$$NIFCFireObservation subClassOf : Observation \tag{15}$$
$$NIFC_Fire subClassOf : Fire \tag{16}$$
$$NIFC_Fire subClassOf : geo : Feature \tag{17}$$
$$NIFC_Fire subClassOf : FeatureOfInterest \tag{18}$$

$$NIFC_{I}ncidentComplexFiresubClassOf : NIFC_{F}ire \quad (19)$$
$$NIFC_{P}rescribedFiresubClassOf : NIFC_{F}ire \quad (20)$$
$$NIFC_{W}ildfiresubClassOf : NIFC_{F}ire \quad (21)$$
$$NIFC_{I}ncidentComplexFiresubClassOf : ComplexFire \quad (22)$$
$$NIFC_{I}ncidentComplexFiresubClassOf : NIFC_{F}ire \quad (23)$$
$$NIFC_{P}rescribedFiresubClassOf : NIFC_{F}ire \quad (24)$$
$$NIFC_{P}rescribedFiresubClassOf : PrescribedFire \quad (25)$$
$$NIFC_{W}ildfiresubClassOf : NIFC_{F}ire \quad (26)$$
$$NIFC_{W}ildfiresubClassOf : Wildfire \quad (27)$$
$$PrescribedFiresubClassOf : Fire \quad (28)$$
$$NIFC_{P}rescribedFiresubClassOf : PrescribedFire \quad (29)$$
$$AdministrativeRegionsubClassOf : Region \quad (30)$$
$$S2CellsubClassOf : Cell \quad (31)$$
$$WildfiresubClassOf : Fire \quad (32)$$
$$NIFC_{W}ildfiresubClassOf : Wildfire \quad (33)$$
$$AdministrativeRegionsubClassOf : geo : Feature \quad (34)$$
$$NIFC_{F}iresubClassOf : geo : Feature \quad (35)$$
$$NIFC_{F}iresubClassOf : FeatureOfInterest \quad (36)$$
$$NIFCFireObservablePropertysubClassOf : ObservableProperty \quad (37)$$
$$NIFCFireObservationsubClassOf : Observation \quad (38)$$
$$hasFeatureOfInterestsomeNIFC_{F}ire \quad (39)$$
$$observedPropertysomeNIFCFireObservableProperty \quad (40)$$
$$phenomenonTimesometime : TemporalEntity \quad (41)$$
$$hasSimpleResultsomerdfs : Literal \quad (42)$$
$$hasFireCausesomeFireCause \quad (43)$$
$$hasTemporalScopesometime : TemporalEntity \quad (44)$$
$$geo : hasDefaultGeometrysomegeo : Geometry \quad (45)$$
$$geo : hasGeometrysomegeo : Geometry \quad (46)$$
$$spatialRelationonlyAdministrativeRegion_{3} \quad (47)$$
$$spatialRelationonlyS2Cell \quad (48)$$
$$hasIncidentNamesomerdfs : Literal \quad (49)$$

2.25 Gnis Ld Usgs

2.25.1 Overview

I am the overview.

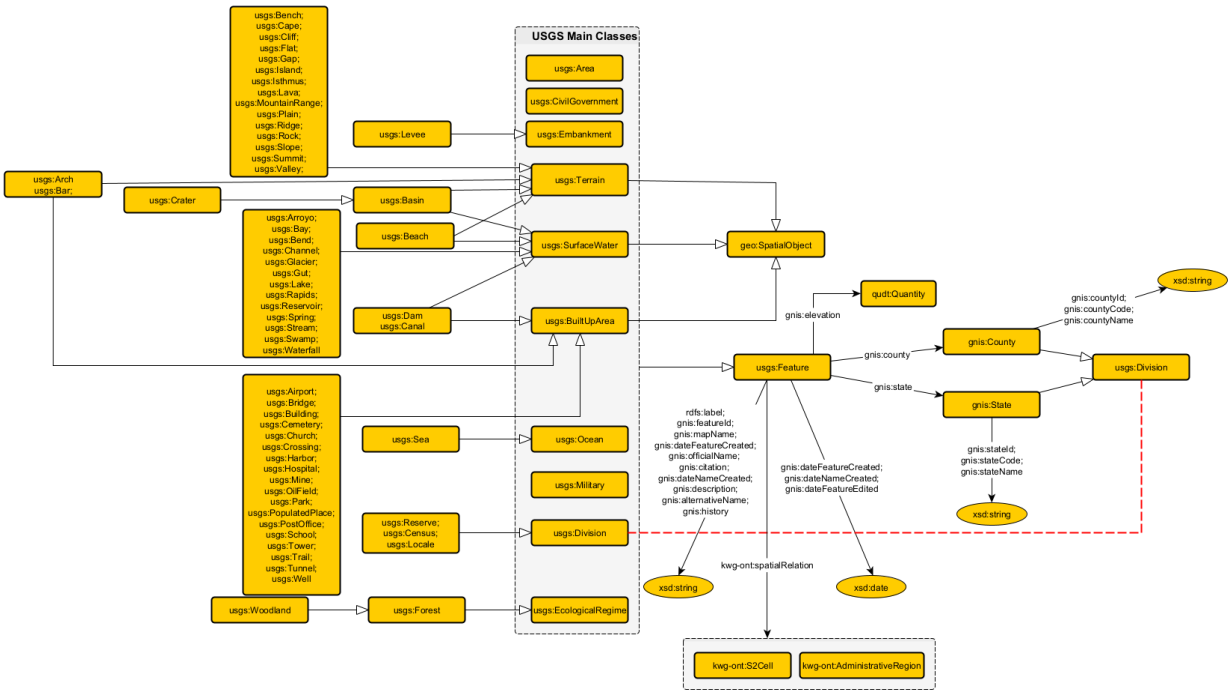

Figure 2.25: The schema diagram for the Gnis Ld Usgs.

2.25.2 Axioms

$$AirportsubClassOf : BuiltUpArea \tag{1}$$
$$ArchsubClassOf : BuiltUpArea \tag{2}$$
$$ArchsubClassOf : Terrain \tag{3}$$
$$ArroyosubClassOf : SurfaceWater \tag{4}$$
$$BarsubClassOf : BuiltUpArea \tag{5}$$
$$BarsubClassOf : Terrain \tag{6}$$
$$BasinsubClassOf : SurfaceWater \tag{7}$$
$$BasinsubClassOf : Terrain \tag{8}$$
$$CratersubClassOf : Basin \tag{9}$$
$$BaysubClassOf : SurfaceWater \tag{10}$$
$$BeachsubClassOf : SurfaceWater \tag{11}$$
$$BeachsubClassOf : Terrain \tag{12}$$
$$BenchsubClassOf : Terrain \tag{13}$$
$$BendsubClassOf : SurfaceWater \tag{14}$$
$$BridgesubClassOf : BuiltUpArea \tag{15}$$
$$BuildingsubClassOf : BuiltUpArea \tag{16}$$
$$BuiltUpAreasubClassOf : geosparql : SpatialObject \tag{17}$$

$$AirportsubClassOf : BuiltUpArea \quad (18)$$
$$ArchsubClassOf : BuiltUpArea \quad (19)$$
$$BarsubClassOf : BuiltUpArea \quad (20)$$
$$BridgesubClassOf : BuiltUpArea \quad (21)$$
$$BuildingsubClassOf : BuiltUpArea \quad (22)$$
$$CanalsubClassOf : BuiltUpArea \quad (23)$$
$$CemeterysubClassOf : BuiltUpArea \quad (24)$$
$$ChurchsubClassOf : BuiltUpArea \quad (25)$$
$$CrossingsubClassOf : BuiltUpArea \quad (26)$$
$$DamsubClassOf : BuiltUpArea \quad (27)$$
$$HarborsubClassOf : BuiltUpArea \quad (28)$$
$$HospitalsubClassOf : BuiltUpArea \quad (29)$$
$$MinesubClassOf : BuiltUpArea \quad (30)$$
$$OilFieldsubClassOf : BuiltUpArea \quad (31)$$
$$ParksubClassOf : BuiltUpArea \quad (32)$$
$$PopulatedPlacesubClassOf : BuiltUpArea \quad (33)$$
$$PostOfficesubClassOf : BuiltUpArea \quad (34)$$
$$SchoolsubClassOf : BuiltUpArea \quad (35)$$
$$TowersubClassOf : BuiltUpArea \quad (36)$$
$$TrailsubClassOf : BuiltUpArea \quad (37)$$
$$TunnelsubClassOf : BuiltUpArea \quad (38)$$
$$WellsubClassOf : BuiltUpArea \quad (39)$$
$$CanalsubClassOf : BuiltUpArea \quad (40)$$
$$CanalsubClassOf : SurfaceWater \quad (41)$$
$$CapesubClassOf : Terrain \quad (42)$$
$$CemeterysubClassOf : BuiltUpArea \quad (43)$$
$$CensussubClassOf : Division \quad (44)$$
$$ChannelsubClassOf : SurfaceWater \quad (45)$$
$$ChurchsubClassOf : BuiltUpArea \quad (46)$$
$$CliffsubClassOf : Terrain \quad (47)$$
$$CratersubClassOf : Basin \quad (48)$$
$$CratersubClassOf : Terrain \quad (49)$$
$$CrossingsubClassOf : BuiltUpArea \quad (50)$$
$$DamsubClassOf : BuiltUpArea \quad (51)$$
$$DamsubClassOf : SurfaceWater \quad (52)$$
$$CensussubClassOf : Division \quad (53)$$
$$LocalesubClassOf : Division \quad (54)$$
$$ReservesubClassOf : Division \quad (55)$$

$$Forest subClassOf : EcologicalRegime \quad (56)$$
$$Leveee subClassOf : Embankment \quad (57)$$
$$Flat subClassOf : Terrain \quad (58)$$
$$Forest subClassOf : EcologicalRegime \quad (59)$$
$$Woodland subClassOf : Forest \quad (60)$$
$$Gap subClassOf : Terrain \quad (61)$$
$$Glacier subClassOf : SurfaceWater \quad (62)$$
$$Gut subClassOf : SurfaceWater \quad (63)$$
$$Harbor subClassOf : BuiltUpArea \quad (64)$$
$$Hospital subClassOf : BuiltUpArea \quad (65)$$
$$Island subClassOf : Terrain \quad (66)$$
$$Isthmus subClassOf : Terrain \quad (67)$$
$$Lake subClassOf : SurfaceWater \quad (68)$$
$$Lava subClassOf : Terrain \quad (69)$$
$$Leveee subClassOf : Embankment \quad (70)$$
$$Locale subClassOf : Division \quad (71)$$
$$Mine subClassOf : BuiltUpArea \quad (72)$$
$$MountainRange subClassOf : Terrain \quad (73)$$
$$Sea subClassOf : Ocean \quad (74)$$
$$OilField subClassOf : BuiltUpArea \quad (75)$$
$$Park subClassOf : BuiltUpArea \quad (76)$$
$$Plain subClassOf : Terrain \quad (77)$$
$$PopulatedPlace subClassOf : BuiltUpArea \quad (78)$$
$$PostOffice subClassOf : BuiltUpArea \quad (79)$$
$$Rapids subClassOf : SurfaceWater \quad (80)$$
$$Reserve subClassOf : Division \quad (81)$$
$$Reservoir subClassOf : SurfaceWater \quad (82)$$
$$Ridge subClassOf : Terrain \quad (83)$$
$$Rock subClassOf : Terrain \quad (84)$$
$$School subClassOf : BuiltUpArea \quad (85)$$
$$Sea subClassOf : Ocean \quad (86)$$
$$Slope subClassOf : Terrain \quad (87)$$
$$Spring subClassOf : SurfaceWater \quad (88)$$
$$Stream subClassOf : SurfaceWater \quad (89)$$
$$Summit subClassOf : Terrain \quad (90)$$
$$SurfaceWater subClassOf : geosparql : SpatialObject \quad (91)$$
$$Arroyo subClassOf : SurfaceWater \quad (92)$$
$$Basin subClassOf : SurfaceWater \quad (93)$$

$$BaysubClassOf : SurfaceWater \quad (94)$$
$$BeachsubClassOf : SurfaceWater \quad (95)$$
$$BendsubClassOf : SurfaceWater \quad (96)$$
$$CanalsubClassOf : SurfaceWater \quad (97)$$
$$ChannelsubClassOf : SurfaceWater \quad (98)$$
$$DamsubClassOf : SurfaceWater \quad (99)$$
$$GlaciersubClassOf : SurfaceWater \quad (100)$$
$$GutsubClassOf : SurfaceWater \quad (101)$$
$$LakesubClassOf : SurfaceWater \quad (102)$$
$$RapidssubClassOf : SurfaceWater \quad (103)$$
$$ReservoirsubClassOf : SurfaceWater \quad (104)$$
$$SpringsubClassOf : SurfaceWater \quad (105)$$
$$StreamsubClassOf : SurfaceWater \quad (106)$$
$$SwampsubClassOf : SurfaceWater \quad (107)$$
$$WaterfallsubClassOf : SurfaceWater \quad (108)$$
$$SwampsubClassOf : SurfaceWater \quad (109)$$
$$TerrainsubClassOf : geosparql : SpatialObjectArchsubClassOf : Terrain \quad (110)$$
$$BarsubClassOf : Terrain \quad (111)$$
$$BasinsubClassOf : Terrain \quad (112)$$
$$BeachsubClassOf : Terrain \quad (113)$$
$$BenchsubClassOf : Terrain \quad (114)$$
$$CapesubClassOf : Terrain \quad (115)$$
$$CliffsubClassOf : Terrain \quad (116)$$
$$CratersubClassOf : Terrain \quad (117)$$
$$FlatsubClassOf : Terrain \quad (118)$$
$$GapsubClassOf : Terrain \quad (119)$$
$$IslandsubClassOf : Terrain \quad (120)$$
$$IsthmussubClassOf : Terrain \quad (121)$$
$$LavasubClassOf : Terrain \quad (122)$$
$$MountainRangesubClassOf : Terrain \quad (123)$$
$$PlainsubClassOf : Terrain \quad (124)$$
$$RidgesubClassOf : Terrain \quad (125)$$
$$RocksubClassOf : Terrain \quad (126)$$
$$SlopesubClassOf : Terrain \quad (127)$$
$$SummitsubClassOf : Terrain \quad (128)$$
$$ValleysubClassOf : Terrain \quad (129)$$
$$TowersubClassOf : BuiltUpArea \quad (130)$$
$$TrailsubClassOf : BuiltUpArea \quad (131)$$

$$Tunnel subClassOf : BuiltUpArea \quad (132)$$
$$Valley subClassOf : Terrain \quad (133)$$
$$Waterfall subClassOf : SurfaceWater \quad (134)$$
$$Well subClassOf : BuiltUpArea \quad (135)$$
$$Woodland subClassOf : Forest \quad (136)$$
$$BuiltUpArea subClassOf : geosparql : SpatialObject \quad (137)$$
$$SurfaceWater subClassOf : geosparql : SpatialObject \quad (138)$$
$$Terrain subClassOf : geosparql : SpatialObject \quad (139)$$

2.26 Cropland Types Usda

2.26.1 Overview

I am the overview.

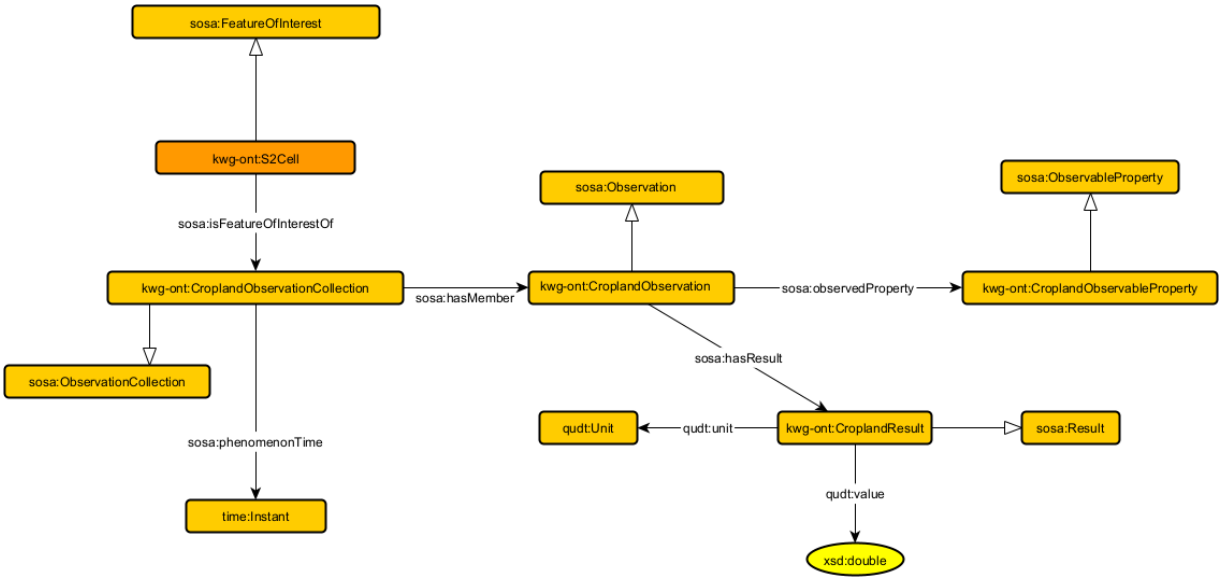

Figure 2.26: The schema diagram for the Cropland Types Usda.

2.26.2 Axioms

$$S2Cell subClassOf : Cell \quad (1)$$
$$CroplandObservableProperty subClassOf : ObservableProperty \quad (2)$$
$$CroplandObservation subClassOf : Observation \quad (3)$$
$$CroplandObservationCollection subClassOf : ObservationCollection \quad (4)$$
$$CroplandResult subClassOf : Result \quad (5)$$
$$S2Cell subClassOf : Cell \quad (6)$$

$$S2CellsubClassOf : FeatureOfInterest \quad (7)$$
$$time : InstantsubClassOf : time : TemporalEntity \quad (8)$$
$$time : InstantsubClassOf : time : TemporalEntity \quad (9)$$
$$S2CellsubClassOf : FeatureOfInterest \quad (10)$$
$$CroplandObservablePropertysubClassOf : ObservableProperty \quad (11)$$
$$CroplandObservationsubClassOf : Observation \quad (12)$$
$$CroplandObservationCollectionsubClassOf : ObservationCollection \quad (13)$$
$$CroplandResultsubClassOf : Result \quad (14)$$
$$hasResultsomeCroplandResult \quad (15)$$
$$observedPropertysomeCroplandObservableProperty \quad (16)$$
$$hasFeatureOfInterestsomeS2Cell \quad (17)$$
$$hasMembersomeCroplandObservation \quad (18)$$
$$phenomenonTimesometime : TemporalEntity \quad (19)$$
$$qudt : unitsomequdt : Unit \quad (20)$$
$$qudt : valuesomexsd : double \quad (21)$$

2.27 Zipcode Us

2.27.1 Overview

I am the overview.

2.27.2 Axioms

$$AdministrativeRegion_3subClassOf : AdministrativeRegion \quad (1)$$
$$AdministrativeRegion_3subClassOf : AdministrativeRegion \quad (2)$$
$$ZipCodeAreasubClassOf : geo : Feature \quad (3)$$
$$ZipCodeAreasubClassOf : geo : Feature \quad (4)$$
$$geo : hasDefaultGeometrysomegeo : Geometry \quad (5)$$
$$geo : hasGeometrysomegeo : Geometry \quad (6)$$
$$spatialRelationonlyAdministrativeRegion_3 \quad (7)$$
$$spatialRelationonlyS2Cell \quad (8)$$
$$hasZipCodesomerdfs : Literal \quad (9)$$

2.28 Hurricane Tracks Noaa

2.28.1 Overview

I am the overview.

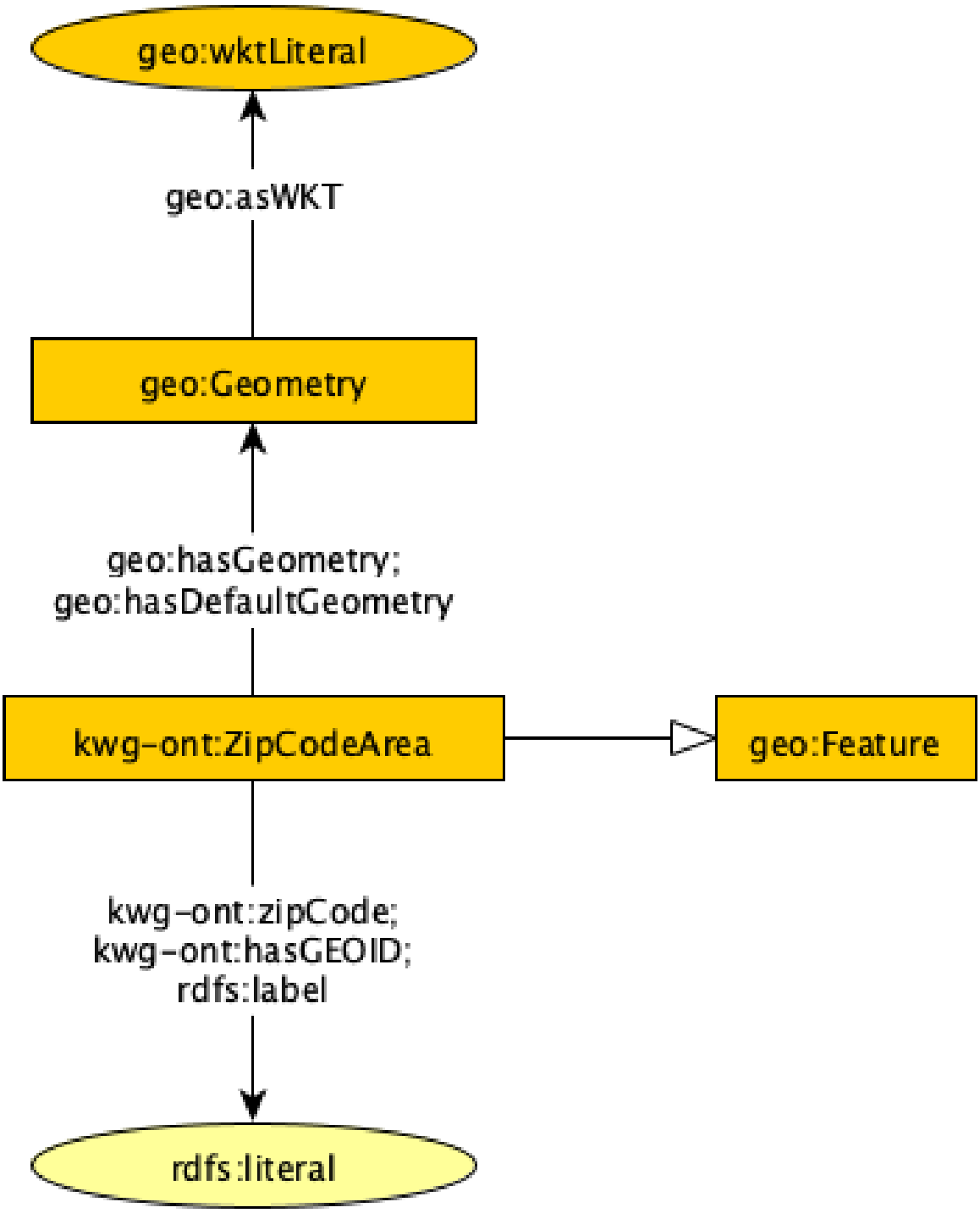

Figure 2.27: The schema diagram for the Zipcode Us.

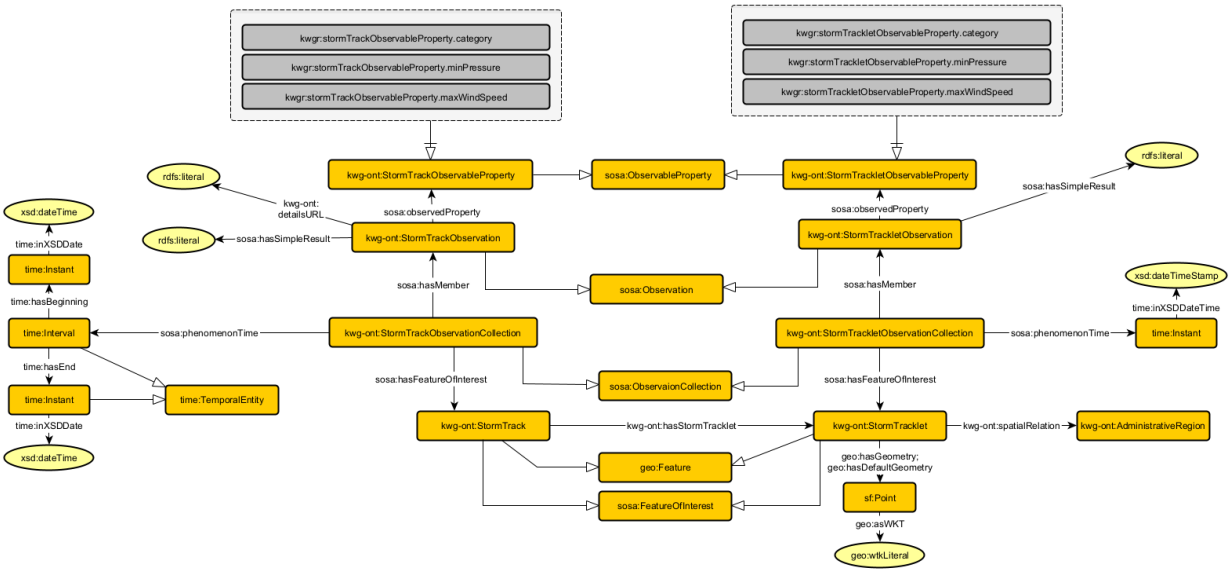

Figure 2.28: The schema diagram for the Hurricane Tracks Noaa.

2.28.2 Axioms

$$AdministrativeRegion subClassOf : Region \quad (1)$$
$$AdministrativeRegion subClassOf : geo : Feature \quad (2)$$
$$AdministrativeRegion_3 subClassOf : AdministrativeRegion \quad (3)$$
$$AdministrativeRegion_3 subClassOf : AdministrativeRegion \quad (4)$$
$$S2Cell subClassOf : Cell \quad (5)$$
$$AdministrativeRegion subClassOf : Region \quad (6)$$
$$S2Cell subClassOf : Cell \quad (7)$$
$$StormTrack subClassOf : geo : Feature \quad (8)$$
$$StormTrack subClassOf : FeatureOfInterest \quad (9)$$
$$StormTrackObservableProperty subClassOf : ObservableProperty \quad (10)$$
$$StormTrackObservation subClassOf : Observation \quad (11)$$
$$StormTrackObservationCollection subClassOf : ObservationCollection \quad (12)$$
$$StormTrackletsubClassOf : geo : Feature \quad (13)$$
$$StormTrackletsubClassOf : FeatureOfInterest \quad (14)$$
$$StormTrackletObservablePropertysubClassOf : ObservableProperty \quad (15)$$
$$StormTrackletObservationsubClassOf : Observation \quad (16)$$
$$StormTrackletObservationCollectionsubClassOf : ObservationCollection \quad (17)$$
$$AdministrativeRegion subClassOf : geo : Feature \quad (18)$$
$$StormTrack subClassOf : geo : Feature \quad (19)$$
$$StormTrackletsubClassOf : geo : Feature \quad (20)$$

$$sf : PointsubClassOf : geo : Geometry \quad (21)$$
$$sf : PointsubClassOf : geo : Geometry \quad (22)$$
$$time : InstantsubClassOf : time : TemporalEntity \quad (23)$$
$$time : IntervalsubClassOf : time : TemporalEntity \quad (24)$$
$$time : InstantsubClassOf : time : TemporalEntity \quad (25)$$
$$time : IntervalsubClassOf : time : TemporalEntity \quad (26)$$
$$StormTracksubClassOf : FeatureOfInterest \quad (27)$$
$$StormTrackletsubClassOf : FeatureOfInterest \quad (28)$$
$$StormTrackObservablePropertysubClassOf : ObservableProperty \quad (29)$$
$$StormTrackletObservablePropertysubClassOf : ObservableProperty \quad (30)$$
$$StormTrackObservationsubClassOf : Observation \quad (31)$$
$$StormTrackletObservationsubClassOf : Observation \quad (32)$$
$$StormTrackObservationCollectionsubClassOf : ObservationCollection \quad (33)$$
$$StormTrackletObservationCollectionsubClassOf : ObservationCollection \quad (34)$$
$$hasStormTrackletsomeStormTracklet \quad (35)$$
$$hasTemporalScopesometime : TemporalEntity \quad (36)$$
$$observedPropertysomeStormTrackObservableProperty \quad (37)$$
$$detailsURLsomerdfs : Literal \quad (38)$$
$$hasSimpleResultsomerdfs : Literal \quad (39)$$
$$hasFeatureOfInterestsomeStormTrack \quad (40)$$
$$hasMembersomeStormTrackObservation \quad (41)$$
$$phenomenonTimesometime : Interval \quad (42)$$
$$hasTemporalScopesometime : TemporalEntity \quad (43)$$
$$geo : hasDefaultGeometrysomegeo : Geometry \quad (44)$$
$$geo : hasGeometrysomegeo : Geometry \quad (45)$$
$$spatialRelationonlyAdministrativeRegion_3 \quad (46)$$
$$spatialRelationonlyS2Cell \quad (47)$$
$$observedPropertysomeStormTrackletObservableProperty \quad (48)$$
$$hasSimpleResultsomerdfs : Literal \quad (49)$$
$$hasFeatureOfInterestsomeStormTracklet \quad (50)$$
$$hasMembersomeStormTrackletObservation \quad (51)$$
$$phenomenonTimesometime : Instant \quad (52)$$

2.29 Transportation Usdot

2.29.1 Overview

I am the overview.

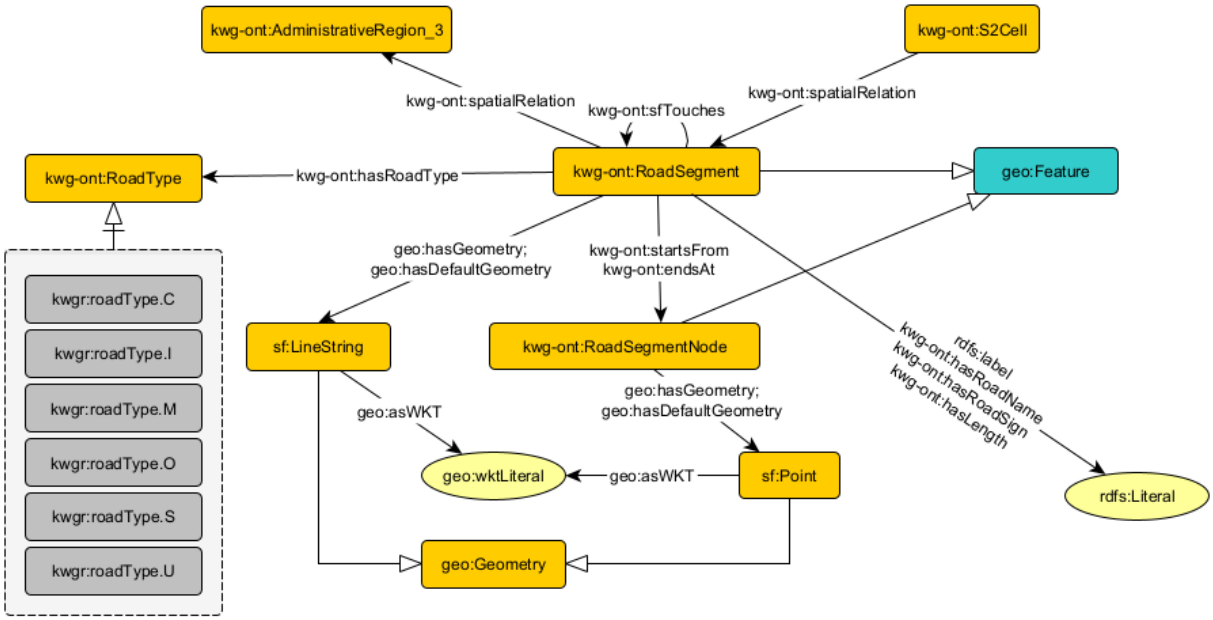

Figure 2.29: The schema diagram for the Transportation Usdot.

2.29.2 Axioms

$$AdministrativeRegion subClassOf : geo : Feature \quad (1)$$
$$AdministrativeRegion_3 subClassOf : AdministrativeRegion \quad (2)$$
$$AdministrativeRegion_3 subClassOf : AdministrativeRegion \quad (3)$$
$$S2Cell subClassOf : Cell \quad (4)$$
$$RoadSegment subClassOf : geo : Feature \quad (5)$$
$$RoadSegmentNode subClassOf : geo : Feature \quad (6)$$
$$S2Cell subClassOf : Cell \quad (7)$$
$$AdministrativeRegion subClassOf : geo : Feature \quad (8)$$
$$RoadSegment subClassOf : geo : Feature \quad (9)$$
$$RoadSegmentNode subClassOf : geo : Feature \quad (10)$$
$$time : Instant subClassOf : time : TemporalEntity \quad (11)$$
$$time : Instant subClassOf : time : TemporalEntity \quad (12)$$
$$endsAt some RoadSegmentNode \quad (13)$$
$$hasRoadType some RoadType \quad (14)$$
$$sfTouches some RoadSegment \quad (15)$$
$$startsFrom some RoadSegmentNode \quad (16)$$
$$geo : hasDefaultGeometry some geo : Geometry \quad (17)$$
$$geo : hasGeometry some geo : Geometry \quad (18)$$

$$spatialRelationonlyAdministrativeRegion_3 \tag{19}$$

$$spatialRelationonlyS2Cell \tag{20}$$

$$hasLengthsomerdfs : Literal \tag{21}$$

$$hasRoadNamesomerdfs : Literal \tag{22}$$

$$hasRoadSignsomerdfs : Literal \tag{23}$$

$$geo : hasDefaultGeometrysomeNone \tag{24}$$

$$geo : hasGeometrysomeNone \tag{25}$$

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