

OGC® DOCUMENT: 18-053R2

External identifier of this OGC® document: <http://www.opengis.net/docs/CS/3DTiles/1.0>



Open
Geospatial
Consortium

OGC DOCUMENT TITLE

COMMUNITY STANDARD

APPROVED

Version: 1.0

Submission Date: 2018-06-04

Approval Date: 2018-12-14

Publication Date: 2019-01-31

Editor: Patrick Cozzi, Sean Lilley

Notice: This document is an OGC Member approved international standard. This document is available on a royalty free, non-discriminatory basis. Recipients of this document are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.

License Agreement

Use of this document is subject to the license agreement at <https://www.ogc.org/license>

Copyright notice

Copyright © 2025 Open Geospatial Consortium

To obtain additional rights of use, visit <https://www.ogc.org/legal>

Note

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. The Open Geospatial Consortium shall not be held responsible for identifying any or all such patent rights.

Recipients of this document are requested to submit, with their comments, notification of any relevant patent claims or other intellectual property rights of which they may be aware that might be infringed by any implementation of the standard set forth in this document, and to provide supporting documentation.

CONTENTS

I. ABSTRACT	xvii
II. KEYWORDS	xvii
III. PREFACE	xviii
IV. SECURITY CONSIDERATIONS	xix
V. SUBMITTERS	xix
VI. SOURCE OF THE CONTENT FOR THIS OGC DOCUMENT	xix
VII. VALIDITY OF CONTENT	xix
VIII. FUTURE WORK	xix
IX. CONTRIBUTORS	xx
1. SCOPE	2
2. CONFORMANCE	4
3. NORMATIVE REFERENCES	6
4. TERMS AND DEFINITIONS	8
5. CONVENTIONS	10
5.1. Identifiers	10
5.2. Other conventions	10
6. CORE	12
6.1. Coordinate Reference System Parameters	13
6.2. Coordinate Reference System Properties	14
6.3. Coordinate Reference System Types	18
7. COORDINATE OPERATION MODULE	27
7.1. Coordinate Operation Categories	27
7.2. Coordinate Operation Methods	30
7.3. Coordinate Operation Parameters	31
7.4. Coordinate Operation Properties	32

8. COORDINATE SYSTEM MODULE	36
8.1. 3D Coordinate Systems	36
8.2. Celestial Coordinate Systems	38
8.3. Coordinate System Components	40
8.4. Coordinate System Properties	40
8.5. Coordinate System Types	41
8.6. Temporal Coordinate Systems	46
9. DATUM MODULE	49
9.1. Datum Parameters	49
9.2. Datum Properties	50
9.3. Datum Types	51
9.4. Spheroid Properties	54
9.5. Spheroid Types	56
10. SRS APPLICATION MODULE	59
10.1. Map Types	59
10.2. SRS Application Types	61
11. PROJECTIONS MODULE	66
11.1. Azimuthal Projections	67
11.2. Compromise Projections	68
11.3. Conformal Projections	72
11.4. Conical Projections	74
11.5. Cylindrical Projections	77
11.6. Equal Area Projections	81
11.7. Equidistant Projections	83
11.8. Globular Projections	86
11.9. Lenticular Projections	87
11.10. Minimum Error Projections	91
11.11. Perspective Projections	91
11.12. Polyconic Projections	94
11.13. Polyhedral Projections	98
11.14. Pseudo Azimuthal Projections	102
11.15. Pseudo Conical Projections	104
11.16. Pseudo Cylindrical Projections	105
11.17. Stereographic Projections	120
12. PLANET MODULE	123
12.1. Interstellar Body	123
13. COMMON INSTANCES	127
13.1. Coordinate System Axis	127
13.2. SRS Literal Types	129
13.3. Spheroids	130

ANNEX A (INFORMATIVE) ALIGNMENTS	146
Overview	
A.1. IGN Ontology	146
A.2. ISO19111 Ontology	148
A.3. IFC Ontology	149
ANNEX B (INFORMATIVE) SHACL SHAPES	151
Overview	
ANNEX C (INFORMATIVE) REVISION HISTORY	153
BIBLIOGRAPHY	155

LIST OF TABLES

Table 1 — geosrs:AreaOfUse	13
Table 2 — geosrs:Extent	13
Table 3 — geosrs:GeographicBoundingBox	13
Table 4 — geosrs:AxesList	14
Table 5 — geosrs:SingleCRSList	14
Table 6 — geosrs:baseCRS	14
Table 7 — geosrs:conversion	15
Table 8 — geosrs:coordinateSystem	15
Table 9 — geosrs:datum	16
Table 10 — geosrs:datumEnsemble	16
Table 11 — geosrs:domainOfValidity	16
Table 12 — geosrs:method	17
Table 13 — geocrs:asProj4	17
Table 14 — geocrs:asProjJSON	17
Table 15 — geocrs:asWKT	18
Table 16 — geosrs:EPSGcode	18
Table 17 — geosrs:BoundCRS	19
Table 18 — geosrs:CompoundCRS	19
Table 19 — geosrs:CRS	19
Table 20 — geosrs:EngineeringCRS	20
Table 21 — geosrs:GeocentricCRS	20
Table 22 — geosrs:GeodeticCRS	21
Table 23 — geosrs:GeographicCRS	21
Table 24 — geosrs:ParametricCRS	21
Table 25 — geosrs:ProjectedCRS	22

Table 26 – geosrs:SelenographicCRS	22
Table 27 – geosrs:ReferenceSystem	22
Table 28 – geosrs:SingleCRS	22
Table 29 – geosrs:SpatialReferenceSystem	23
Table 30 – geosrs:SpatioParametricCompoundCRS	23
Table 31 – geosrs:SpatioParametricTemporalCompoundCRS	23
Table 32 – geosrs:SpatioTemporalCompoundCRS	24
Table 33 – geosrs:StaticCRS	24
Table 34 – geosrs:TemporalCRS	24
Table 35 – geosrs:VerticalCRS	25
Table 36 – geosrs:GeographicObject	27
Table 37 – geosrs:RegisterOperations	28
Table 38 – geosrs:ScaleOperation	28
Table 39 – geosrs:RotationOperation	28
Table 40 – geosrs:IdentityOperation	28
Table 41 – geosrs:ShearOperation	29
Table 42 – geosrs:TranslationOperation	29
Table 43 – geosrs:AffineTransformationOperation	29
Table 44 – geosrs:CoordinateTransformationOperation	30
Table 45 – geosrs:PassThroughOperation	30
Table 46 – geosrs:ConcatenatedOperation	30
Table 47 – geosrs:PointMotionOperation	31
Table 48 – geosrs:OperationParameterGroup	32
Table 49 – geosrs:ParameterValueGroup	32
Table 50 – geosrs:derivingConversion	33
Table 51 – geosrs:parameter	33
Table 52 – geosrs:sourceCRS	34
Table 53 – geosrs:targetCRS	34
Table 54 – geosrs:3DCoordinateSystem	37
Table 55 – geosrs:ConicalCoordinateSystem	37
Table 56 – geosrs:CylindricalCoordinateSystem	37
Table 57 – geosrs:CelestialCoordinateSystem	38
Table 58 – geosrs:EclipticCoordinateSystem	38
Table 59 – geosrs:EquatorialCoordinateSystem	39
Table 60 – geosrs:GalacticCoordinateSystem	39
Table 61 – geosrs:HorizontalCoordinateSystem	39
Table 62 – geosrs:PerifocalCoordinateSystem	40
Table 63 – geosrs:SuperGalacticCS	40
Table 64 – geosrs:axis	41
Table 65 – geosrs:axisDirection	41
Table 66 – geosrs:AffineCoordinateSystem	42

Table 67 – geosrs:BarycentricCoordinateSystem	42
Table 68 – geosrs:CurvilinearCoordinateSystem	43
Table 69 – geosrs:EngineeringCoordinateSystem	43
Table 70 – geosrs:GeodeticCoordinateSystem	43
Table 71 – geosrs:GeographicalCoordinateSystem	43
Table 72 – geosrs:GridCoordinateSystem	44
Table 73 – geosrs:HexagonalCoordinateSystem	44
Table 74 – geosrs:LocalCoordinateSystem	44
Table 75 – geosrs:ObliqueCoordinateSystem	45
Table 76 – geosrs:OrthogonalCoordinateSystem	45
Table 77 – geosrs:PlanarCoordinateSystem	45
Table 78 – geosrs:1DCoordinateSystem	46
Table 79 – geosrs:DateTimeTemporalCoordinateSystem	46
Table 80 – geosrs:TemporalCountCoordinateSystem	47
Table 81 – geosrs:TemporalCoordinateSystem	47
Table 82 – geosrs:TemporalMeasureCoordinateSystem	47
Table 83 – geosrs:DefiningParameter	49
Table 84 – geosrs:datumDefiningParameter	50
Table 85 – geosrs:ellipsoid	50
Table 86 – geosrs:primeMeridian	51
Table 87 – geosrs:DynamicGeodeticReferenceFrame	52
Table 88 – geosrs:DynamicVerticalDatum	52
Table 89 – geosrs:ParametricDatum	52
Table 90 – geosrs:EngineeringDatum	53
Table 91 – geosrs:TemporalDatum	53
Table 92 – geosrs:DatumEnsemble	53
Table 93 – geosrs:eccentricity	54
Table 94 – geosrs:inverseFlattening	54
Table 95 – geosrs:isSphere	55
Table 96 – geosrs:semiMajorAxis	55
Table 97 – geosrs:semiMinorAxis	56
Table 98 – geosrs:TriaxialEllipsoid	56
Table 99 – geosrs:CadastralMap	59
Table 100 – geosrs:NauticalChart	60
Table 101 – geosrs:ThematicMap	60
Table 102 – geosrs:TopographicMap	60
Table 103 – geosrs:WeatherMap	61
Table 104 – geosrs:SRSApplication	61
Table 105 – geosrs:SpatialReferencing	61
Table 106 – geosrs:EngineeringSurvey	62
Table 107 – geosrs:SatelliteSurvey	62

Table 108 – geosrs:SatelliteNavigation	62
Table 109 – geosrs:CoastalHydrography	62
Table 110 – geosrs:OffshoreEngineering	63
Table 111 – geosrs:Hydrography	63
Table 112 – geosrs:Drilling	63
Table 113 – geosrs:OilAndGasExploration	63
Table 114 – geosrs:BreusingGeometricProjection	67
Table 115 – geosrs:BreusingHarmonicProjection	67
Table 116 – geosrs:GinzburgIIProjection	67
Table 117 – geosrs:GinzburgIProjection	68
Table 118 – geosrs:GnomonicProjection	68
Table 119 – geosrs:JamesAzimuthalProjection	68
Table 120 – geosrs:ArmadilloProjection	69
Table 121 – geosrs:BakerDinomicProjection	69
Table 122 – geosrs:BertinProjection	69
Table 123 – geosrs:ChamberlinTrimetricProjection	69
Table 124 – geosrs:DenoyerSemiEllipticalProjection	70
Table 125 – geosrs:FairgrieveProjection	70
Table 126 – geosrs:LarriveeProjection	70
Table 127 – geosrs:PetermannStarProjection	70
Table 128 – geosrs:SpilhausOceanicProjection	71
Table 129 – geosrs:VanDerGrintenIIIProjection	71
Table 130 – geosrs:WinkelIIProjection	71
Table 131 – geosrs:WinkelIProjection	71
Table 132 – geosrs:WinkelSnyderProjection	71
Table 133 – geosrs:AdamsProjection	72
Table 134 – geosrs:AdamsWorldInASquareIIProjection	72
Table 135 – geosrs:AdamsWorldInASquareIProjection	73
Table 136 – geosrs:AugustEpicycloidalProjection	73
Table 137 – geosrs:CoxConformalProjection	73
Table 138 – geosrs:EisenlohrProjection	73
Table 139 – geosrs:GS50Projection	74
Table 140 – geosrs:PeirceQuincuncialProjection	74
Table 141 – geosrs:StereographicProjection	74
Table 142 – geosrs:BipolarObliqueConicConformalProjection	75
Table 143 – geosrs:CentralConicProjection	75
Table 144 – geosrs:HerschelConformalConicProjection	75
Table 145 – geosrs:Krovak	75
Table 146 – geosrs:LambertConformalConicProjection	76
Table 147 – geosrs:MurdochIIIProjection	76
Table 148 – geosrs:MurdochIIProjection	76

Table 149 – geosrs:MurdochIProjection	76
Table 150 – geosrs:SchjerningIProjection	77
Table 151 – geosrs:VitkovskyIProjection	77
Table 152 – geosrs:ArdenCloseProjection	77
Table 153 – geosrs:BraunPerspectiveProjection	78
Table 154 – geosrs:CompactMillerProjection	78
Table 155 – geosrs:CylindricalStereographicProjection	78
Table 156 – geosrs:KarchenkoShabanovaProjection	78
Table 157 – geosrs:LabordeProjection	79
Table 158 – geosrs:MercatorProjection	79
Table 159 – geosrs:MillerProjection	79
Table 160 – geosrs:PattersonCylindricalProjection	79
Table 161 – geosrs:PavlovProjection	80
Table 162 – geosrs:ToblerCylindricalIIProjection	80
Table 163 – geosrs:ToblerCylindricalIProjection	80
Table 164 – geosrs:UrmayevIIProjection	80
Table 165 – geosrs:WebMercatorProjection	80
Table 166 – geosrs:AlbersEqualAreaProjection	81
Table 167 – geosrs:AzimuthalEqualAreaProjection	81
Table 168 – geosrs:CylindricalEqualArea	82
Table 169 – geosrs:GallPetersProjection	82
Table 170 – geosrs:HoboDyerProjection	82
Table 171 – geosrs:LambertAzimuthalEqualArea	82
Table 172 – geosrs:TrystanEdwardsProjection	82
Table 173 – geosrs:WiechelProjection	83
Table 174 – geosrs:AzimuthalEquidistantProjection	83
Table 175 – geosrs:BerghausStarProjection	84
Table 176 – geosrs:CassiniProjection	84
Table 177 – geosrs:EquidistantConicProjection	84
Table 178 – geosrs:EquidistantCylindricalProjection	84
Table 179 – geosrs:EquirectangularProjection	85
Table 180 – geosrs:ObliquePlateCarreeProjection	85
Table 181 – geosrs:PlateCarreeProjection	85
Table 182 – geosrs:TwoPointEquidistantProjection	85
Table 183 – geosrs:ApianGlobularIProjection	86
Table 184 – geosrs:BaconGlobularProjection	86
Table 185 – geosrs:FournierGlobularIProjection	86
Table 186 – geosrs:A4Projection	87
Table 187 – geosrs:BriesemeisterProjection	87
Table 188 – geosrs:CiricIProjection	87
Table 189 – geosrs:CupolaProjection	88

Table 190 – geosrs:DedistortProjection	88
Table 191 – geosrs:DietrichKitadaProjection	88
Table 192 – geosrs:FranculaIIIProjection	88
Table 193 – geosrs:FranculaIVProjection	89
Table 194 – geosrs:FranculaXProjection	89
Table 195 – geosrs:FranculaVIIIProjection	89
Table 196 – geosrs:FranculaVProjection	89
Table 197 – geosrs:FranculaXIIIProjection	89
Table 198 – geosrs:FranculaXIIProjection	90
Table 199 – geosrs:FranculaXIVProjection	90
Table 200 – geosrs:HamusoidalProjection	90
Table 201 – geosrs:KissProjection	90
Table 202 – geosrs:AiryProjection	91
Table 203 – geosrs:CentralCylindricalProjection	92
Table 204 – geosrs:GeneralVerticalPerspectiveProjection	92
Table 205 – geosrs:GilbertTwoWorldPerspectiveProjection	92
Table 206 – geosrs:LaHireProjection	92
Table 207 – geosrs:LorgnaProjection	93
Table 208 – geosrs:LowryProjection	93
Table 209 – geosrs:OrthographicProjection	93
Table 210 – geosrs:PerspectiveConicProjection	93
Table 211 – geosrs:TiltedPerspectiveProjection	94
Table 212 – geosrs:VerticalPerspectiveProjection	94
Table 213 – geosrs:GinzburgIVProjection	94
Table 214 – geosrs:GinzburgIXProjection	95
Table 215 – geosrs:GinzburgVIProjection	95
Table 216 – geosrs:GinzburgVProjection	95
Table 217 – geosrs:GottWagnerProjection	95
Table 218 – geosrs:HillEucyclicProjection	96
Table 219 – geosrs:LagrangeProjection	96
Table 220 – geosrs:LaskowskiProjection	96
Table 221 – geosrs:RectangularPolyconicProjection	96
Table 222 – geosrs:StabiusWernerIIIProjection	96
Table 223 – geosrs:StabiusWernerIProjection	97
Table 224 – geosrs:VanDerGrintenIIProjection	97
Table 225 – geosrs:VanDerGrintenIProjection	97
Table 226 – geosrs:VanDerGrintenIVProjection	97
Table 227 – geosrs:WagnerIXProjection	98
Table 228 – geosrs:WagnerVIIIProjection	98
Table 229 – geosrs:WagnerVIIProjection	98
Table 230 – geosrs:AuthaGraphProjection	99

Table 231 – geosrs:CahillKeyesProjection	99
Table 232 – geosrs:CollignonButterflyProjection	99
Table 233 – geosrs:DodecahedralProjection	99
Table 234 – geosrs:DymaxionProjection	100
Table 235 – geosrs:GnomonicButterflyProjection	100
Table 236 – geosrs:GnomonicCubedSphereProjection	100
Table 237 – geosrs:GnomonicIcosahedronProjection	100
Table 238 – geosrs:GuyouProjection	100
Table 239 – geosrs:IcosahedralProjection	101
Table 240 – geosrs:LeeProjection	101
Table 241 – geosrs:MyrahedalProjection	101
Table 242 – geosrs:OctantProjection	101
Table 243 – geosrs:QuadrilateralizedSphericalCubeProjection	102
Table 244 – geosrs:WatermanButterflyProjection	102
Table 245 – geosrs:AitoffObliqueProjection	102
Table 246 – geosrs:AitoffProjection	103
Table 247 – geosrs:HammerProjection	103
Table 248 – geosrs:Strebe1995Projection	103
Table 249 – geosrs:WinkelTripelProjection	103
Table 250 – geosrs:AmericanPolyconicProjection	104
Table 251 – geosrs:BonneProjection	104
Table 252 – geosrs:BottomleyProjection	104
Table 253 – geosrs:NicolosiGlobularProjection	105
Table 254 – geosrs:PtolemyIIProjection	105
Table 255 – geosrs:WernerProjection	105
Table 256 – geosrs:ApianIIProjection	106
Table 257 – geosrs:AtlantisProjection	106
Table 258 – geosrs:BaranyiIIIProjection	106
Table 259 – geosrs:BaranyiIIProjection	107
Table 260 – geosrs:BaranyiIProjection	107
Table 261 – geosrs:BaranyiIVProjection	107
Table 262 – geosrs:BoggsEumorphicProjection	107
Table 263 – geosrs:BromleyProjection	108
Table 264 – geosrs:CabotProjection	108
Table 265 – geosrs:CollignonProjection	108
Table 266 – geosrs:CrasterParabolicProjection	108
Table 267 – geosrs:DeakinMinimumErrorProjection	109
Table 268 – geosrs:Eckert1Projection	109
Table 269 – geosrs:Eckert2Projection	109
Table 270 – geosrs:Eckert3Projection	109
Table 271 – geosrs:Eckert4Projection	110

Table 272 – geosrs:Eckert5Projection	110
Table 273 – geosrs:Eckert6Projection	110
Table 274 – geosrs:EqualEarthProjection	110
Table 275 – geosrs:FaheyProjection	110
Table 276 – geosrs:FoucautProjection	111
Table 277 – geosrs:FoucautSinusoidalProjection	111
Table 278 – geosrs:FournierIIProjection	111
Table 279 – geosrs:GinzburgVIIIProjection	111
Table 280 – geosrs:GoodeHomolosineProjection	112
Table 281 – geosrs:HEALPixProjection	112
Table 282 – geosrs:HufnagelProjection	112
Table 283 – geosrs:Kavrayskiy7Projection	112
Table 284 – geosrs:LoximuthalProjection	113
Table 285 – geosrs:MayrProjection	113
Table 286 – geosrs:McBrydeThomasFlatPolarParabolicProjection	113
Table 287 – geosrs:McBrydeThomasFlatPolarQuarticProjection	113
Table 288 – geosrs:McBrydeThomasFlatPolarSinusoidalProjection	113
Table 289 – geosrs:McBrydeThomasIIProjection	114
Table 290 – geosrs:McBrydeThomasIProjection	114
Table 291 – geosrs:NaturalEarth2Projection	114
Table 292 – geosrs:NaturalEarthProjection	114
Table 293 – geosrs:NellHammerProjection	115
Table 294 – geosrs:NellProjection	115
Table 295 – geosrs:OrteliusOvalProjection	115
Table 296 – geosrs:PutninsP1Projection	115
Table 297 – geosrs:PutninsP2Projection	116
Table 298 – geosrs:PutninsP3Projection	116
Table 299 – geosrs:PutninsP5Projection	116
Table 300 – geosrs:PutninsP6Projection	116
Table 301 – geosrs:QuarticAuthalicProjection	116
Table 302 – geosrs:RobinsonProjection	117
Table 303 – geosrs:SinusoidalProjection	117
Table 304 – geosrs:TheTimesProjection	117
Table 305 – geosrs:ToblerG1Projection	117
Table 306 – geosrs:ToblerHyperellipticalProjection	118
Table 307 – geosrs:WagnerIIIProjection	118
Table 308 – geosrs:WagnerIIProjection	118
Table 309 – geosrs:WagnerIProjection	118
Table 310 – geosrs:WagnerIVProjection	118
Table 311 – geosrs:WagnerVIProjection	119
Table 312 – geosrs:WagnerVProjection	119

Table 313 – geosrs:WerenskioldIProjection	119
Table 314 – geosrs:PutninsP3'Projection	119
Table 315 – geosrs:PutninsP4'Projection	120
Table 316 – geosrs:PutninsP5'Projection	120
Table 317 – geosrs:PutninsP6'Projection	120
Table 318 – geosrs:MillerOblatedStereographicProjection	121
Table 319 – geosrs:RoussilheProjection	121
Table 320 – geosrs:ArtificialSatellite	123
Table 321 – geosrs:Asteroid	123
Table 322 – geosrs:Comet	124
Table 323 – geosrs:DwarfPlanet	124
Table 324 – geosrs:InterstellarBody	124
Table 325 – geosrs:Moon	124
Table 326 – geosrs:NaturalSatellite	124
Table 327 – geosrs:Planet	125
Table 328 – geosrs:PlanetStatus	125
Table 329 – geosrs:Plutoid	125
Table 330 – geosrs:Star	125
Table 331 – geosrs:down	127
Table 332 – geosrs:east	128
Table 333 – geosrs:north	128
Table 334 – geosrs:south	128
Table 335 – geosrs:up	128
Table 336 – geosrs:west	129
Table 337 – geosrs:proj4Literal	129
Table 338 – geosrs:projJSONLiteral	130
Table 339 – geosrs:wktLiteral	130
Table 340 – geosrs:GRS1980	131
Table 341 – geosrs:GRS67	131
Table 342 – geosrs:PZ90	131
Table 343 – geosrs:Airy1830	132
Table 344 – geosrs:AiryModified1849	132
Table 345 – geosrs:International1924	132
Table 346 – geosrs:AustralianNationalSpheroid	133
Table 347 – geosrs:Everest1930	133
Table 348 – geosrs:Clarke1866	133
Table 349 – geosrs:Plessis1817	134
Table 350 – geosrs:Danish1876	134
Table 351 – geosrs:Struve1860	134
Table 352 – geosrs:IAG1975	134
Table 353 – geosrs:Clarke1858	135

Table 354 – geosrs:Clarke1880	135
Table 355 – geosrs:Helmert1906	135
Table 356 – geosrs:CGCS2000	136
Table 357 – geosrs:GSK-2011	136
Table 358 – geosrs:Zach1812	136
Table 359 – geosrs:Clarke1880ARC	137
Table 360 – geosrs:Clarke1880IGN	137
Table 361 – geosrs:WGS66	137
Table 362 – geosrs:WGS72	138
Table 363 – geosrs:WGS84	138
Table 364 – geosrs:Krassowsky1940	138
Table A.1 – Alignment: Namespaces	146
Table A.2 – Alignment: IGN Ontology	147
Table A.3 – Alignment: ISO19111 Ontology	148
Table A.4 – Alignment: IFC Ontology	149

LIST OF FIGURES

Figure 1	12
----------------	----

LIST OF NORMATIVE STATEMENTS

REQUIREMENTS CLASS 1: 06-CORE.ADOC EXTENSION	12
REQUIREMENTS CLASS 2: 07-CO_MODULE.ADOC EXTENSION	27
REQUIREMENTS CLASS 3: 08-CS_MODULE.ADOC EXTENSION	36
REQUIREMENTS CLASS 4: 09-DATUM_MODULE.ADOC EXTENSION	49
REQUIREMENTS CLASS 5: 10-SRSAPPLICATION_MODULE.ADOC EXTENSION	59
REQUIREMENTS CLASS 6: 11-PROJECTIONS_MODULE.ADOC EXTENSION	66
REQUIREMENTS CLASS 7: 12-PLANET_MODULE.ADOC EXTENSION	123
REQUIREMENTS CLASS 8: 13-INSTANCES.ADOC EXTENSION	127
REQUIREMENT 1: COORDINATE REFERENCE SYSTEM PARAMETERS	13
REQUIREMENT 2: COORDINATE REFERENCE SYSTEM PROPERTIES	14
REQUIREMENT 3: COORDINATE REFERENCE SYSTEM TYPES	19
REQUIREMENT 4: COORDINATE OPERATION CATEGORIES	27

REQUIREMENT 5: COORDINATE OPERATION METHODS	30
REQUIREMENT 6: COORDINATE OPERATION PARAMETERS	32
REQUIREMENT 7: COORDINATE OPERATION PROPERTIES	33
REQUIREMENT 8: 3D COORDINATE SYSTEMS	36
REQUIREMENT 9: CELESTIAL COORDINATE SYSTEMS	38
REQUIREMENT 10: COORDINATE SYSTEM COMPONENTS	40
REQUIREMENT 11: COORDINATE SYSTEM PROPERTIES	40
REQUIREMENT 12: COORDINATE SYSTEM TYPES	42
REQUIREMENT 13: TEMPORAL COORDINATE SYSTEMS	46
REQUIREMENT 14: DATUM PARAMETERS	49
REQUIREMENT 15: DATUM PROPERTIES	50
REQUIREMENT 16: DATUM TYPES	51
REQUIREMENT 17: SPHEROID PROPERTIES	54
REQUIREMENT 18: SPHEROID TYPES	56
REQUIREMENT 19: MAP TYPES	59
REQUIREMENT 20: SRS APPLICATION TYPES	61
REQUIREMENT 21: AZIMUTHAL PROJECTIONS	67
REQUIREMENT 22: COMPROMISE PROJECTIONS	68
REQUIREMENT 23: CONFORMAL PROJECTIONS	72
REQUIREMENT 24: CONICAL PROJECTIONS	74
REQUIREMENT 25: CYLINDRICAL PROJECTIONS	77
REQUIREMENT 26: EQUAL AREA PROJECTIONS	81
REQUIREMENT 27: EQUIDISTANT PROJECTIONS	83
REQUIREMENT 28: GLOBULAR PROJECTIONS	86
REQUIREMENT 29: LENTICULAR PROJECTIONS	87
REQUIREMENT 30: MINIMUM ERROR PROJECTIONS	91
REQUIREMENT 31: PERSPECTIVE PROJECTIONS	91
REQUIREMENT 32: POLYCONIC PROJECTIONS	94
REQUIREMENT 33: POLYHEDRAL PROJECTIONS	98
REQUIREMENT 34: PSEUDO AZIMUTHAL PROJECTIONS	102
REQUIREMENT 35: PSEUDO CONICAL PROJECTIONS	104
REQUIREMENT 36: PSEUDO CYLINDRICAL PROJECTIONS	105
REQUIREMENT 37: STEREOGRAPHIC PROJECTIONS	120

REQUIREMENT 38: INTERSTELLAR BODY	123
REQUIREMENT 39: COORDINATE SYSTEM AXIS	127
REQUIREMENT 40: SRS LITERAL TYPES	129
REQUIREMENT 41: SPHEROIDS	130



ABSTRACT

<Insert Abstract Text here>



KEYWORDS

The following are keywords to be used by search engines and document catalogues.

keyword_1, keyword_2, keyword_3, etc.



PREFACE

This document establishes the OGC CRS ontology and its submodules. The definition of elements of coordinate reference systems is an essential part of geospatial data provision. However, until now, coordinate reference systems and their components could not be represented in an OGC-standardized semantic web vocabulary. This document introduces the ontology model, its classes and properties, application examples and can serve as the foundation of a semantic web based coordinate system registry at OGC. Special attention is given to the compatibility of the CRS Ontology vocabulary to other OGC-endorsed Semantic Web standards such as GeoSPARQL and alignments to other data standards are provided as part of this specification.

NOTE: Insert Preface Text here. Give OGC specific commentary: describe the technical content, reason for document, history of the document and precursors, and plans for future work.

There are two ways to specify the Preface: “simple clause” or “full clause”

If the Preface does not contain subclauses, it is considered a simple preface clause. This one is entered as text after the `.Preface` label and must be placed between the AsciiDoc document attributes and the first AsciiDoc section title. It should not be give a section title of its own.

If the Preface contains subclauses, it needs to be encoded as a full preface clause. This one is recognized as a full Metanorma AsciiDoc section with the title “Preface”, i.e. `== Preface`. (Simple preface content can also be encoded like full preface.)

IV

SECURITY CONSIDERATIONS

No security considerations have been made for this Standard.

V

SUBMITTERS

All questions regarding this submission should be directed to the editor or the submitters:

NAME	AFFILIATION	OGC MEMBER
Luís Moreira de Sousa	Instituto Superior Técnico: Lisbon, PT	Yes
Timo Homburg	Mainz University Of Applied Sciences	No
Nathalie Abadie	IGN France	Yes
Ghislain Atemezang	European Union Agency for Railways (ERA)	Yes

VI

SOURCE OF THE CONTENT FOR THIS OGC DOCUMENT

VII

VALIDITY OF CONTENT

VIII

FUTURE WORK

NOTE: If you need to place any further sections in the preface area use the [.preface] attribute.



CONTRIBUTORS

Additional contributors to this Standard include the following:

Individual name(s), Organization



1

SCOPE



SCOPE

<Insert Scope text here>

NOTE: Give the subject of the document and the aspects of that scope covered by the document.



2

CONFORMANCE



CONFORMANCE

<Insert conformance content here>

NOTE: Provide a short description of the content approached in subsequent sections and the main subject of the document



3

NORMATIVE REFERENCES

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

Identification of Common Molecular Subsequences. Smith, T.F., Waterman, M.S., J. Mol. Biol. 147, 195–197 (1981)

ZIB Structure Prediction Pipeline: Composing a Complex Biological Workflow through Web Services. May, P., Ehrlich, H.C., Steinke, T. In: Nagel, W.E., Walter, W.V., Lehner, W. (eds.) Euro-Par 2006. LNCS, vol. 4128, pp. 1148–1158. Springer, Heidelberg (2006)

The Grid: Blueprint for a New Computing Infrastructure., Foster, I., Kesselman, C.. Morgan Kaufmann, San Francisco (1999).

Grid Information Services for Distributed Resource Sharing. Czajkowski, K., Fitzgerald, S., Foster, I., Kesselman, C. In: 10th IEEE International Symposium on High Performance Distributed Computing, pp. 181–184. IEEE Press, New York (2001)

The background features a dark blue field with several thin, light yellow lines intersecting at various points. Three of these intersection points are marked with small yellow dots. One dot is located in the upper right quadrant, another in the middle right, and a third in the lower left. The overall design is minimalist and modern.

4

TERMS AND DEFINITIONS

This document uses the terms defined in OGC Policy Directive 49, which is based on the ISO/IEC Directives, Part 2, Rules for the structure and drafting of International Standards. In particular, the word “shall” (not “must”) is the verb form used to indicate a requirement to be strictly followed to conform to this document and OGC documents do not use the equivalent phrases in the ISO/IEC Directives, Part 2.

This document also uses terms defined in the OGC Standard for Modular specifications (OGC 08-131r3), also known as the ‘ModSpec’. The definitions of terms such as standard, specification, requirement, and conformance test are provided in the ModSpec.

For the purposes of this document, the following additional terms and definitions apply.

4.1. example term

term used for exemplary purposes

Note 1 to entry: An example note.

Example Here’s an example of an example term.

[SOURCE:]



5

CONVENTIONS

NOTE: This section provides details and examples for any conventions used in the document. Examples of conventions are symbols, abbreviations, use of XML schema, or special notes regarding how to read the document.

5.1. Identifiers

The normative provisions in this standard are denoted by the URI

<http://www.opengis.net/spec/{standard}/{m.n}>

All requirements and conformance tests that appear in this document are denoted by partial URIs which are relative to this base.

5.2. Other conventions

<Place any other convention needed with its corresponding title>



6

CORE

This clause establishes the **Core** Requirements class, with IRI /req/core, which has a corresponding Conformance Class, **Core**, with IRI /conf/core.

The Core module establishes a set of classes and properties which define the building blocks of a spatial reference system definition. Some of the definitions are extended in specialized modules related to the Core module.

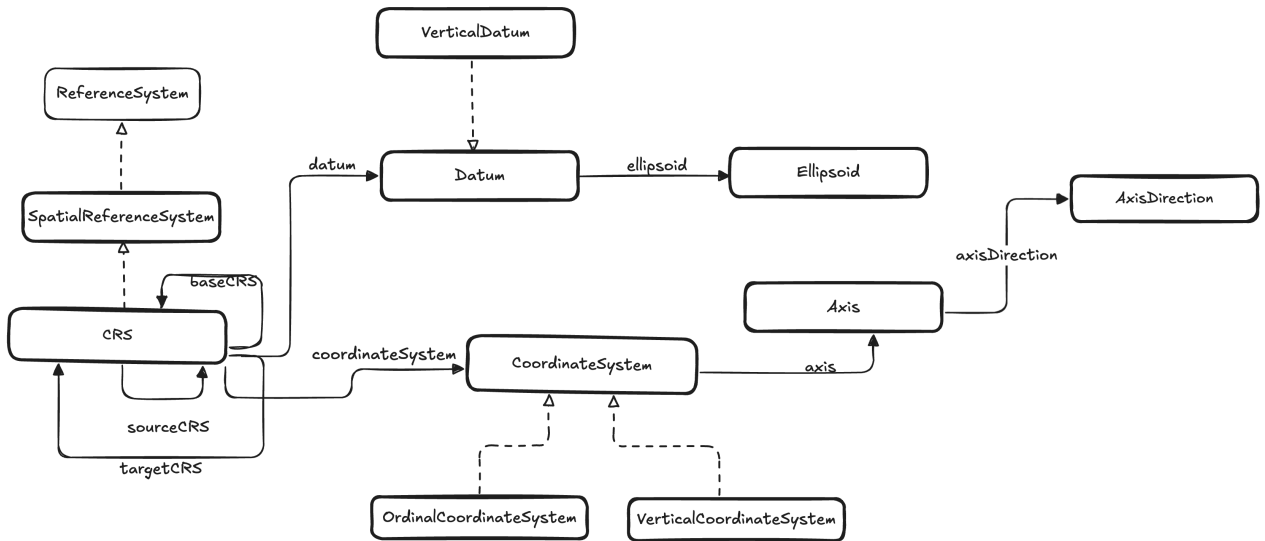


Figure 1

From a base class SpatialReferenceSystem, we define a class for a coordinate system, as the superclass of all spatial reference systems describing locations using coordinates. These SpatialReferenceSystems are described using a Datum and a coordinate system definitions with at least one coordinate axis. Together with several subtypes of coordinate reference system, these definitions complete the Core module.

REQUIREMENTS CLASS 1: 06-CORE.ADOC EXTENSION

IDENTIFIER	/req/06-core.adoc
TARGET TYPE	Implementation Specification
REQUIREMENT	/req/Coordinate_Reference_System_Parameters
	/req/Coordinate_Reference_System_Types
	/req/Coordinate_Reference_System_Properties

6.1. Coordinate Reference System Parameters

Requirement 1: Coordinate Reference System Parameters	
IDENTIFIER	/req/Coordinate_Reference_System_Parameters
STATEMENT	Implementations shall allow the RDFS classes geosrs:AreaOfUse, geosrs:Extent, geosrs:GeographicBoundingBox, geosrs:AxesList, geosrs:SingleCRSList to be used in SPARQL graph patterns.

6.1.1. Class: geosrs:AreaOfUse

Table 1 — geosrs:AreaOfUse

URI	https://w3id.org/geosrs/srs/AreaOfUse
Definition	Area within which a coordinate operation may be used.
Example	<code>geosrs:AreaOfUse</code>

6.1.2. Class: geosrs:Extent

Table 2 — geosrs:Extent

URI	https://w3id.org/geosrs/srs/Extent
Definition	Geographic area or time interval in which the referring object is valid. Cf. ISO 19115-1:2014:2014-04, part 6.6.1 and table B.15 line 335.

6.1.3. Class: geosrs:GeographicBoundingBox

Table 3 — geosrs:GeographicBoundingBox

URI	https://w3id.org/geosrs/srs/GeographicBoundingBox
Definition	Frame delimiting an area of interest. See ISO 19115-1:2014:2014-04, part 6.6.1 and table B.15.1 line 344.

6.1.4. Class: geosrs:AxesList

Table 4 — geosrs:AxesList

URI	https://w3id.org/geosrs/srs/AxesList
Definition	Ordered list of coordinate system axes.

6.1.5. Class: geosrs:SingleCRSList

Table 5 — geosrs:SingleCRSList

URI	https://w3id.org/geosrs/srs/SingleCRSList
Definition	Ordered list of simple reference coordinate systems.

6.2. Coordinate Reference System Properties

REQUIREMENT 2: COORDINATE REFERENCE SYSTEM PROPERTIES

IDENTIFIER	/req/Coordinate_Reference_System_Properties
STATEMENT	Implementations shall allow the RDFS properties geosrs:baseCRS, geosrs:conversion, geosrs:coordinateSystem, geosrs:datum, geosrs:datumEnsemble, geosrs:domainOfValidity, geosrs:method, geocrs:asProj4, geocrs:asProjJSON, geocrs:asWKT, geosrs:EPSGcode to be used in SPARQL graph patterns.

6.2.1. Property: geosrs:baseCRS

Table 6 — geosrs:baseCRS

URI	https://w3id.org/geosrs/srs/baseCRS
Type	owl:ObjectProperty

Definition	The geodetic coordinate reference system on which a projected coordinate reference system is based. Cf. ISO 19111:2007:2007-07, table 11, association role base CRS.
Range	<u>GeodeticCRS</u>
Domain	<u>ProjectedCRS</u>

6.2.2. Property: geosrs:conversion

Table 7 — geosrs:conversion

URI	<u>https://w3id.org/geosrs/srs/conversion</u>
Type	<u>owl:ObjectProperty</u>
Definition	The conversion used to define a projected coordinate reference system. Cf. ISO 19111:2007:2007-07, table 7, named association Definition.
Range	<u>Conversion</u>
Domain	<u>CRS</u>

6.2.3. Property: geosrs:coordinateSystem

Table 8 — geosrs:coordinateSystem

URI	<u>https://w3id.org/geosrs/srs/coordinateSystem</u>
Type	<u>owl:ObjectProperty</u>
Definition	The property relates a coordinate reference system to its coordinate system
Range	<u>CoordinateSystem</u>
Domain	<u>CRS</u>
Example	<u>geosrs:coordinateSystem</u>

6.2.4. Property: geosrs:datum

Table 9 — geosrs:datum

URI	https://w3id.org/geosrs/srs/datum
Type	owl:ObjectProperty
Definition	The property relates a coordinate reference system to a datum
Range	Datum
Domain	CRS

6.2.5. Property: geosrs:datumEnsemble

Table 10 — geosrs:datumEnsemble

URI	https://w3id.org/geosrs/srs/datumEnsemble
Type	owl:ObjectProperty
Definition	Indicates a single CRS referring to a collection of one or more datums (Datum Ensemble)
Range	DatumEnsemble
Domain	SingleCRS

6.2.6. Property: geosrs:domainOfValidity

Table 11 — geosrs:domainOfValidity

URI	https://w3id.org/geosrs/srs/domainOfValidity
Type	owl:ObjectProperty
Definition	Geographic area or time interval in which the referring object is valid. Cf. ISO 19111:2007:2007-07, tables 4, 33 and 42, attribute domainOfValidity.

Range	<u>AreaOfUse</u>
Domain	<u>CRS</u>

6.2.7. Property: geosrs:method

Table 12 — geosrs:method

URI	<u>https://w3id.org/geosrs/srs/method</u>
Type	<u>owl:ObjectProperty</u>
Range	<u>CoordinateOperation</u>
Domain	<u>CRS</u>

6.2.8. Property: geocrs:asProj4

Table 13 — geocrs:asProj4

URI	geocrs:asProj4
Type	<u>owl:DatatypeProperty</u>
Definition	PROJ4 string defining a CRS. Note: this paradigm is ambiguous and presently considered outdated.
Range	<u>proj4Literal</u>
Domain	<u>CRS</u>

6.2.9. Property: geocrs:asProjJSON

Table 14 — geocrs:asProjJSON

URI	geocrs:asProjJSON
Type	<u>owl:DatatypeProperty</u>

Definition	CRS definition encoded as a JSON object interpretable by PROJ4.
Range	<u>projJSONLiteral</u>
Domain	<u>CRS</u>

6.2.10. Property: geocrs:asWKT

Table 15 — geocrs:asWKT

URI	geocrs:asWKT
Type	<u>owl:DatatypeProperty</u>
Definition	CRS definition encoded according to the Well Known Text structure. Cf. ISO 19162:2019.
Range	<u>wktLiteral</u>
Domain	<u>CRS</u>

6.2.11. Property: geosrs:EPSGcode

Table 16 — geosrs:EPSGcode

URI	<u>https://w3id.org/geosrs/srs/EPSGcode</u>
Type	<u>owl:DatatypeProperty</u>
Definition	Identifier of this resource in the EPSG Geodetic Parameter Dataset.
Range	<u>xsd:string</u>

6.3. Coordinate Reference System Types

REQUIREMENT 3: COORDINATE REFERENCE SYSTEM TYPES

IDENTIFIER /req/Coordinate_Reference_System_Types

STATEMENT Implementations shall allow the RDFS classes geosrs:BoundCRS, geosrs:CompoundCRS, geosrs:CRS, geosrs:EngineeringCRS, geosrs:GeocentricCRS, geosrs:GeodeticCRS, geosrs:GeographicCRS, geosrs:ParametricCRS, geosrs:ProjectedCRS, geosrs:SelenographicCRS, geosrs:ReferenceSystem, geosrs:SingleCRS, geosrs:SpatialReferenceSystem, geosrs:SpatioParametricCompoundCRS, geosrs:SpatioParametricTemporalCompoundCRS, geosrs:SpatioTemporalCompoundCRS, geosrs:StaticCRS, geosrs:TemporalCRS, geosrs:VerticalCRS to be used in SPARQL graph patterns.

6.3.1. Class: geosrs:BoundCRS

Table 17 — geosrs:BoundCRS

URI	https://w3id.org/geosrs/srs/BoundCRS
Super-classes	CRS

6.3.2. Class: geosrs:CompoundCRS

Table 18 — geosrs:CompoundCRS

URI	https://w3id.org/geosrs/srs/CompoundCRS
Definition	Coordinate reference system using at least two independent single coordinate reference systems. Cf. ISO 19111:2007:2007-07, parts 8.2.3.c, 8.2.4, table 6 and annex B.1.2.4.
Super-classes	CRS
Example	geosrs:CompoundCRS

6.3.3. Class: geosrs:CRS

Table 19 — geosrs:CRS

URI	https://w3id.org/geosrs/srs/CRS
-----	---

Definition	Depending on the spatial dimension of coordinates (1D, 2D, 3D), this piece of metadata is used for specifying the elements of definition associated to a given set of coordinates: its datum, its ellipsoid, its prime meridian, the type of coordinates (geocentric, geographic, projected,...), the coordinates units of measure, when appropriate the cartographic projection used, the vertical coordinate reference system.
Super-classes	SpatialReferenceSystem

6.3.4. Class: geosrs:EngineeringCRS

Table 20 — geosrs:EngineeringCRS

URI	https://w3id.org/geosrs/srs/EngineeringCRS
Definition	A contextually local coordinate reference system which can be divided into two broad categories: — earth-fixed systems applied to engineering activities on or near the surface of the earth; — CRSs on moving platforms such as road vehicles, vessels, aircraft or spacecraft.
Super-classes	CRS

6.3.5. Class: geosrs:GeocentricCRS

Table 21 — geosrs:GeocentricCRS

URI	https://w3id.org/geosrs/srs/GeocentricCRS
Definition	A cartesian coordinate reference system that represents locations in the vicinity of the Earth (including its surface, interior, atmosphere, and surrounding outer space) as X, Y, and Z measurements from its center of mass. Commonly used to track the orbits of satellites.
Super-classes	CRS
Example	geosrs:GeocentricCRS

6.3.6. Class: geosrs:GeodeticCRS

Table 22 — geosrs:GeodeticCRS

URI	https://w3id.org/geosrs/srs/GeodeticCRS
Definition	Coordinate Reference System associated with a geodetic datum. Cf. ISO 19111:2007:2007-07, part 8.2.2.a, table 10 and annex B.1.2.1.a.
Super-classes	CRS

6.3.7. Class: geosrs:GeographicCRS

Table 23 — geosrs:GeographicCRS

URI	https://w3id.org/geosrs/srs/GeographicCRS
Definition	Coordinate Reference System that has a geodetic reference frame and an ellipsoidal coordinate system
Super-classes	CRS
Example	geosrs:GeographicCRS

6.3.8. Class: geosrs:ParametricCRS

Table 24 — geosrs:ParametricCRS

URI	https://w3id.org/geosrs/srs/ParametricCRS
Definition	Coordinate Reference System based on a parametric datum
Super-classes	CRS

6.3.9. Class: geosrs:ProjectedCRS

Table 25 — geosrs:ProjectedCRS

URI	https://w3id.org/geosrs/srs/ProjectedCRS
Definition	Coordinate Reference System derived from a two-dimensional geodetic coordinate reference system by applying a map projection. Cf. ISO 19111:2007:2007-07, part 8.2.3.b, table 11 and annex B.1.2.3.
Super-classes	CRS
Example	geosrs:ProjectedCRS

6.3.10. Class: geosrs:SelenographicCRS

Table 26 — geosrs:SelenographicCRS

URI	https://w3id.org/geosrs/srs/SelenographicCRS
Definition	Coordinate Reference System to refer locations on the surface of the Earth's Moon.
Super-classes	CRS

6.3.11. Class: geosrs:ReferenceSystem

Table 27 — geosrs:ReferenceSystem

URI	https://w3id.org/geosrs/srs/ReferenceSystem
Definition	An abstract coordinate system, whose origin, orientation and scale are specified in physical space. It is based on a set of reference points, defined as geometric points whose position is identified physically and mathematically.

6.3.12. Class: geosrs:SingleCRS

Table 28 — geosrs:SingleCRS

URI	https://w3id.org/geosrs/srs/SingleCRS
-----	---

Definition	Coordinate reference system consisting of one coordinate system and one datum. Cf. ISO 19111:2007:2007-07, table 5.
Super-classes	CRS

6.3.13. Class: geosrs:SpatialReferenceSystem

Table 29 — geosrs:SpatialReferenceSystem

URI	https://w3id.org/geosrs/srs/SpatialReferenceSystem
Definition	A spatial reference system (SRS) is a system for establishing spatial position. A spatial reference system can use geographic identifiers (place names, for example), coordinates (in which case it is a coordinate reference system), or identifiers with structured geometry (in which case it is a discrete global grid system).
Super-classes	ReferenceSystem

6.3.14. Class: geosrs:SpatioParametricCompoundCRS

Table 30 — geosrs:SpatioParametricCompoundCRS

URI	https://w3id.org/geosrs/srs/SpatioParametricCompoundCRS
Definition	A spatio-parametric coordinate reference system is a compound CRS in which one component is a geographic 2D, projected 2D or engineering 2D CRS, supplemented by a parametric CRS to create a three-dimensional CRS
Super-classes	CompoundCRS

6.3.15. Class: geosrs:SpatioParametricTemporalCompoundCRS

Table 31 — geosrs:SpatioParametricTemporalCompoundCRS

URI	https://w3id.org/geosrs/srs/SpatioParametricTemporalCompoundCRS
-----	---

Definition	Coordinate reference system combining a spatio-parametric reference system with at least one temporal reference system
Super-classes	SpatioParametricCompoundCRS

6.3.16. Class: geosrs:SpatioTemporalCompoundCRS

Table 32 — geosrs:SpatioTemporalCompoundCRS

URI	https://w3id.org/geosrs/srs/SpatioTemporalCompoundCRS
Definition	Coordinate reference system combining a spatial reference system with at least one temporal reference system
Super-classes	CompoundCRS

6.3.17. Class: geosrs:StaticCRS

Table 33 — geosrs:StaticCRS

URI	https://w3id.org/geosrs/srs/StaticCRS
Definition	Coordinate Reference System that has a static reference frame
Super-classes	CRS

6.3.18. Class: geosrs:TemporalCRS

Table 34 — geosrs:TemporalCRS

URI	https://w3id.org/geosrs/srs/TemporalCRS
Definition	Coordinate Reference System based on a temporal datum
Super-classes	CRS

6.3.19. Class: geosrs:VerticalCRS

Table 35 — geosrs:VerticalCRS

URI	https://w3id.org/geosrs/srs/VerticalCRS
Definition	One-dimensional coordinate reference system associated with a vertical datum and used for recording heights or depths. Ellipsoidal heights are not captured in a vertical coordinate reference system but as part of a 3D coordinates tuple defined in a geodetic 3D coordinate reference system. Cf. ISO 19111:2007:2007-07, parts 8.2.2.b, table 14 and annex B.1.2.1.b.
Super-classes	CRS
Example	geosrs:VerticalCRS

7

COORDINATE OPERATION MODULE

COORDINATE OPERATION MODULE

This clause establishes the **Co** Requirements class, with IRI `/req/co`, which has a corresponding Conformance Class, **Co**, with IRI `/conf/co`.

REQUIREMENTS CLASS 2: 07-CO_MODULE.ADOC EXTENSION

IDENTIFIER	<code>/req/07-co_module.adoc</code>
TARGET TYPE	Implementation Specification
REQUIREMENT	<code>/req/Coordinate_Operation_Methods</code>
	<code>/req/Coordinate_Operation_Parameters</code>
	<code>/req/Coordinate_Operation_Categories</code>
	<code>/req/Coordinate_Operation_Properties</code>

7.1. Coordinate Operation Categories

REQUIREMENT 4: COORDINATE OPERATION CATEGORIES

IDENTIFIER	<code>/req/Coordinate_Operation_Categories</code>
STATEMENT	Implementations shall allow the RDFS classes <code>geosrs:GeographicObject</code> , <code>geosrs:RegisterOperations</code> , <code>geosrs:ScaleOperation</code> , <code>geosrs:RotationOperation</code> , <code>geosrs:IdentityOperation</code> , <code>geosrs:ShearOperation</code> , <code>geosrs:TranslationOperation</code> , <code>geosrs:AffineTransformationOperation</code> , <code>geocrs:CoordinateTransformationOperation</code> to be used in SPARQL graph patterns.

7.1.1. Class: `geosrs:GeographicObject`

Table 36 — `geosrs:GeographicObject`

URI	https://w3id.org/geosrs/co/GeographicObject
Definition	Identifier of a geographic feature of which the coordinates are used as operation parameters.

Super-classes	iso19107:Geometry[iso19107:Geometry]
---------------	--

7.1.2. Class: geosrs:RegisterOperations

Table 37 — geosrs:RegisterOperations

URI	https://w3id.org/geosrs/co/RegisterOperations
Definition	Operations supported in the Coordinate Operations package.

7.1.3. Class: geosrs:ScaleOperation

Table 38 — geosrs:ScaleOperation

URI	https://w3id.org/geosrs/co/ScaleOperation
Definition	Scale transformation operation
Super-classes	AffineTransformationOperation

7.1.4. Class: geosrs:RotationOperation

Table 39 — geosrs:RotationOperation

URI	https://w3id.org/geosrs/co/RotationOperation
Definition	Rotation transformation operation
Super-classes	AffineTransformationOperation

7.1.5. Class: geosrs:IdentityOperation

Table 40 — geosrs:IdentityOperation

URI	https://w3id.org/geosrs/co/IdentityOperation
-----	---

Definition	Identity transformation operation
Super-classes	<u>AffineTransformationOperation</u>

7.1.6. Class: geosrs:ShearOperation

Table 41 — geosrs:ShearOperation

URI	<u>https://w3id.org/geosrs/co/ShearOperation</u>
Definition	Shear transformation operation
Super-classes	<u>AffineTransformationOperation</u>

7.1.7. Class: geosrs:TranslationOperation

Table 42 — geosrs:TranslationOperation

URI	<u>https://w3id.org/geosrs/co/TranslationOperation</u>
Definition	Translation transformation operation
Super-classes	<u>AffineTransformationOperation</u>

7.1.8. Class: geosrs:AffineTransformationOperation

Table 43 — geosrs:AffineTransformationOperation

URI	<u>https://w3id.org/geosrs/co/AffineTransformationOperation</u>
Definition	Affine coordinate transformation operation
Super-classes	<u>CoordinateTransformationOperation</u> []

7.1.9. Class: geocrs:CoordinateTransformationOperation

Table 44 — geocrs:CoordinateTransformationOperation

URI	geocrs:CoordinateTransformationOperation[]
Definition	Coordinate operation in which the two coordinate reference systems are based on different datums.
Super-classes	SingleOperation

7.2. Coordinate Operation Methods

REQUIREMENT 5: COORDINATE OPERATION METHODS

IDENTIFIER	/req/Coordinate_Operation_Methods
STATEMENT	Implementations shall allow the RDFS classes geocrs:CoordinateOperation , geocrs:PassThroughOperation , geocrs:ConcatenatedOperation , geocrs:SingleOperation , geocrs:Transformation , geocrs:Conversion , geocrs:PointMotionOperation , geocrs:OperationMethod to be used in SPARQL graph patterns.

7.2.1. Class: [geocrs:PassThroughOperation](#)

Table 45 — [geocrs:PassThroughOperation](#)

URI	https://w3id.org/geosrs/co/PassThroughOperation
Definition	Specification of a subset of coordinate tuples that is subject to a coordinate operation
Super-classes	CoordinateOperation

7.2.2. Class: [geocrs:ConcatenatedOperation](#)

Table 46 — [geocrs:ConcatenatedOperation](#)

URI	https://w3id.org/geosrs/co/ConcatenatedOperation
Definition	Ordered sequence of two or more single coordinate operations. Note: The sequence of coordinate operations is constrained by the requirement that the source

	<p>coordinate reference system of step (n + 1) shall be the same as the target coordinate reference system of step (n). The source coordinate reference system of the first step and the target coordinate reference system of the last step are the source and target coordinate reference system associated with the concatenated coordinate operation. For a concatenated coordinate operation sequence of n coordinate operations: source CRS (concatenated coordinate operation) .eq. source CRS (coordinate operation step 1) target CRS (coordinate operation step i) .eq. source CRS (coordinate operation step i + 1); i .eq. 1 ... (n – 1) target CRS (concatenated coordinate operation) .eq. target CRS (coordinate operation step n) Instead of a forward coordinate operation, an inverse coordinate operation may be used for one or more of the coordinate operation steps mentioned above, if the inverse coordinate operation is uniquely defined by the forward coordinate operation method.</p>
Super-classes	CoordinateOperation

7.2.3. Class: geosrs:PointMotionOperation

Table 47 — geosrs:PointMotionOperation

URI	https://w3id.org/geosrs/co/PointMotionOperation
Definition	<p>Mathematical operation that describes the change of coordinate values within one coordinate reference system due to the motion of the point between one coordinate epoch and another coordinate epoch Note: In this document the motion is due to tectonic plate movement or deformation.</p>
Super-classes	SingleOperation

7.3. Coordinate Operation Parameters

REQUIREMENT 6: COORDINATE OPERATION PARAMETERS

IDENTIFIER	/req/Coordinate_Operation_Parameters
STATEMENT	Implementations shall allow the RDFS classes geosrs:GeneralOperationParameter, geosrs:OperationParameterGroup, geosrs:OperationParameter, geosrs:GeneralParameterValue, geosrs:ParameterValueGroup, geosrs:OperationParameterValue to be used in SPARQL graph patterns.

7.3.1. Class: geosrs:OperationParameterGroup

Table 48 — geosrs:OperationParameterGroup

URI	https://w3id.org/geosrs/co/OperationParameterGroup
Definition	Definition of a group of related parameters used by a coordinate operation method.
Super-classes	GeneralOperationParameter

7.3.2. Class: geosrs:ParameterValueGroup

Table 49 — geosrs:ParameterValueGroup

URI	https://w3id.org/geosrs/co/ParameterValueGroup
Definition	Group of related parameter values. Note: The same group can be repeated more than once in a coordinate operation or higher level ParameterValueGroup, if those instances contain different values of one or more ParameterValues which suitably distinguish among those groups.
Super-classes	GeneralParameterValue

7.4. Coordinate Operation Properties

REQUIREMENT 7: COORDINATE OPERATION PROPERTIES

IDENTIFIER /req/Coordinate_Operation_Properties

STATEMENT Implementations shall allow the RDFS properties `geosrs:derivingConversion`, `geosrs:parameter`, `geosrs:sourceCRS`, `geosrs:targetCRS` to be used in SPARQL graph patterns.

7.4.1. Property: `geosrs:derivingConversion`

Table 50 — `geosrs:derivingConversion`

URI	https://w3id.org/geosrs/co/derivingConversion
Type	owl:ObjectProperty
Definition	Relates a derived CRS to a conversion
Range	Conversion
Domain	DerivedCRS

7.4.2. Property: `geosrs:parameter`

Table 51 — `geosrs:parameter`

URI	https://w3id.org/geosrs/co/parameter
Type	owl:ObjectProperty
Definition	Value of the datum-defining parameter
Range	OperationParameter
Domain	Conversion

7.4.3. Property: `geosrs:sourceCRS`

Table 52 — geosrs:sourceCRS

URI	https://w3id.org/geosrs/co/sourceCRS
Type	owl:ObjectProperty
Definition	The coordinate reference system associated to the data used as input of a given operation. Cf. ISO 19111:2007:2007-07, table 42, named association Source.
Range	CRS
Domain	CoordinateOperation
Example	geosrs:sourceCRS

7.4.4. Property: geosrs:targetCRS

Table 53 — geosrs:targetCRS

URI	https://w3id.org/geosrs/co/targetCRS
Type	owl:ObjectProperty
Definition	The coordinate reference system associated to the data obtained as output of a given operation. Cf. ISO 19111:2007:2007-07, table 42, named association Target.
Range	CRS
Domain	CoordinateOperation



8

COORDINATE SYSTEM MODULE

This clause establishes the **CS** Requirements class, with IRI `/req/cs`, which has a corresponding Conformance Class, **CS**, with IRI `/conf/cs`.

The coordinate system module introduces different types of coordinate systems which are distinguished in geospatial science and applications. Coordinate systems are distinguished by their area of use, i.e planetary or interstellar and by their multidimensionality.

REQUIREMENTS CLASS 3: 08-CS_MODULE.ADOC EXTENSION

IDENTIFIER	<code>/req/08-cs_module.adoc</code>
TARGET TYPE	Implementation Specification
REQUIREMENT	<code>/req/Temporal_Coordinate_Systems</code>
	<code>/req/3D_Coordinate_Systems</code>
	<code>/req/Coordinate_System_Types</code>
	<code>/req/Celestial_Coordinate_Systems</code>
	<code>/req/Coordinate_System_Components</code>
	<code>/req/Coordinate_System_Properties</code>

8.1. 3D Coordinate Systems

REQUIREMENT 8: 3D COORDINATE SYSTEMS

IDENTIFIER	<code>/req/3D_Coordinate_Systems</code>
STATEMENT	Implementations shall allow the RDFS classes <code>geosrs:3DCoordinateSystem</code> , <code>geosrs:ConicalCoordinateSystem</code> , <code>geosrs:CylindricalCoordinateSystem</code> , <code>geosrs:EllipsoidalCoordinateSystem</code> , <code>geosrs:SphericalCoordinateSystem</code> to be used in SPARQL graph patterns.

8.1.1. Class: geosrs:3DCoordinateSystem

The class `geosrs:3DCoordinateSystem` describes a coordinate system in three dimensions. These coordinate systems are common for 3D representations or 2D representations with a time aspect.

Table 54 — `geosrs:3DCoordinateSystem`

URI	https://w3id.org/geosrs/cs/3DCoordinateSystem
Definition	Non-repeating sequence of coordinate system axes that spans a given coordinate space in three dimensions
Super-classes	CoordinateSystem
Example	geosrs:3DCoordinateSystem

8.1.2. Class: geosrs:ConicalCoordinateSystem

Table 55 — `geosrs:ConicalCoordinateSystem`

URI	https://w3id.org/geosrs/cs/ConicalCoordinateSystem
Definition	A conical coordinate system is a three-dimensional orthogonal coordinate system consisting of concentric spheres (described by their radius r) and by two families of perpendicular cones, aligned along the z - and x -axes, respectively
Super-classes	OrthogonalCoordinateSystem

8.1.3. Class: geosrs:CylindricalCoordinateSystem

Table 56 — `geosrs:CylindricalCoordinateSystem`

URI	https://w3id.org/geosrs/cs/CylindricalCoordinateSystem
Definition	Three-dimensional coordinate system in Euclidean space in which position is specified by two linear coordinates and one angular coordinate

8.2. Celestial Coordinate Systems

REQUIREMENT 9: CELESTIAL COORDINATE SYSTEMS

IDENTIFIER `/req/Celestial_Coordinate_Systems`

STATEMENT

Implementations shall allow the RDFS classes `geosrs:CelestialCoordinateSystem`, `geosrs:EclipticCoordinateSystem`, `geosrs:EquatorialCoordinateSystem`, `geosrs:GalacticCoordinateSystem`, `geosrs:HorizontalCoordinateSystem`, `geosrs:PerifocalCoordinateSystem`, `geosrs:SuperGalacticCS` to be used in SPARQL graph patterns.

8.2.1. Class: `geosrs:CelestialCoordinateSystem`

Table 57 — `geosrs:CelestialCoordinateSystem`

URI	https://w3id.org/geosrs/cs/CelestialCoordinateSystem
Definition	A coordinate system for specifying positions of celestial objects relative to physical reference points
Super-classes	CoordinateSystem

8.2.2. Class: `geosrs:EclipticCoordinateSystem`

Table 58 — `geosrs:EclipticCoordinateSystem`

URI	https://w3id.org/geosrs/cs/EclipticCoordinateSystem
Definition	An ecliptic coordinate system is used for representing the apparent positions and orbits of solar system objects.
Super-classes	CelestialCoordinateSystem

8.2.3. Class: `geosrs:EquatorialCoordinateSystem`

Table 59 — geosrs:EquatorialCoordinateSystem

URI	https://w3id.org/geosrs/cs/EquatorialCoordinateSystem
Definition	A celestial coordinate system in which an object's position on the celestial sphere is described in terms of its north-south declination and east-west right ascension, measured relative to the celestial equator and vernal equinox, respectively.
Super-classes	CelestialCoordinateSystem

8.2.4. Class: geosrs:GalacticCoordinateSystem

Table 60 — geosrs:GalacticCoordinateSystem

URI	https://w3id.org/geosrs/cs/GalacticCoordinateSystem
Definition	A coordinate system with the Sun as its center, the primary direction aligned with the approximate center of the Milky Way Galaxy, and the fundamental plane parallel to an approximation of the galactic plane but offset to its north.
Super-classes	CelestialCoordinateSystem 3DCoordinateSystem

8.2.5. Class: geosrs:HorizontalCoordinateSystem

Table 61 — geosrs:HorizontalCoordinateSystem

URI	https://w3id.org/geosrs/cs/HorizontalCoordinateSystem
Definition	A horizontal coordinate system is a celestial coordinate system that uses the observer's local horizon as the fundamental plane.
Super-classes	CelestialCoordinateSystem

8.2.6. Class: geosrs:PerifocalCoordinateSystem

Table 62 — geosrs:PerifocalCoordinateSystem

URI	https://w3id.org/geosrs/cs/PerifocalCoordinateSystem
Definition	A frame of reference centered at the focus of the orbit, i. e. the celestial body about which the orbit is centered.
Super-classes	CelestialCoordinateSystem

8.2.7. Class: geosrs:SuperGalacticCS

Table 63 — geosrs:SuperGalacticCS

URI	https://w3id.org/geosrs/cs/SuperGalacticCS
Definition	A reference frame for the supercluster of galaxies that contains the Milky Way galaxy, referenced to a local relatively flat collection of galaxy clusters used to define the supergalactic plane.
Super-classes	CelestialCoordinateSystem 3DCoordinateSystem

8.3. Coordinate System Components

REQUIREMENT 10: COORDINATE SYSTEM COMPONENTS

IDENTIFIER	/req/Coordinate_System_Components
STATEMENT	Implementations shall allow the RDFS classes geosrs:CoordinateSystemAxis to be used in SPARQL graph patterns.

8.4. Coordinate System Properties

REQUIREMENT 11: COORDINATE SYSTEM PROPERTIES

IDENTIFIER	/req/Coordinate_System_Properties
------------	-----------------------------------

REQUIREMENT 11: COORDINATE SYSTEM PROPERTIES

STATEMENT

Implementations shall allow the RDFS properties `geosrs:axis`, `geosrs:axisDirection` to be used in SPARQL graph patterns.

8.4.1. Property: `geosrs:axis`

Table 64 — `geosrs:axis`

URI	https://w3id.org/geosrs/cs/axis
Type	owl:ObjectProperty
Definition	The property relates a coordinate system to one of its axis
Range	Axis
Domain	CoordinateSystem

8.4.2. Property: `geosrs:axisDirection`

Table 65 — `geosrs:axisDirection`

URI	https://w3id.org/geosrs/cs/axisDirection
Type	owl:ObjectProperty
Definition	The direction of an axis. Cf. ISO 19111:2007:2007-07, table 27, attribute coordinate system axis direction.
Range	AxisDirection
Domain	Axis
Example	geosrs:axisDirection

8.5. Coordinate System Types

REQUIREMENT 12: COORDINATE SYSTEM TYPES

IDENTIFIER /req/Coordinate_System_Types

STATEMENT

Implementations shall allow the RDFS classes `geosrs:CoordinateSystem`, `geosrs:AffineCoordinateSystem`, `geosrs:BarycentricCoordinateSystem`, `geosrs:CartesianCoordinateSystem`, `geosrs:CurvilinearCoordinateSystem`, `geosrs:EngineeringCoordinateSystem`, `geosrs:GeodeticCoordinateSystem`, `geosrs:GeographicalCoordinateSystem`, `geosrs:GridCoordinateSystem`, `geosrs:HexagonalCoordinateSystem`, `geosrs:LocalCoordinateSystem`, `geosrs:ObliqueCoordinateSystem`, `geosrs:OrdinalCoordinateSystem`, `geosrs:OrthogonalCoordinateSystem`, `geosrs:ParametricCoordinateSystem`, `geosrs:PlanarCoordinateSystem`, `geosrs:PolarCoordinateSystem`, `geosrs:VerticalCoordinateSystem` to be used in SPARQL graph patterns.

8.5.1. Class: `geosrs:AffineCoordinateSystem`

Table 66 — `geosrs:AffineCoordinateSystem`

URI	https://w3id.org/geosrs/cs/AffineCoordinateSystem
Definition	Coordinate system in Euclidean space with straight axes that are not necessarily mutually perpendicular
Super-classes	<code>CoordinateSystem</code>

8.5.2. Class: `geosrs:BarycentricCoordinateSystem`

Table 67 — `geosrs:BarycentricCoordinateSystem`

URI	https://w3id.org/geosrs/cs/BarycentricCoordinateSystem
Definition	A coordinate system in which the location of a point is specified by reference to a simplex (a triangle for points in a plane, a tetrahedron for points in three-dimensional space, etc.)
Super-classes	<code>CoordinateSystem</code>

8.5.3. Class: `geosrs:CurvilinearCoordinateSystem`

Table 68 — geosrs:CurvilinearCoordinateSystem

URI	https://w3id.org/geosrs/cs/CurvilinearCoordinateSystem
Definition	A coordinate system for the Euclidean space in which the coordinate lines may be curved
Super-classes	CoordinateSystem

8.5.4. Class: geosrs:EngineeringCoordinateSystem

Table 69 — geosrs:EngineeringCoordinateSystem

URI	https://w3id.org/geosrs/cs/EngineeringCoordinateSystem
Definition	Coordinate system used by an engineering coordinate reference system, one of an affine coordinate system, a Cartesian coordinate system, a cylindrical coordinate system, a linear coordinate sytem, an ordinal coordinate system, a polar coordinate system or a spherical coordinate system
Super-classes	CoordinateSystem

8.5.5. Class: geosrs:GeodeticCoordinateSystem

Table 70 — geosrs:GeodeticCoordinateSystem

URI	https://w3id.org/geosrs/cs/GeodeticCoordinateSystem
Definition	Coordinate system used by a Geodetic CRS, one of a Cartesian coordinate system or a spherical coordinate system.
Super-classes	CoordinateSystem

8.5.6. Class: geosrs:GeographicalCoordinateSystem

Table 71 — geosrs:GeographicalCoordinateSystem

URI	https://w3id.org/geosrs/cs/GeographicalCoordinateSystem
-----	---

Definition	Spherical or geodetic coordinate system for measuring and communicating positions directly on Earth as latitude and longitude.
Super-classes	SphericalCoordinateSystem GeodeticCoordinateSystem

8.5.7. Class: geosrs:GridCoordinateSystem

Table 72 — geosrs:GridCoordinateSystem

URI	https://w3id.org/geosrs/cs/GridCoordinateSystem
Definition	A grid coordinate system identifies areas within a grid.
Super-classes	CoordinateSystem

8.5.8. Class: geosrs:HexagonalCoordinateSystem

Table 73 — geosrs:HexagonalCoordinateSystem

URI	https://w3id.org/geosrs/cs/HexagonalCoordinateSystem
Definition	A hexagonal coordinate system identifies areas within a hexagonal lattice.
Super-classes	GridCoordinateSystem

8.5.9. Class: geosrs:LocalCoordinateSystem

Table 74 — geosrs:LocalCoordinateSystem

URI	https://w3id.org/geosrs/cs/LocalCoordinateSystem
Definition	Coordinate system with a point of local reference.
Super-classes	CoordinateSystem

8.5.10. Class: geosrs:ObliqueCoordinateSystem

Table 75 — geosrs:ObliqueCoordinateSystem

URI	https://w3id.org/geosrs/cs/ObliqueCoordinateSystem
Definition	A plane coordinate system whose axes are not perpendicular.
Super-classes	CoordinateSystem

8.5.11. Class: geosrs:OrthogonalCoordinateSystem

Table 76 — geosrs:OrthogonalCoordinateSystem

URI	https://w3id.org/geosrs/cs/OrthogonalCoordinateSystem
Definition	A orthogonal coordinate system is a system of curvilinear coordinates in which each family of surfaces intersects the others at right angles.
Super-classes	CurvilinearCoordinateSystem

8.5.12. Class: geosrs:PlanarCoordinateSystem

Table 77 — geosrs:PlanarCoordinateSystem

URI	https://w3id.org/geosrs/cs/PlanarCoordinateSystem
Definition	A two-dimensional measurement system that locates features on a plane based on their distance from an origin (0,0) along two perpendicular axes.
Super-classes	CoordinateSystem
Example	geosrs:PlanarCoordinateSystem

8.6. Temporal Coordinate Systems

Requirement 13: Temporal Coordinate Systems	
IDENTIFIER	/req/Temporal_Coordinate_Systems
STATEMENT	Implementations shall allow the RDFS classes geosrs:1DCoordinateSystem, geosrs:DateTimeTemporalCoordinateSystem, geosrs:TemporalCountCoordinateSystem, geosrs:TemporalCoordinateSystem, geosrs:TemporalMeasureCoordinateSystem to be used in SPARQL graph patterns.

8.6.1. Class: geosrs:1DCoordinateSystem

The class geosrs:1DCoordinateSystem describes a coordinate system with only one dimension. Often, these definitions include temporal coordinate systems which only represent time using one coordinate system axis.

Table 78 — geosrs:1DCoordinateSystem

URI	https://w3id.org/geosrs/cs/1DCoordinateSystem
Definition	Non-repeating sequence of coordinate system axes that spans a given coordinate space in one dimension
Super-classes	CoordinateSystem

8.6.2. Class: geosrs:DateTimeTemporalCoordinateSystem

Table 79 — geosrs:DateTimeTemporalCoordinateSystem

URI	https://w3id.org/geosrs/cs/DateTimeTemporalCoordinateSystem
Definition	One-dimensional coordinate system used to record time in dateTime representation as defined in ISO 8601.
Super-classes	TemporalCoordinateSystem

8.6.3. Class: geosrs:TemporalCountCoordinateSystem

Table 80 — geosrs:TemporalCountCoordinateSystem

URI	https://w3id.org/geosrs/cs/TemporalCountCoordinateSystem
Definition	One-dimensional coordinate system used to record time as an integer count.
Super-classes	TemporalCoordinateSystem

8.6.4. Class: geosrs:TemporalCoordinateSystem

Table 81 — geosrs:TemporalCoordinateSystem

URI	https://w3id.org/geosrs/cs/TemporalCoordinateSystem
Definition	One-dimensional coordinate system where the axis is time.
Super-classes	1DCoordinateSystem

8.6.5. Class: geosrs:TemporalMeasureCoordinateSystem

Table 82 — geosrs:TemporalMeasureCoordinateSystem

URI	https://w3id.org/geosrs/cs/TemporalMeasureCoordinateSystem
Definition	One-dimensional coordinate system used to record a time as a real number.
Super-classes	TemporalCoordinateSystem

9

DATUM MODULE

This clause establishes the **Datum** Requirements class, with IRI `/req/datum`, which has a corresponding Conformance Class, **Datum**, with IRI `/conf/datum`.

REQUIREMENTS CLASS 4: 09-DATUM_MODULE.ADOC EXTENSION

IDENTIFIER	<code>/req/09-datum_module.adoc</code>
TARGET TYPE	Implementation Specification
REQUIREMENT	<code>/req/Datum_Types</code>
	<code>/req/Datum_Parameters</code>
	<code>/req/Spheroid_Types</code>
	<code>/req/Datum_Properties</code>
	<code>/req/Spheroid_Properties</code>

9.1. Datum Parameters

REQUIREMENT 14: DATUM PARAMETERS

IDENTIFIER	<code>/req/Datum_Parameters</code>
STATEMENT	Implementations shall allow the RDFS classes <code>geosrs:PrimeMeridian</code> , <code>geosrs:DefiningParameter</code> to be used in SPARQL graph patterns.

9.1.1. Class: `geosrs:DefiningParameter`

Table 83 — `geosrs:DefiningParameter`

URI	https://w3id.org/geosrs/datum/DefiningParameter
Definition	Parameter value, an ordered sequence of values, or a reference to a file of parameter values that define

a paramtric datum. Cf. ISO 19111:2019 Geographic information — Referencing by coordinates.

9.2. Datum Properties

REQUIREMENT 15: DATUM PROPERTIES

IDENTIFIER	/req/Datum_Properties
STATEMENT	Implementations shall allow the RDFS properties geosrs:datumDefiningParameter, geosrs:ellipsoid, geosrs:primeMeridian to be used in SPARQL graph patterns.

9.2.1. Property: geosrs:datumDefiningParameter

Table 84 — geosrs:datumDefiningParameter

URI	https://w3id.org/geosrs/datum/datumDefiningParameter
Type	owl:ObjectProperty
Definition	Parameter used to define the parametric datum
Range	DefiningParameter
Domain	ParametricDatum

9.2.2. Property: geosrs:ellipsoid

Table 85 — geosrs:ellipsoid

URI	https://w3id.org/geosrs/datum/ellipsoid
Type	owl:ObjectProperty
Definition	The properties relates a datum to its ellipsoid definition
Range	Ellipsoid

Domain	<u>Datum</u>
Example	<u>geosrs:ellipsoid</u>

9.2.3. Property: geosrs:primeMeridian

Table 86 — geosrs:primeMeridian

URI	<u>https://w3id.org/geosrs/datum/primeMeridian</u>
Type	<u>owl:ObjectProperty</u>
Definition	The prime meridian used by a geodetic datum. Cf. ISO 19111:2007:2007-07, table 34, association role prime Meridian.
Range	<u>PrimeMeridian</u>
Domain	<u>Datum</u>
Example	<u>geosrs:primeMeridian</u>

9.3. Datum Types

REQUIREMENT 16: DATUM TYPES

IDENTIFIER /req/Datum_Types

STATEMENT

Implementations shall allow the RDFS classes geosrs:Datum, geosrs:GeodeticDatum, geosrs:DynamicGeodeticReferenceFrame, geosrs:VerticalDatum, geosrs:DynamicVerticalDatum, geosrs:ParametricDatum, geosrs:EngineeringDatum, geosrs:TemporalDatum, geosrs:DatumEnsemble to be used in SPARQL graph patterns.

9.3.1. Class: geosrs:DynamicGeodeticReferenceFrame

Table 87 — geosrs:DynamicGeodeticReferenceFrame

URI	https://w3id.org/geosrs/datum/DynamicGeodeticReferenceFrame
Definition	Geodetic reference frame in which some of the parameters describe time evolution of defining station coordinates Example: defining station coordinates having linear velocities to account for crustal motion.
Super-classes	GeodeticDatum

9.3.2. Class: geosrs:DynamicVerticalDatum

Table 88 — geosrs:DynamicVerticalDatum

URI	https://w3id.org/geosrs/datum/DynamicVerticalDatum
Definition	Vertical reference frame in which some of the defining parameters have time dependency Example: Defining station heights have velocity to account for post-glacial isostatic rebound motion. Cf. ISO 19111:2019 Geographic information — Referencing by coordinates.
Super-classes	VerticalDatum
Example	geosrs:DynamicVerticalDatum

9.3.3. Class: geosrs:ParametricDatum

Table 89 — geosrs:ParametricDatum

URI	https://w3id.org/geosrs/datum/ParametricDatum
Definition	Textual description and/or a set of parameters identifying a particular reference surface used as the origin of a parametric coordinate system, including its position with respect to the Earth. Cf. ISO 19111:2019 Geographic information — Referencing by coordinates.
Super-classes	Datum

9.3.4. Class: geosrs:EngineeringDatum

Table 90 — geosrs:EngineeringDatum

URI	https://w3id.org/geosrs/datum/EngineeringDatum
Definition	Definition of the origin and orientation of an engineering coordinate reference systemNote: The origin can be fixed with respect to the Earth (such as a defined point at a construction site), or be a defined point on a moving vehicle (such as on a ship or satellite), or a defined point of an image. Cf. ISO 19111:2019 Geographic information — Referencing by coordinates.
Super-classes	Datum

9.3.5. Class: geosrs:TemporalDatum

Table 91 — geosrs:TemporalDatum

URI	https://w3id.org/geosrs/datum/TemporalDatum
Definition	Definition of the relationship of a temporal coordinate system to an objectNote: The object is normally time on the Earth. Cf. ISO 19111:2019 Geographic information — Referencing by coordinates.
Super-classes	Datum

9.3.6. Class: geosrs:DatumEnsemble

Table 92 — geosrs:DatumEnsemble

URI	https://w3id.org/geosrs/datum/DatumEnsemble
Definition	A collection of two or more datums (or if geodetic or vertical, a collection of two or more reference frames) that are realizations of one Conventional Reference System and which for all but the highest accuracy requirements may be considered to be insignificantly different from each other. Note: Within the datum ensemble every frame or datum is constrained to be

a realization of the same reference system. Cf. ISO 19111:2019 Geographic information — Referencing by coordinates.

9.4. Spheroid Properties

REQUIREMENT 17: SPHEROID PROPERTIES

IDENTIFIER	/req/Spheroid_Properties
STATEMENT	Implementations shall allow the RDFS properties geosrs:eccentricity, geosrs:inverseFlattening, geosrs:isSphere, geosrs:semiMajorAxis, geosrs:semiMinorAxis to be used in SPARQL graph patterns.

9.4.1. Property: geosrs:eccentricity

Table 93 — geosrs:eccentricity

URI	https://w3id.org/geosrs/datum/eccentricity
Type	owl:DatatypeProperty
Definition	A measure of how much an ellipse deviates from a perfect circle.
Range	xsd:double
Domain	Ellipsoid
Example	geosrs:eccentricity

9.4.2. Property: geosrs:inverseFlattening

Table 94 — geosrs:inverseFlattening

URI	https://w3id.org/geosrs/datum/inverseFlattening
Type	owl:DatatypeProperty

Definition	Indicates the inverse flattening value of an ellipsoid, expressed as a number or a ratio (percentage rate, parts per million, etc.). Cf. ISO 19111:2007:2007-07, table 37, attribute inverse flattening
Range	xsd:double
Domain	Ellipsoid
Example	geosrs:inverseFlattening

9.4.3. Property: geosrs:isSphere

Table 95 — geosrs:isSphere

URI	https://w3id.org/geosrs/datum/isSphere
Type	owl:DatatypeProperty
Definition	Indicates whether the ellipsoid is a sphere. Cf. ISO 19111:2007:2007-07, table 37, attribute ellipsoid=sphere indicator.
Range	xsd:boolean
Domain	Ellipsoid
Example	geosrs:isSphere

9.4.4. Property: geosrs:semiMajorAxis

Table 96 — geosrs:semiMajorAxis

URI	https://w3id.org/geosrs/datum/semiMajorAxis
Type	owl:DatatypeProperty
Definition	Indicates the length of the semi major axis of an ellipsoid. Cf. ISO 19111:2007:2007-07, table 36, attribute length of semi-major axis.
Range	xsd:double

Domain	Ellipsoid
Example	geosrs:semiMajorAxis

9.4.5. Property: geosrs:semiMinorAxis

Table 97 — geosrs:semiMinorAxis

URI	https://w3id.org/geosrs/datum/semiMinorAxis
Type	owl:DatatypeProperty
Definition	Indicates the length of the semi minor axis of an ellipsoid. Cf. ISO 19111:2007:2007-07, table 37, attribute length of semi-minor axis.
Range	xsd:double
Domain	Ellipsoid
Example	geosrs:semiMinorAxis

9.5. Spheroid Types

REQUIREMENT 18: SPHEROID TYPES

IDENTIFIER	/req/Spheroid_Types
STATEMENT	Implementations shall allow the RDFS classes geosrs:Ellipsoid, geosrs:TriaxialEllipsoid to be used in SPARQL graph patterns.

9.5.1. Class: geosrs:TriaxialEllipsoid

Table 98 — geosrs:TriaxialEllipsoid

URI	https://w3id.org/geosrs/datum/TriaxialEllipsoid
-----	---

Definition

Surface of an analytic ellipsoid defined by three axes of different length. Also referred as scalene ellipsoid.

10

SRS APPLICATION MODULE

This clause establishes the **SRSAPP** Requirements class, with IRI `/req/srsapp`, which has a corresponding Conformance Class, **SRSAPP**, with IRI `/conf/srsapp`.

REQUIREMENTS CLASS 5: 10-SRSAPPLICATION_MODULE.ADOC EXTENSION

IDENTIFIER	<code>/req/10-srsapplication_module.adoc</code>
TARGET TYPE	Implementation Specification
REQUIREMENT	<code>/req/SRS_Application_Types</code> <code>/req/Map_Types</code>

10.1. Map Types

REQUIREMENT 19: MAP TYPES

IDENTIFIER	<code>/req/Map_Types</code>
STATEMENT	Implementations shall allow the RDFS classes <code>geosrs:CadastreMap</code> , <code>geosrs:NauticalChart</code> , <code>geosrs:ThematicMap</code> , <code>geosrs:TopographicMap</code> , <code>geosrs:WeatherMap</code> to be used in SPARQL graph patterns.

10.1.1. Class: `geosrs:CadastreMap`

Table 99 — `geosrs:CadastreMap`

URI	https://w3id.org/geosrs/application/CadastreMap
Definition	A map displaying a cadastre.
Super-classes	<code>SRSApplication</code>
Example	<code>geosrs:CadastreMap</code>

10.1.2. Class: geosrs:NauticalChart

Table 100 — geosrs:NauticalChart

URI	https://w3id.org/geosrs/application/NauticalChart
Definition	A graphic representation of a sea area and adjacent coastal regions.
Super-classes	SRSAApplication

10.1.3. Class: geosrs:ThematicMap

Table 101 — geosrs:ThematicMap

URI	https://w3id.org/geosrs/application/ThematicMap
Definition	A map used to highlight a specific phenomenon.
Super-classes	SRSAApplication

10.1.4. Class: geosrs:TopographicMap

Table 102 — geosrs:TopographicMap

URI	https://w3id.org/geosrs/application/TopographicMap
Definition	A type of map characterized by large-scale detail and quantitative representation of relief.
Super-classes	SRSAApplication
Example	geosrs:TopographicMap

10.1.5. Class: geosrs:WeatherMap

Table 103 — geosrs:WeatherMap

URI	https://w3id.org/geosrs/application/WeatherMap
Definition	A map for showing the local direction in which weather systems are moving.
Super-classes	SRSApplication

10.2. SRS Application Types

REQUIREMENT 20: SRS APPLICATION TYPES

IDENTIFIER /req/SRS_Application_Types

STATEMENT

Implementations shall allow the RDFS classes geosrs:SRSApplication, geosrs:SpatialReferencing, geosrs:EngineeringSurvey, geosrs:SatelliteSurvey, geosrs:SatelliteNavigation, geosrs:Coastal Hydrography, geosrs:OffshoreEngineering, geosrs:Hydrography, geosrs:Drilling, geosrs:OilAndGas Exploration to be used in SPARQL graph patterns.

10.2.1. Class: geosrs:SRSApplication

Table 104 — geosrs:SRSApplication

URI	https://w3id.org/geosrs/application/SRSApplication
Definition	An application for which a spatial reference system is used.

10.2.2. Class: geosrs:SpatialReferencing

Table 105 — geosrs:SpatialReferencing

URI	https://w3id.org/geosrs/application/SpatialReferencing
Super-classes	SRSApplication

10.2.3. Class: geosrs:EngineeringSurvey

Table 106 — geosrs:EngineeringSurvey

URI	https://w3id.org/geosrs/application/EngineeringSurvey
Super-classes	SRSAApplication
Example	geosrs:EngineeringSurvey

10.2.4. Class: geosrs:SatelliteSurvey

Table 107 — geosrs:SatelliteSurvey

URI	https://w3id.org/geosrs/application/SatelliteSurvey
Super-classes	SRSAApplication

10.2.5. Class: geosrs:SatelliteNavigation

Table 108 — geosrs:SatelliteNavigation

URI	https://w3id.org/geosrs/application/SatelliteNavigation
Super-classes	SRSAApplication

10.2.6. Class: geosrs:CoastalHydrography

Table 109 — geosrs:CoastalHydrography

URI	https://w3id.org/geosrs/application/CoastalHydrography
Super-classes	SRSAApplication
Example	geosrs:CoastalHydrography

10.2.7. Class: geosrs:OffshoreEngineering

Table 110 — geosrs:OffshoreEngineering

URI	https://w3id.org/geosrs/application/OffshoreEngineering
Super-classes	SRSAApplication
Example	<code>geosrs:OffshoreEngineering</code>

10.2.8. Class: geosrs:Hydrography

Table 111 — geosrs:Hydrography

URI	https://w3id.org/geosrs/application/Hydrography
Super-classes	SRSAApplication
Example	<code>geosrs:Hydrography</code>

10.2.9. Class: geosrs:Drilling

Table 112 — geosrs:Drilling

URI	https://w3id.org/geosrs/application/Drilling
Super-classes	SRSAApplication
Example	<code>geosrs:Drilling</code>

10.2.10. Class: geosrs:OilAndGasExploration

Table 113 — geosrs:OilAndGasExploration

URI	https://w3id.org/geosrs/application/OilAndGasExploration
-----	---



11

PROJECTIONS MODULE

This clause establishes the **PROJ** Requirements class, with IRI `/req/proj`, which has a corresponding Conformance Class, **PROJ**, with IRI `/conf/proj`.

REQUIREMENTS CLASS 6: 11-PROJECTIONS_MODULE.ADOC EXTENSION

IDENTIFIER	<code>/req/11-projections_module.adoc</code>
TARGET TYPE	Implementation Specification
REQUIREMENT	<code>/req/Lenticular_Projections</code>
	<code>/req/Conformal_Projections</code>
	<code>/req/Minimum_Error_Projections</code>
	<code>/req/Pseudo_Azimuthal_Projections</code>
	<code>/req/Equal_Area_Projections</code>
	<code>/req/Pseudo_Conical_Projections</code>
	<code>/req/Globular_Projections</code>
	<code>/req/Pseudo_Cylindrical_Projections</code>
	<code>/req/Cylindrical_Projections</code>
	<code>/req/Compromise_Projections</code>
	<code>/req/Polyhedral_Projections</code>
	<code>/req/Equidistant_Projections</code>
	<code>/req/Conical_Projections</code>
	<code>/req/Azimuthal_Projections</code>
	<code>/req/Perspective_Projections</code>
	<code>/req/Polyconic_Projections</code>
	<code>/req/Stereographic_Projections</code>

11.1. Azimuthal Projections

Requirement 21: Azimuthal Projections	
IDENTIFIER	/req/Azimuthal_Projections
STATEMENT	Implementations shall allow the RDFS classes geosrs:BreusingGeometricProjection, geosrs:BreusingHarmonicProjection, geosrs:GinzburgIIProjection, geosrs:GinzburgIProjection, geosrs:GnomonicProjection, geosrs:JamesAzimuthalProjection to be used in SPARQL graph patterns.

11.1.1. Class: geosrs:BreusingGeometricProjection

Table 114 — geosrs:BreusingGeometricProjection

URI	https://w3id.org/geosrs/projection/BreusingGeometricProjection
Super-classes	AzimuthalProjection

11.1.2. Class: geosrs:BreusingHarmonicProjection

Table 115 — geosrs:BreusingHarmonicProjection

URI	https://w3id.org/geosrs/projection/BreusingHarmonicProjection
Super-classes	AzimuthalProjection

11.1.3. Class: geosrs:GinzburgIIProjection

Table 116 — geosrs:GinzburgIIProjection

URI	https://w3id.org/geosrs/projection/GinzburgIIProjection
Super-classes	AzimuthalProjection

11.1.4. Class: geosrs:GinzburgIProjection

Table 117 — geosrs:GinzburgIProjection

URI	https://w3id.org/geosrs/projection/GinzburgIProjection
Super-classes	AzimuthalProjection

11.1.5. Class: geosrs:GnomonicProjection

Table 118 — geosrs:GnomonicProjection

URI	https://w3id.org/geosrs/projection/GnomonicProjection
Super-classes	AzimuthalProjection

11.1.6. Class: geosrs:JamesAzimuthalProjection

Table 119 — geosrs:JamesAzimuthalProjection

URI	https://w3id.org/geosrs/projection/JamesAzimuthalProjection
Super-classes	AzimuthalProjection

11.2. Compromise Projections

REQUIREMENT 22: COMPROMISE PROJECTIONS

IDENTIFIER /req/Compromise_Projections

STATEMENT

Implementations shall allow the RDFS classes geosrs:ArmadilloProjection, geosrs:BakerDinomic Projection, geosrs:BertinProjection, geosrs:ChamberlinTrimetricProjection, geosrs:DenoyerSemi EllipticalProjection, geosrs:FairgrieveProjection, geosrs:LarriveeProjection, geosrs:PetermannStar Projection, geosrs:SpilhausOceanicProjection, geosrs:VanDerGrintenIIIProjection, geosrs:Winkel

REQUIREMENT 22: COMPROMISE PROJECTIONS

IIProjection, geosrs:WinkelIIProjection, geosrs:WinkelSnyderProjection to be used in SPARQL graph patterns.

11.2.1. Class: geosrs:ArmadilloProjection

Table 120 — geosrs:ArmadilloProjection

URI	https://w3id.org/geosrs/projection/ArmadilloProjection
Super-classes	CompromiseProjection

11.2.2. Class: geosrs:BakerDinomicProjection

Table 121 — geosrs:BakerDinomicProjection

URI	https://w3id.org/geosrs/projection/BakerDinomicProjection
Super-classes	CompromiseProjection

11.2.3. Class: geosrs:BertinProjection

Table 122 — geosrs:BertinProjection

URI	https://w3id.org/geosrs/projection/BertinProjection
Super-classes	CompromiseProjection

11.2.4. Class: geosrs:ChamberlinTrimetricProjection

Table 123 — geosrs:ChamberlinTrimetricProjection

URI	https://w3id.org/geosrs/projection/ChamberlinTrimetricProjection
Super-classes	CompromiseProjection

11.2.5. Class: geosrs:DenoyerSemiEllipticalProjection

Table 124 — geosrs:DenoyerSemiEllipticalProjection

URI	https://w3id.org/geosrs/projection/DenoyerSemiEllipticalProjection
Super-classes	CompromiseProjection

11.2.6. Class: geosrs:FairgrieveProjection

Table 125 — geosrs:FairgrieveProjection

URI	https://w3id.org/geosrs/projection/FairgrieveProjection
Super-classes	CompromiseProjection

11.2.7. Class: geosrs:LarriveeProjection

Table 126 — geosrs:LarriveeProjection

URI	https://w3id.org/geosrs/projection/LarriveeProjection
Super-classes	CompromiseProjection

11.2.8. Class: geosrs:PetermannStarProjection

Table 127 — geosrs:PetermannStarProjection

URI	https://w3id.org/geosrs/projection/PetermannStarProjection
Super-classes	CompromiseProjection

11.2.9. Class: geosrs:SpilhausOceanicProjection

Table 128 — geosrs:SpilhausOceanicProjection

URI	https://w3id.org/geosrs/projection/SpilhausOceanicProjection
Super-classes	CompromiseProjection

11.2.10. Class: geosrs:VanDerGrintenIIIProjection

Table 129 — geosrs:VanDerGrintenIIIProjection

URI	https://w3id.org/geosrs/projection/VanDerGrintenIIIProjection
Super-classes	CompromiseProjection

11.2.11. Class: geosrs:WinkelIIIProjection

Table 130 — geosrs:WinkelIIIProjection

URI	https://w3id.org/geosrs/projection/WinkelIIIProjection
Super-classes	CompromiseProjection

11.2.12. Class: geosrs:WinkelIProjection

Table 131 — geosrs:WinkelIProjection

URI	https://w3id.org/geosrs/projection/WinkelIProjection
Super-classes	CompromiseProjection

11.2.13. Class: geosrs:WinkelSnyderProjection

Table 132 — geosrs:WinkelSnyderProjection

URI	https://w3id.org/geosrs/projection/WinkelSnyderProjection
-----	---

Super-classes	CompromiseProjection
---------------	--------------------------------------

11.3. Conformal Projections

REQUIREMENT 23: CONFORMAL PROJECTIONS

IDENTIFIER /req/Conformal_Projections

STATEMENT Implementations shall allow the RDFS classes geosrs:AdamsProjection, geosrs:AdamsWorldInASquarellProjection, geosrs:AdamsWorldInASquarelProjection, geosrs:AugustEpicycloidalProjection, geosrs:CoxConformalProjection, geosrs:EisenlohrProjection, geosrs:GS50Projection, geosrs:PeirceQuincuncialProjection, geosrs:StereographicProjection to be used in SPARQL graph patterns.

11.3.1. Class: geosrs:AdamsProjection

Table 133 — geosrs:AdamsProjection

URI	https://w3id.org/geosrs/projection/AdamsProjection
Super-classes	ConformalProjection

11.3.2. Class: geosrs:AdamsWorldInASquarellProjection

Table 134 — geosrs:AdamsWorldInASquarellProjection

URI	https://w3id.org/geosrs/projection/AdamsWorldInASquarellProjection
Super-classes	ConformalProjection

11.3.3. Class: geosrs:AdamsWorldInASquarelProjection

Table 135 — geosrs:AdamsWorldInASquareProjection

URI	https://w3id.org/geosrs/projection/AdamsWorldInASquareProjection
Super-classes	ConformalProjection

11.3.4. Class: geosrs:AugustEpicycloidalProjection

Table 136 — geosrs:AugustEpicycloidalProjection

URI	https://w3id.org/geosrs/projection/AugustEpicycloidalProjection
Definition	A projection in which every angle between two curves that cross each other on a celestial body is preserved in the image of the projection
Super-classes	ConformalProjection

11.3.5. Class: geosrs:CoxConformalProjection

Table 137 — geosrs:CoxConformalProjection

URI	https://w3id.org/geosrs/projection/CoxConformalProjection
Super-classes	ConformalProjection

11.3.6. Class: geosrs:EisenlohrProjection

Table 138 — geosrs:EisenlohrProjection

URI	https://w3id.org/geosrs/projection/EisenlohrProjection
Super-classes	ConformalProjection

11.3.7. Class: geosrs:GS50Projection

Table 139 — geosrs:GS50Projection

URI	https://w3id.org/geosrs/projection/GS50Projection
Super-classes	ConformalProjection

11.3.8. Class: geosrs:PeirceQuincuncialProjection

Table 140 — geosrs:PeirceQuincuncialProjection

URI	https://w3id.org/geosrs/projection/PeirceQuincuncialProjection
Super-classes	ConformalProjection

11.3.9. Class: geosrs:StereographicProjection

Table 141 — geosrs:StereographicProjection

URI	https://w3id.org/geosrs/projection/StereographicProjection
Super-classes	ConformalProjection
Example	geosrs:StereographicProjection

11.4. Conical Projections

REQUIREMENT 24: CONICAL PROJECTIONS

IDENTIFIER /req/Conical_Projections

STATEMENT

Implementations shall allow the RDFS classes geosrs:BipolarObliqueConicConformalProjection, geosrs:CentralConicProjection, geosrs:HerschelConformalConicProjection, geosrs:Krovak, geosrs:LambertConformalConicProjection, geosrs:MurdochIIIProjection, geosrs:MurdochIIProjection, geosrs:MurdochIProjection, geosrs:SchjernerIProjection, geosrs:VitkovskyIProjection to be used in SPARQL graph patterns.

11.4.1. Class: geosrs:BipolarObliqueConicConformalProjection

Table 142 — geosrs:BipolarObliqueConicConformalProjection

URI	https://w3id.org/geosrs/projection/BipolarObliqueConicConformalProjection
Super-classes	ConicalProjection

11.4.2. Class: geosrs:CentralConicProjection

Table 143 — geosrs:CentralConicProjection

URI	https://w3id.org/geosrs/projection/CentralConicProjection
Super-classes	ConicalProjection

11.4.3. Class: geosrs:HerschelConformalConicProjection

Table 144 — geosrs:HerschelConformalConicProjection

URI	https://w3id.org/geosrs/projection/HerschelConformalConicProjection
Super-classes	ConicalProjection

11.4.4. Class: geosrs:Krovak

Table 145 — geosrs:Krovak

URI	https://w3id.org/geosrs/projection/Krovak
Super-classes	ConicalProjection
Example	geosrs:Krovak

11.4.5. Class: geosrs:LambertConformalConicProjection

Table 146 — geosrs:LambertConformalConicProjection

URI	https://w3id.org/geosrs/projection/LambertConformalConicProjection
Super-classes	ConicalProjection

11.4.6. Class: geosrs:MurdochIIIProjection

Table 147 — geosrs:MurdochIIIProjection

URI	https://w3id.org/geosrs/projection/MurdochIIIProjection
Super-classes	ConicalProjection

11.4.7. Class: geosrs:MurdochIIProjection

Table 148 — geosrs:MurdochIIProjection

URI	https://w3id.org/geosrs/projection/MurdochIIProjection
Super-classes	ConicalProjection

11.4.8. Class: geosrs:MurdochIProjection

Table 149 — geosrs:MurdochIProjection

URI	https://w3id.org/geosrs/projection/MurdochIProjection
Super-classes	ConicalProjection

11.4.9. Class: geosrs:SchjerningIProjection

Table 150 — geosrs:SchjerningIProjection

URI	https://w3id.org/geosrs/projection/SchjerningIProjection
Super-classes	ConicalProjection

11.4.10. Class: geosrs:VitkovskylProjection

Table 151 — geosrs:VitkovskylProjection

URI	https://w3id.org/geosrs/projection/VitkovskylProjection
Super-classes	ConicalProjection

11.5. Cylindrical Projections

REQUIREMENT 25: CYLINDRICAL PROJECTIONS

IDENTIFIER /req/Cylindrical_Projections

STATEMENT

Implementations shall allow the RDFS classes geosrs:ArdenCloseProjection, geosrs:BraunPerspectiveProjection, geosrs:CompactMillerProjection, geosrs:CylindricalStereographicProjection, geosrs:KarchenkoShabanovaProjection, geosrs:LabordeProjection, geosrs:MercatorProjection, geosrs:MillerProjection, geosrs:PattersonCylindricalProjection, geosrs:PavlovProjection, geosrs:ToblerCylindricalIIIProjection, geosrs:ToblerCylindricalIIProjection, geosrs:UrmayevIIIProjection, geosrs:WebMercatorProjection to be used in SPARQL graph patterns.

11.5.1. Class: geosrs:ArdenCloseProjection

Table 152 — geosrs:ArdenCloseProjection

URI	https://w3id.org/geosrs/projection/ArdenCloseProjection
Super-classes	CylindricalProjection

11.5.2. Class: geosrs:BraunPerspectiveProjection

Table 153 — geosrs:BraunPerspectiveProjection

URI	https://w3id.org/geosrs/projection/BraunPerspectiveProjection
Super-classes	CylindricalProjection

11.5.3. Class: geosrs:CompactMillerProjection

Table 154 — geosrs:CompactMillerProjection

URI	https://w3id.org/geosrs/projection/CompactMillerProjection
Super-classes	CylindricalProjection

11.5.4. Class: geosrs:CylindricalStereographicProjection

Table 155 — geosrs:CylindricalStereographicProjection

URI	https://w3id.org/geosrs/projection/CylindricalStereographicProjection
Super-classes	CylindricalProjection

11.5.5. Class: geosrs:KarchenkoShabanovaProjection

Table 156 — geosrs:KarchenkoShabanovaProjection

URI	https://w3id.org/geosrs/projection/KarchenkoShabanovaProjection
Super-classes	CylindricalProjection

11.5.6. Class: geosrs:LabordeProjection

Table 157 — geosrs:LabordeProjection

URI	https://w3id.org/geosrs/projection/LabordeProjection
Super-classes	CylindricalProjection
Example	geosrs:LabordeProjection

11.5.7. Class: geosrs:MercatorProjection

Table 158 — geosrs:MercatorProjection

URI	https://w3id.org/geosrs/projection/MercatorProjection
Super-classes	CylindricalProjection
Example	geosrs:MercatorProjection

11.5.8. Class: geosrs:MillerProjection

Table 159 — geosrs:MillerProjection

URI	https://w3id.org/geosrs/projection/MillerProjection
Super-classes	CylindricalProjection

11.5.9. Class: geosrs:PattersonCylindricalProjection

Table 160 — geosrs:PattersonCylindricalProjection

URI	https://w3id.org/geosrs/projection/PattersonCylindricalProjection
Super-classes	CylindricalProjection

11.5.10. Class: geosrs:PavlovProjection

Table 161 — geosrs:PavlovProjection

URI	https://w3id.org/geosrs/projection/PavlovProjection
Super-classes	CylindricalProjection

11.5.11. Class: geosrs:ToblerCylindricalIIIProjection

Table 162 — geosrs:ToblerCylindricalIIIProjection

URI	https://w3id.org/geosrs/projection/ToblerCylindricalIIIProjection
Super-classes	CylindricalProjection

11.5.12. Class: geosrs:ToblerCylindricalIIProjection

Table 163 — geosrs:ToblerCylindricalIIProjection

URI	https://w3id.org/geosrs/projection/ToblerCylindricalIIProjection
Super-classes	CylindricalProjection

11.5.13. Class: geosrs:UrmayevIIIProjection

Table 164 — geosrs:UrmayevIIIProjection

URI	https://w3id.org/geosrs/projection/UrmayevIIIProjection
Super-classes	CylindricalProjection

11.5.14. Class: geosrs:WebMercatorProjection

Table 165 — geosrs:WebMercatorProjection

URI	https://w3id.org/geosrs/projection/WebMercatorProjection
-----	---

11.6. Equal Area Projections

REQUIREMENT 26: EQUAL AREA PROJECTIONS

IDENTIFIER /req/Equal_Area_Projections

STATEMENT

Implementations shall allow the RDFS classes `geosrs:AlbersEqualAreaProjection`, `geosrs:AzimuthalEqualAreaProjection`, `geosrs:CylindricalEqualArea`, `geosrs:GallPetersProjection`, `geosrs:HoboDyerProjection`, `geosrs:LambertAzimuthalEqualArea`, `geosrs:TrystanEdwardsProjection`, `geosrs:WiechelProjection` to be used in SPARQL graph patterns.

11.6.1. Class: `geosrs:AlbersEqualAreaProjection`

Table 166 — `geosrs:AlbersEqualAreaProjection`

URI	https://w3id.org/geosrs/projection/AlbersEqualAreaProjection
Super-classes	EqualAreaProjection
Example	<code>geosrs:AlbersEqualAreaProjection</code>

11.6.2. Class: `geosrs:AzimuthalEqualAreaProjection`

Table 167 — `geosrs:AzimuthalEqualAreaProjection`

URI	https://w3id.org/geosrs/projection/AzimuthalEqualAreaProjection
Super-classes	EqualAreaProjection

11.6.3. Class: `geosrs:CylindricalEqualArea`

Table 168 — geosrs:CylindricalEqualArea

URI	https://w3id.org/geosrs/projection/CylindricalEqualArea
Super-classes	EqualAreaProjection
Example	geosrs:CylindricalEqualArea

11.6.4. Class: geosrs:GallPetersProjection

Table 169 — geosrs:GallPetersProjection

URI	https://w3id.org/geosrs/projection/GallPetersProjection
Super-classes	EqualAreaProjection

11.6.5. Class: geosrs:HoboDyerProjection

Table 170 — geosrs:HoboDyerProjection

URI	https://w3id.org/geosrs/projection/HoboDyerProjection
Super-classes	EqualAreaProjection

11.6.6. Class: geosrs:LambertAzimuthalEqualArea

Table 171 — geosrs:LambertAzimuthalEqualArea

URI	https://w3id.org/geosrs/projection/LambertAzimuthalEqualArea
Super-classes	EqualAreaProjection

11.6.7. Class: geosrs:TrystanEdwardsProjection

Table 172 — geosrs:TrystanEdwardsProjection

URI	https://w3id.org/geosrs/projection/TrystanEdwardsProjection
-----	---

Super-classes

[EqualAreaProjection](#)

11.6.8. Class: geosrs:WiechelProjection

Table 173 — geosrs:WiechelProjection

URI	https://w3id.org/geosrs/projection/WichelProjection
Super-classes	EqualAreaProjection

11.7. Equidistant Projections

REQUIREMENT 27: EQUIDISTANT PROJECTIONS

IDENTIFIER /req/Equidistant_Projections

STATEMENT Implementations shall allow the RDFS classes geosrs:AzimuthalEquidistantProjection, geosrs:BerghausStarProjection, geosrs:CassiniProjection, geosrs:EquidistantConicProjection, geosrs:EquidistantCylindricalProjection, geosrs:EquirectangularProjection, geosrs:ObliquePlateCarreeProjection, geosrs:PlateCarreeProjection, geosrs:TwoPointEquidistantProjection to be used in SPARQL graph patterns.

11.7.1. Class: geosrs:AzimuthalEquidistantProjection

Table 174 — geosrs:AzimuthalEquidistantProjection

URI	https://w3id.org/geosrs/projection/AzimuthalEquidistantProjection
Super-classes	EquidistantProjection
Example	geosrs:AzimuthalEquidistantProjection

11.7.2. Class: geosrs:BerghausStarProjection

Table 175 — geosrs:BerghausStarProjection

URI	https://w3id.org/geosrs/projection/BerghausStarProjection
Super-classes	EquidistantProjection

11.7.3. Class: geosrs:CassiniProjection

Table 176 — geosrs:CassiniProjection

URI	https://w3id.org/geosrs/projection/CassiniProjection
Definition	A map projection first described in an approximate form by César-François Cassini de Thury in 1745
Super-classes	EquidistantProjection
Example	geosrs:CassiniProjection

11.7.4. Class: geosrs:EquidistantConicProjection

Table 177 — geosrs:EquidistantConicProjection

URI	https://w3id.org/geosrs/projection/EquidistantConicProjection
Super-classes	EquidistantProjection

11.7.5. Class: geosrs:EquidistantCylindricalProjection

Table 178 — geosrs:EquidistantCylindricalProjection

URI	https://w3id.org/geosrs/projection/EquidistantCylindricalProjection
Super-classes	EquidistantProjection
Example	geosrs:EquidistantCylindricalProjection

11.7.6. Class: geosrs:EquirectangularProjection

Table 179 — geosrs:EquirectangularProjection

URI	https://w3id.org/geosrs/projection/EquirectangularProjection
Super-classes	EquidistantProjection

11.7.7. Class: geosrs:ObliquePlateCarreeProjection

Table 180 — geosrs:ObliquePlateCarreeProjection

URI	https://w3id.org/geosrs/projection/ObliquePlateCarreeProjection
Super-classes	EquidistantProjection

11.7.8. Class: geosrs:PlateCarreeProjection

Table 181 — geosrs:PlateCarreeProjection

URI	https://w3id.org/geosrs/projection/PlateCarreeProjection
Super-classes	EquidistantProjection

11.7.9. Class: geosrs:TwoPointEquidistantProjection

Table 182 — geosrs:TwoPointEquidistantProjection

URI	https://w3id.org/geosrs/projection/TwoPointEquidistantProjection
Super-classes	EquidistantProjection

11.8. Globular Projections

REQUIREMENT 28: GLOBULAR PROJECTIONS

IDENTIFIER	/req/Globular_Projections
STATEMENT	Implementations shall allow the RDFS classes geosrs:ApianGlobularIProjection, geosrs:BaconGlobularProjection, geosrs:FournierGlobularIProjection to be used in SPARQL graph patterns.

11.8.1. Class: geosrs:ApianGlobularIProjection

Table 183 — geosrs:ApianGlobularIProjection

URI	https://w3id.org/geosrs/projection/ApianGlobularIProjection
Super-classes	GlobularProjection

11.8.2. Class: geosrs:BaconGlobularProjection

Table 184 — geosrs:BaconGlobularProjection

URI	https://w3id.org/geosrs/projection/BaconGlobularProjection
Super-classes	GlobularProjection

11.8.3. Class: geosrs:FournierGlobularIProjection

Table 185 — geosrs:FournierGlobularIProjection

URI	https://w3id.org/geosrs/projection/FournierGlobularIProjection
Super-classes	GlobularProjection

11.9. Lenticular Projections

REQUIREMENT 29: LENTICULAR PROJECTIONS

IDENTIFIER	/req/Lenticular_Projections
STATEMENT	Implementations shall allow the RDFS classes geosrs:A4Projection, geosrs:BriesemeisterProjection, geosrs:CiricIProjection, geosrs:CupolaProjection, geosrs:DedistortProjection, geosrs:DietrichKitadaProjection, geosrs:FranculaIIIProjection, geosrs:FranculaIVProjection, geosrs:FranculaIXProjection, geosrs:FranculaVIIIProjection, geosrs:FranculaVProjection, geosrs:FranculaXIIIProjection, geosrs:FranculaXIIProjection, geosrs:FranculaXIVProjection, geosrs:HamusoidalProjection, geosrs:KissProjection to be used in SPARQL graph patterns.

11.9.1. Class: geosrs:A4Projection

Table 186 — geosrs:A4Projection

URI	https://w3id.org/geosrs/projection/A4Projection
Super-classes	LenticularProjection

11.9.2. Class: geosrs:BriesemeisterProjection

Table 187 — geosrs:BriesemeisterProjection

URI	https://w3id.org/geosrs/projection/BriesemeisterProjection
Super-classes	LenticularProjection

11.9.3. Class: geosrs:CiricIProjection

Table 188 — geosrs:CiricIProjection

URI	https://w3id.org/geosrs/projection/CiricIProjection
Super-classes	LenticularProjection

11.9.4. Class: geosrs:CupolaProjection

Table 189 — geosrs:CupolaProjection

URI	https://w3id.org/geosrs/projection/CupolaProjection
Super-classes	LenticularProjection

11.9.5. Class: geosrs:DedistortProjection

Table 190 — geosrs:DedistortProjection

URI	https://w3id.org/geosrs/projection/DedistortProjection
Super-classes	LenticularProjection

11.9.6. Class: geosrs:DietrichKitadaProjection

Table 191 — geosrs:DietrichKitadaProjection

URI	https://w3id.org/geosrs/projection/DietrichKitadaProjection
Super-classes	LenticularProjection

11.9.7. Class: geosrs:FranculaIIIProjection

Table 192 — geosrs:FranculaIIIProjection

URI	https://w3id.org/geosrs/projection/FranculaIIIProjection
Super-classes	LenticularProjection

11.9.8. Class: geosrs:FranculaIVProjection

Table 193 — geosrs:FraculaIVProjection

URI	https://w3id.org/geosrs/projection/FraculaIVProjection
Super-classes	LenticularProjection

11.9.9. Class: geosrs:FraculaIXProjection

Table 194 — geosrs:FraculaIXProjection

URI	https://w3id.org/geosrs/projection/FraculaIXProjection
Super-classes	LenticularProjection

11.9.10. Class: geosrs:FraculaVIIIProjection

Table 195 — geosrs:FraculaVIIIProjection

URI	https://w3id.org/geosrs/projection/FraculaVIIIProjection
Super-classes	LenticularProjection

11.9.11. Class: geosrs:FraculaVProjection

Table 196 — geosrs:FraculaVProjection

URI	https://w3id.org/geosrs/projection/FraculaVProjection
Super-classes	LenticularProjection

11.9.12. Class: geosrs:FraculaXIIIProjection

Table 197 — geosrs:FraculaXIIIProjection

URI	https://w3id.org/geosrs/projection/FraculaXIIIProjection
Super-classes	LenticularProjection

11.9.13. Class: geosrs:FranculaXIIProjection

Table 198 — geosrs:FranculaXIIProjection

URI	https://w3id.org/geosrs/projection/FranculaXIIProjection
Super-classes	LenticularProjection

11.9.14. Class: geosrs:FranculaXIVProjection

Table 199 — geosrs:FranculaXIVProjection

URI	https://w3id.org/geosrs/projection/FranculaXIVProjection
Super-classes	LenticularProjection

11.9.15. Class: geosrs:HamusoidalProjection

Table 200 — geosrs:HamusoidalProjection

URI	https://w3id.org/geosrs/projection/HamusoidalProjection
Super-classes	LenticularProjection

11.9.16. Class: geosrs:KissProjection

Table 201 — geosrs:KissProjection

URI	https://w3id.org/geosrs/projection/KissProjection
Super-classes	LenticularProjection

11.10. Minimum Error Projections

Requirement 30: Minimum Error Projections	
IDENTIFIER	/req/Minimum_Error_Projections
STATEMENT	Implementations shall allow the RDFS classes geosrs:AiryProjection to be used in SPARQL graph patterns.

11.10.1. Class: geosrs:AiryProjection

Table 202 — geosrs:AiryProjection

URI	https://w3id.org/geosrs/projection/AiryProjection
Definition	An azimuthal minimum error projection for the region within the small or great circle defined by an angular distance, from the tangency point of the plane
Super-classes	MinimumErrorProjection
Example	geosrs:AiryProjection

11.11. Perspective Projections

Requirement 31: Perspective Projections	
IDENTIFIER	/req/Perspective_Projections
STATEMENT	Implementations shall allow the RDFS classes geosrs:CentralCylindricalProjection, geosrs:GeneralVerticalPerspectiveProjection, geosrs:GilbertTwoWorldPerspectiveProjection, geosrs:LaHireProjection, geosrs:LorgnaProjection, geosrs:LowryProjection, geosrs:OrthographicProjection, geosrs:PerspectiveConicProjection, geosrs:TiltedPerspectiveProjection, geosrs:VerticalPerspectiveProjection to be used in SPARQL graph patterns.

11.11.1. Class: geosrs:CentralCylindricalProjection

Table 203 — geosrs:CentralCylindricalProjection

URI	https://w3id.org/geosrs/projection/CentralCylindricalProjection
Super-classes	PerspectiveProjection
Example	geosrs:CentralCylindricalProjection

11.11.2. Class: geosrs:GeneralVerticalPerspectiveProjection

Table 204 — geosrs:GeneralVerticalPerspectiveProjection

URI	https://w3id.org/geosrs/projection/GeneralVerticalPerspectiveProjection
Super-classes	PerspectiveProjection

11.11.3. Class: geosrs:GilbertTwoWorldPerspectiveProjection

Table 205 — geosrs:GilbertTwoWorldPerspectiveProjection

URI	https://w3id.org/geosrs/projection/GilbertTwoWorldPerspectiveProjection
Super-classes	PerspectiveProjection

11.11.4. Class: geosrs:LaHireProjection

Table 206 — geosrs:LaHireProjection

URI	https://w3id.org/geosrs/projection/LaHireProjection
Super-classes	PerspectiveProjection

11.11.5. Class: geosrs:LorgnaProjection

Table 207 — geosrs:LorgnaProjection

URI	https://w3id.org/geosrs/projection/LorgnaProjection
Super-classes	PerspectiveProjection

11.11.6. Class: geosrs:LowryProjection

Table 208 — geosrs:LowryProjection

URI	https://w3id.org/geosrs/projection/LowryProjection
Super-classes	PerspectiveProjection

11.11.7. Class: geosrs:OrthographicProjection

Table 209 — geosrs:OrthographicProjection

URI	https://w3id.org/geosrs/projection/OrthographicProjection
Super-classes	PerspectiveProjection

11.11.8. Class: geosrs:PerspectiveConicProjection

Table 210 — geosrs:PerspectiveConicProjection

URI	https://w3id.org/geosrs/projection/PerspectiveConicProjection
Super-classes	PerspectiveProjection

11.11.9. Class: geosrs:TiltedPerspectiveProjection

Table 211 — geosrs:TiltedPerspectiveProjection

URI	https://w3id.org/geosrs/projection/TiltedPerspectiveProjection
Super-classes	PerspectiveProjection

11.11.10. Class: geosrs:VerticalPerspectiveProjection

Table 212 — geosrs:VerticalPerspectiveProjection

URI	https://w3id.org/geosrs/projection/VerticalPerspectiveProjection
Super-classes	PerspectiveProjection

11.12. Polyconic Projections

REQUIREMENT 32: POLYCONIC PROJECTIONS

IDENTIFIER /req/Polyconic_Projections

STATEMENT Implementations shall allow the RDFS classes geosrs:GinzburgIVProjection, geosrs:GinzburgIXProjection, geosrs:GinzburgVIPProjection, geosrs:GinzburgVProjection, geosrs:GottWagnerProjection, geosrs:HillEucyclicProjection, geosrs:LagrangeProjection, geosrs:LaskowskiProjection, geosrs:RectangularPolyconicProjection, geosrs:StabiusWernerIIIProjection, geosrs:StabiusWernerIProjection, geosrs:VanDerGrintenIIProjection, geosrs:VanDerGrintenIProjection, geosrs:VanDerGrintenIVProjection, geosrs:WagnerIXProjection, geosrs:WagnerVIIIProjection, geosrs:WagnerVIIProjection to be used in SPARQL graph patterns.

11.12.1. Class: geosrs:GinzburgIVProjection

Table 213 — geosrs:GinzburgIVProjection

URI	https://w3id.org/geosrs/projection/GinzburgIVProjection
Super-classes	PolyconicProjection

11.12.2. Class: geosrs:GinzburgIXProjection

Table 214 — geosrs:GinzburgIXProjection

URI	https://w3id.org/geosrs/projection/GinzburgIXProjection
Super-classes	PolyconicProjection

11.12.3. Class: geosrs:GinzburgVIProjection

Table 215 — geosrs:GinzburgVIProjection

URI	https://w3id.org/geosrs/projection/GinzburgVIProjection
Super-classes	PolyconicProjection

11.12.4. Class: geosrs:GinzburgVProjection

Table 216 — geosrs:GinzburgVProjection

URI	https://w3id.org/geosrs/projection/GinzburgVProjection
Super-classes	PolyconicProjection

11.12.5. Class: geosrs:GottWagnerProjection

Table 217 — geosrs:GottWagnerProjection

URI	https://w3id.org/geosrs/projection/GottWagnerProjection
Super-classes	PolyconicProjection

11.12.6. Class: geosrs:HillEucyclicProjection

Table 218 — geosrs:HillEucyclicProjection

URI	https://w3id.org/geosrs/projection/HillEucyclicProjection
Super-classes	PolyconicProjection

11.12.7. Class: geosrs:LagrangeProjection

Table 219 — geosrs:LagrangeProjection

URI	https://w3id.org/geosrs/projection/LagrangeProjection
Super-classes	PolyconicProjection

11.12.8. Class: geosrs:LaskowskiProjection

Table 220 — geosrs:LaskowskiProjection

URI	https://w3id.org/geosrs/projection/LaskowskiProjection
Super-classes	PolyconicProjection

11.12.9. Class: geosrs:RectangularPolyconicProjection

Table 221 — geosrs:RectangularPolyconicProjection

URI	https://w3id.org/geosrs/projection/RectangularPolyconicProjection
Super-classes	PolyconicProjection

11.12.10. Class: geosrs:StabiusWernerIIIProjection

Table 222 — geosrs:StabiusWernerIIIProjection

URI	https://w3id.org/geosrs/projection/StabiusWernerIIIProjection
Super-classes	PolyconicProjection

11.12.11. Class: geosrs:StabiusWernerIProjection

Table 223 — geosrs:StabiusWernerIProjection

URI	https://w3id.org/geosrs/projection/StabiusWernerIProjection
Super-classes	PolyconicProjection

11.12.12. Class: geosrs:VanDerGrintenIIProjection

Table 224 — geosrs:VanDerGrintenIIProjection

URI	https://w3id.org/geosrs/projection/VanDerGrintenIIProjection
Super-classes	PolyconicProjection

11.12.13. Class: geosrs:VanDerGrintenIProjection

Table 225 — geosrs:VanDerGrintenIProjection

URI	https://w3id.org/geosrs/projection/VanDerGrintenIProjection
Super-classes	PolyconicProjection

11.12.14. Class: geosrs:VanDerGrintenIVProjection

Table 226 — geosrs:VanDerGrintenIVProjection

URI	https://w3id.org/geosrs/projection/VanDerGrintenIVProjection
Super-classes	PolyconicProjection

11.12.15. Class: geosrs:WagnerIXProjection

Table 227 — geosrs:WagnerIXProjection

URI	https://w3id.org/geosrs/projection/WagnerIXProjection
Super-classes	PolyconicProjection

11.12.16. Class: geosrs:WagnerVIIIProjection

Table 228 — geosrs:WagnerVIIIProjection

URI	https://w3id.org/geosrs/projection/WagnerVIIIProjection
Super-classes	PolyconicProjection

11.12.17. Class: geosrs:WagnerVIIProjection

Table 229 — geosrs:WagnerVIIProjection

URI	https://w3id.org/geosrs/projection/WagnerVIIProjection
Super-classes	PolyconicProjection

11.13. Polyhedral Projections

REQUIREMENT 33: POLYHEDRAL PROJECTIONS	
IDENTIFIER	/req/Polyhedral_Projections
STATEMENT	Implementations shall allow the RDFS classes geosrs:AuthaGraphProjection, geosrs:CahillKeyes Projection, geosrs:CollignonButterflyProjection, geosrs:DodecahedralProjection, geosrs:Dymaxion Projection, geosrs:GnomonicButterflyProjection, geosrs:GnomonicCubedSphereProjection, geosrs:GnomonicIcosahedronProjection, geosrs:GuyouProjection, geosrs:IcosahedralProjection, geosrs:Lee Projection, geosrs:MyrahedalProjection, geosrs:OctantProjection, geosrs:QuadrilateralizedSpherical CubeProjection, geosrs:WatermanButterflyProjection to be used in SPARQL graph patterns.

11.13.1. Class: geosrs:AuthaGraphProjection

Table 230 — geosrs:AuthaGraphProjection

URI	https://w3id.org/geosrs/projection/AuthaGraphProjection
Super-classes	PolyhedralProjection

11.13.2. Class: geosrs:CahillKeyesProjection

Table 231 — geosrs:CahillKeyesProjection

URI	https://w3id.org/geosrs/projection/CahillKeyesProjection
Super-classes	PolyhedralProjection

11.13.3. Class: geosrs:CollignonButterflyProjection

Table 232 — geosrs:CollignonButterflyProjection

URI	https://w3id.org/geosrs/projection/CollignonButterflyProjection
Super-classes	PolyhedralProjection

11.13.4. Class: geosrs:DodecahedralProjection

Table 233 — geosrs:DodecahedralProjection

URI	https://w3id.org/geosrs/projection/DodecahedralProjection
Super-classes	PolyhedralProjection

11.13.5. Class: geosrs:DymaxionProjection

Table 234 — geosrs:DymaxionProjection

URI	https://w3id.org/geosrs/projection/DymaxionProjection
Super-classes	PolyhedralProjection

11.13.6. Class: geosrs:GnomonicButterflyProjection

Table 235 — geosrs:GnomonicButterflyProjection

URI	https://w3id.org/geosrs/projection/GnomonicButterflyProjection
Super-classes	PolyhedralProjection

11.13.7. Class: geosrs:GnomonicCubedSphereProjection

Table 236 — geosrs:GnomonicCubedSphereProjection

URI	https://w3id.org/geosrs/projection/GnomonicCubedSphereProjection
Super-classes	PolyhedralProjection

11.13.8. Class: geosrs:GnomonicIcosahedronProjection

Table 237 — geosrs:GnomonicIcosahedronProjection

URI	https://w3id.org/geosrs/projection/GnomonicIcosahedronProjection
Super-classes	PolyhedralProjection

11.13.9. Class: geosrs:GuyouProjection

Table 238 — geosrs:GuyouProjection

URI	https://w3id.org/geosrs/projection/GuyouProjection
-----	---

Super-classes	PolyhedralProjection
---------------	--------------------------------------

11.13.10. Class: geosrs:IcosahedralProjection

Table 239 — geosrs:IcosahedralProjection

URI	https://w3id.org/geosrs/projection/IcosahedralProjection
Super-classes	PolyhedralProjection

11.13.11. Class: geosrs:LeeProjection

Table 240 — geosrs:LeeProjection

URI	https://w3id.org/geosrs/projection/LeeProjection
Super-classes	PolyhedralProjection

11.13.12. Class: geosrs:MyrahedalProjection

Table 241 — geosrs:MyrahedalProjection

URI	https://w3id.org/geosrs/projection/MyrahedalProjection
Super-classes	PolyhedralProjection

11.13.13. Class: geosrs:OctantProjection

Table 242 — geosrs:OctantProjection

URI	https://w3id.org/geosrs/projection/OctantProjection
Super-classes	PolyhedralProjection

11.13.14. Class: geosrs:QuadrilateralizedSphericalCubeProjection

Table 243 — geosrs:QuadrilateralizedSphericalCubeProjection

URI	https://w3id.org/geosrs/projection/QuadrilateralizedSphericalCubeProjection
Super-classes	PolyhedralProjection

11.13.15. Class: geosrs:WatermanButterflyProjection

Table 244 — geosrs:WatermanButterflyProjection

URI	https://w3id.org/geosrs/projection/WatermanButterflyProjection
Super-classes	PolyhedralProjection

11.14. Pseudo Azimuthal Projections

REQUIREMENT 34: PSEUDO AZIMUTHAL PROJECTIONS

IDENTIFIER /req/Pseudo_Azimuthal_Projections

STATEMENT Implementations shall allow the RDFS classes geosrs:AitoffObliqueProjection, geosrs:AitoffProjection, geosrs:HammerProjection, geosrs:Strebe1995Projection, geosrs:WinkelTripelProjection to be used in SPARQL graph patterns.

11.14.1. Class: geosrs:AitoffObliqueProjection

Table 245 — geosrs:AitoffObliqueProjection

URI	https://w3id.org/geosrs/projection/AitoffObliqueProjection
Super-classes	PseudoAzimuthalProjection

11.14.2. Class: geosrs:AitoffProjection

Table 246 — geosrs:AitoffProjection

URI	https://w3id.org/geosrs/projection/AitoffProjection
Definition	A modified azimuthal projection whose graticule takes the form of an ellipse
Super-classes	PseudoAzimuthalProjection

11.14.3. Class: geosrs:HammerProjection

Table 247 — geosrs:HammerProjection

URI	https://w3id.org/geosrs/projection/HammerProjection
Super-classes	PseudoAzimuthalProjection

11.14.4. Class: geosrs:Strebe1995Projection

Table 248 — geosrs:Strebe1995Projection

URI	https://w3id.org/geosrs/projection/Strebe1995Projection
Super-classes	PseudoAzimuthalProjection

11.14.5. Class: geosrs:WinkelTripelProjection

Table 249 — geosrs:WinkelTripelProjection

URI	https://w3id.org/geosrs/projection/WinkelTripelProjection
Super-classes	PseudoAzimuthalProjection

11.15. Pseudo Conical Projections

Requirement 35: Pseudo Conical Projections	
IDENTIFIER	/req/Pseudo_Conical_Projections
STATEMENT	Implementations shall allow the RDFS classes geosrs:AmericanPolyconicProjection, geosrs:BonneProjection, geosrs:BottomleyProjection, geosrs:NicolosiGlobularProjection, geosrs:PtolemyIIProjection, geosrs:WernerProjection to be used in SPARQL graph patterns.

11.15.1. Class: geosrs:AmericanPolyconicProjection

Table 250 — geosrs:AmericanPolyconicProjection

URI	https://w3id.org/geosrs/projection/AmericanPolyconicProjection
Super-classes	PseudoConicalProjection
Example	<code>geosrs:AmericanPolyconicProjection</code>

11.15.2. Class: geosrs:BonneProjection

Table 251 — geosrs:BonneProjection

URI	https://w3id.org/geosrs/projection/BonneProjection
Super-classes	PseudoConicalProjection

11.15.3. Class: geosrs:BottomleyProjection

Table 252 — geosrs:BottomleyProjection

URI	https://w3id.org/geosrs/projection/BottomleyProjection
Super-classes	PseudoConicalProjection

11.15.4. Class: geosrs:NicolosiGlobularProjection

Table 253 — geosrs:NicolosiGlobularProjection

URI	https://w3id.org/geosrs/projection/NicolosiGlobularProjection
Super-classes	PseudoConicalProjection

11.15.5. Class: geosrs:PtolemyIIProjection

Table 254 — geosrs:PtolemyIIProjection

URI	https://w3id.org/geosrs/projection/PtolemyIIProjection
Super-classes	PseudoConicalProjection

11.15.6. Class: geosrs:WernerProjection

Table 255 — geosrs:WernerProjection

URI	https://w3id.org/geosrs/projection/WernerProjection
Super-classes	PseudoConicalProjection

11.16. Pseudo Cylindrical Projections

REQUIREMENT 36: PSEUDO CYLINDRICAL PROJECTIONS

IDENTIFIER /req/Pseudo_Cylindrical_Projections

STATEMENT Implementations shall allow the RDFS classes geosrs:ApianIIProjection, geosrs:AtlantisProjection, geosrs:BaranyIIIIProjection, geosrs:BaranyIIProjection, geosrs:BaranyIProjection, geosrs:BaranyiIVProjection, geosrs:BoggsEumorphicProjection, geosrs:BromleyProjection, geosrs:CabotProjection, geosrs:CollignonProjection, geosrs:CrasterParabolicProjection, geosrs:DeakinMinimumErrorProjection, geosrs:Eckert1Projection, geosrs:Eckert2Projection, geosrs:Eckert3Projection, geosrs:

REQUIREMENT 36: PSEUDO CYLINDRICAL PROJECTIONS

Eckert4Projection, geosrs:Eckert5Projection, geosrs:Eckert6Projection, geosrs:EqualEarthProjection, geosrs:FaheyProjection, geosrs:FoucautProjection, geosrs:FoucautSinusoidalProjection, geosrs:FournierIIProjection, geosrs:GinzburgVIIIProjection, geosrs:GoodeHomolosineProjection, geosrs:HEALPixProjection, geosrs:HufnagelProjection, geosrs:Kavrayskiy7Projection, geosrs:LoximuthalProjection, geosrs:MayrProjection, geosrs:McBrydeThomasFlatPolarParabolicProjection, geosrs:McBrydeThomasFlatPolarQuarticProjection, geosrs:McBrydeThomasFlatPolarSinusoidalProjection, geosrs:McBrydeThomasIIProjection, geosrs:McBrydeThomasIProjection, geosrs:NaturalEarth2Projection, geosrs:NaturalEarthProjection, geosrs:NellHammerProjection, geosrs:NellProjection, geosrs:OrteliusOvalProjection, geosrs:PutninsP1Projection, geosrs:PutninsP2Projection, geosrs:PutninsP3Projection, geosrs:PutninsP5Projection, geosrs:PutninsP6Projection, geosrs:QuarticAuthalicProjection, geosrs:RobinsonProjection, geosrs:SinusoidalProjection, geosrs:TheTimesProjection, geosrs:ToblerG1Projection, geosrs:ToblerHyperellipticalProjection, geosrs:WagnerIIIProjection, geosrs:WagnerIIProjection, geosrs:WagnerIProjection, geosrs:WagnerIVProjection, geosrs:WagnerVProjection, geosrs:WagnerVProjection, geosrs:WerenskioldIProjection, geosrs:PutninsP3'Projection, geosrs:PutninsP4'Projection, geosrs:PutninsP5'Projection, geosrs:PutninsP6'Projection to be used in SPARQL graph patterns.

11.16.1. Class: geosrs:ApianIIProjection

Table 256 — geosrs:ApianIIProjection

URI	https://w3id.org/geosrs/projection/ApianIIProjection
Super-classes	PseudoCylindricalProjection

11.16.2. Class: geosrs:AtlantisProjection

Table 257 — geosrs:AtlantisProjection

URI	https://w3id.org/geosrs/projection/AtlantisProjection
Super-classes	PseudoCylindricalProjection

11.16.3. Class: geosrs:BaranyIIIProjection

Table 258 — geosrs:BaranyIIIProjection

URI	https://w3id.org/geosrs/projection/BaranyIIIProjection
-----	---

Super-classes	<u>PseudoCylindricalProjection</u>
---------------	--

11.16.4. Class: geosrs:BaranyillProjection

Table 259 — geosrs:BaranyillProjection

URI	<u>https://w3id.org/geosrs/projection/BaranyillProjection</u>
Super-classes	<u>PseudoCylindricalProjection</u>

11.16.5. Class: geosrs:BaranyilProjection

Table 260 — geosrs:BaranyilProjection

URI	<u>https://w3id.org/geosrs/projection/BaranyilProjection</u>
Super-classes	<u>PseudoCylindricalProjection</u>

11.16.6. Class: geosrs:BaranyilVProjection

Table 261 — geosrs:BaranyilVProjection

URI	<u>https://w3id.org/geosrs/projection/BaranyilVProjection</u>
Super-classes	<u>PseudoCylindricalProjection</u>

11.16.7. Class: geosrs:BoggsEumorphicProjection

Table 262 — geosrs:BoggsEumorphicProjection

URI	<u>https://w3id.org/geosrs/projection/BoggsEumorphicProjection</u>
Super-classes	<u>PseudoCylindricalProjection</u>

11.16.8. Class: geosrs:BromleyProjection

Table 263 — geosrs:BromleyProjection

URI	https://w3id.org/geosrs/projection/BromleyProjection
Super-classes	PseudoCylindricalProjection

11.16.9. Class: geosrs:CabotProjection

Table 264 — geosrs:CabotProjection

URI	https://w3id.org/geosrs/projection/CabotProjection
Super-classes	PseudoCylindricalProjection

11.16.10. Class: geosrs:CollignonProjection

Table 265 — geosrs:CollignonProjection

URI	https://w3id.org/geosrs/projection/CollignonProjection
Definition	An equal-area pseudocylindrical projection that maps the sphere onto a triangle or diamond
Super-classes	PseudoCylindricalProjection

11.16.11. Class: geosrs:CrasterParabolicProjection

Table 266 — geosrs:CrasterParabolicProjection

URI	https://w3id.org/geosrs/projection/CrasterParabolicProjection
Super-classes	PseudoCylindricalProjection

11.16.12. Class: geosrs:DeakinMinimumErrorProjection

Table 267 — geosrs:DeakinMinimumErrorProjection

URI	https://w3id.org/geosrs/projection/DeakinMinimumErrorProjection
Super-classes	PseudoCylindricalProjection

11.16.13. Class: geosrs:Eckert1Projection

Table 268 — geosrs:Eckert1Projection

URI	https://w3id.org/geosrs/projection/Eckert1Projection
Super-classes	PseudoCylindricalProjection

11.16.14. Class: geosrs:Eckert2Projection

Table 269 — geosrs:Eckert2Projection

URI	https://w3id.org/geosrs/projection/Eckert2Projection
Super-classes	PseudoCylindricalProjection

11.16.15. Class: geosrs:Eckert3Projection

Table 270 — geosrs:Eckert3Projection

URI	https://w3id.org/geosrs/projection/Eckert3Projection
Super-classes	PseudoCylindricalProjection

11.16.16. Class: geosrs:Eckert4Projection

Table 271 — geosrs:Eckert4Projection

URI	https://w3id.org/geosrs/projection/Eckert4Projection
Super-classes	PseudoCylindricalProjection

11.16.17. Class: geosrs:Eckert5Projection

Table 272 — geosrs:Eckert5Projection

URI	https://w3id.org/geosrs/projection/Eckert5Projection
Super-classes	PseudoCylindricalProjection

11.16.18. Class: geosrs:Eckert6Projection

Table 273 — geosrs:Eckert6Projection

URI	https://w3id.org/geosrs/projection/Eckert6Projection
Super-classes	PseudoCylindricalProjection

11.16.19. Class: geosrs:EqualEarthProjection

Table 274 — geosrs:EqualEarthProjection

URI	https://w3id.org/geosrs/projection/EqualEarthProjection
Super-classes	PseudoCylindricalProjection
Example	geosrs:EqualEarthProjection

11.16.20. Class: geosrs:FaheyProjection

Table 275 — geosrs:FaheyProjection

URI	https://w3id.org/geosrs/projection/FaheyProjection
-----	---

Super-classes	PseudoCylindricalProjection
---------------	---

11.16.21. Class: geosrs:FoucautProjection

Table 276 — geosrs:FoucautProjection

URI	https://w3id.org/geosrs/projection/FoucautProjection
Super-classes	PseudoCylindricalProjection

11.16.22. Class: geosrs:FoucautSinusoidalProjection

Table 277 — geosrs:FoucautSinusoidalProjection

URI	https://w3id.org/geosrs/projection/FoucautSinusoidalProjection
Super-classes	PseudoCylindricalProjection

11.16.23. Class: geosrs:FournierIIProjection

Table 278 — geosrs:FournierIIProjection

URI	https://w3id.org/geosrs/projection/FournierIIProjection
Super-classes	PseudoCylindricalProjection

11.16.24. Class: geosrs:GinzburgVIIIProjection

Table 279 — geosrs:GinzburgVIIIProjection

URI	https://w3id.org/geosrs/projection/GinzburgVIIIProjection
Super-classes	PseudoCylindricalProjection

11.16.25. Class: geosrs:GoodeHomolosineProjection

Table 280 — geosrs:GoodeHomolosineProjection

URI	https://w3id.org/geosrs/projection/GoodeHomolosineProjection
Super-classes	PseudoCylindricalProjection

11.16.26. Class: geosrs:HEALPixProjection

Table 281 — geosrs:HEALPixProjection

URI	https://w3id.org/geosrs/projection/HEALPixProjection
Super-classes	PseudoCylindricalProjection

11.16.27. Class: geosrs:HufnagelProjection

Table 282 — geosrs:HufnagelProjection

URI	https://w3id.org/geosrs/projection/HufnagelProjection
Super-classes	PseudoCylindricalProjection

11.16.28. Class: geosrs:Kavrayskiy7Projection

Table 283 — geosrs:Kavrayskiy7Projection

URI	https://w3id.org/geosrs/projection/Kavrayskiy7Projection
Super-classes	PseudoCylindricalProjection

11.16.29. Class: geosrs:LoximuthalProjection

Table 284 — geosrs:LoximuthalProjection

URI	https://w3id.org/geosrs/projection/LoximuthalProjection
Super-classes	PseudoCylindricalProjection

11.16.30. Class: geosrs:MayrProjection

Table 285 — geosrs:MayrProjection

URI	https://w3id.org/geosrs/projection/MayrProjection
Super-classes	PseudoCylindricalProjection

11.16.31. Class: geosrs:McBrydeThomasFlatPolarParabolicProjection

Table 286 — geosrs:McBrydeThomasFlatPolarParabolicProjection

URI	https://w3id.org/geosrs/projection/McBrydeThomasFlatPolarParabolicProjection
Super-classes	PseudoCylindricalProjection

11.16.32. Class: geosrs:McBrydeThomasFlatPolarQuarticProjection

Table 287 — geosrs:McBrydeThomasFlatPolarQuarticProjection

URI	https://w3id.org/geosrs/projection/McBrydeThomasFlatPolarQuarticProjection
Super-classes	PseudoCylindricalProjection

11.16.33. Class: geosrs:McBrydeThomasFlatPolarSinusoidalProjection

Table 288 — geosrs:McBrydeThomasFlatPolarSinusoidalProjection

URI	https://w3id.org/geosrs/projection/McBrydeThomasFlatPolarSinusoidalProjection
-----	---

Super-classes	PseudoCylindricalProjection
---------------	---

11.16.34. Class: geosrs:McBrydeThomasIIProjection

Table 289 — geosrs:McBrydeThomasIIProjection

URI	https://w3id.org/geosrs/projection/McBrydeThomasIIProjection
Super-classes	PseudoCylindricalProjection

11.16.35. Class: geosrs:McBrydeThomasIProjection

Table 290 — geosrs:McBrydeThomasIProjection

URI	https://w3id.org/geosrs/projection/McBrydeThomasIProjection
Super-classes	PseudoCylindricalProjection

11.16.36. Class: geosrs:NaturalEarth2Projection

Table 291 — geosrs:NaturalEarth2Projection

URI	https://w3id.org/geosrs/projection/NaturalEarth2Projection
Super-classes	PseudoCylindricalProjection

11.16.37. Class: geosrs:NaturalEarthProjection

Table 292 — geosrs:NaturalEarthProjection

URI	https://w3id.org/geosrs/projection/NaturalEarthProjection
Definition	A pseudocylindrical map projection designed by Tom Patterson and introduced in 2008
Super-classes	PseudoCylindricalProjection

11.16.38. Class: geosrs:NellHammerProjection

Table 293 — geosrs:NellHammerProjection

URI	https://w3id.org/geosrs/projection/NellHammerProjection
Super-classes	PseudoCylindricalProjection

11.16.39. Class: geosrs:NellProjection

Table 294 — geosrs:NellProjection

URI	https://w3id.org/geosrs/projection/NellProjection
Super-classes	PseudoCylindricalProjection

11.16.40. Class: geosrs:OrteliusOvalProjection

Table 295 — geosrs:OrteliusOvalProjection

URI	https://w3id.org/geosrs/projection/OrteliusOvalProjection
Super-classes	PseudoCylindricalProjection

11.16.41. Class: geosrs:PutninsP1Projection

Table 296 — geosrs:PutninsP1Projection

URI	https://w3id.org/geosrs/projection/PutninsP1Projection
Super-classes	PseudoCylindricalProjection

11.16.42. Class: geosrs:PutninsP2Projection

Table 297 — geosrs:PutninsP2Projection

URI	https://w3id.org/geosrs/projection/PutninsP2Projection
Super-classes	PseudoCylindricalProjection

11.16.43. Class: geosrs:PutninsP3Projection

Table 298 — geosrs:PutninsP3Projection

URI	https://w3id.org/geosrs/projection/PutninsP3Projection
Super-classes	PseudoCylindricalProjection

11.16.44. Class: geosrs:PutninsP5Projection

Table 299 — geosrs:PutninsP5Projection

URI	https://w3id.org/geosrs/projection/PutninsP5Projection
Super-classes	PseudoCylindricalProjection

11.16.45. Class: geosrs:PutninsP6Projection

Table 300 — geosrs:PutninsP6Projection

URI	https://w3id.org/geosrs/projection/PutninsP6Projection
Super-classes	PseudoCylindricalProjection

11.16.46. Class: geosrs:QuarticAuthalicProjection

Table 301 — geosrs:QuarticAuthalicProjection

URI	https://w3id.org/geosrs/projection/QuarticAuthalicProjection
Super-classes	PseudoCylindricalProjection

11.16.47. Class: geosrs:RobinsonProjection

Table 302 — geosrs:RobinsonProjection

URI	https://w3id.org/geosrs/projection/RobinsonProjection
Super-classes	PseudoCylindricalProjection

11.16.48. Class: geosrs:SinusoidalProjection

Table 303 — geosrs:SinusoidalProjection

URI	https://w3id.org/geosrs/projection/SinusoidalProjection
Super-classes	PseudoCylindricalProjection

11.16.49. Class: geosrs:TheTimesProjection

Table 304 — geosrs:TheTimesProjection

URI	https://w3id.org/geosrs/projection/TheTimesProjection
Super-classes	PseudoCylindricalProjection

11.16.50. Class: geosrs:ToblerG1Projection

Table 305 — geosrs:ToblerG1Projection

URI	https://w3id.org/geosrs/projection/ToblerG1Projection
Super-classes	PseudoCylindricalProjection

11.16.51. Class: geosrs:ToblerHyperellipticalProjection

Table 306 — geosrs:ToblerHyperellipticalProjection

URI	https://w3id.org/geosrs/projection/ToblerHyperellipticalProjection
Super-classes	PseudoCylindricalProjection

11.16.52. Class: geosrs:WagnerIIIProjection

Table 307 — geosrs:WagnerIIIProjection

URI	https://w3id.org/geosrs/projection/WagnerIIIProjection
Super-classes	PseudoCylindricalProjection

11.16.53. Class: geosrs:WagnerIIProjection

Table 308 — geosrs:WagnerIIProjection

URI	https://w3id.org/geosrs/projection/WagnerIIProjection
Super-classes	PseudoCylindricalProjection

11.16.54. Class: geosrs:WagnerIProjection

Table 309 — geosrs:WagnerIProjection

URI	https://w3id.org/geosrs/projection/WagnerIProjection
Super-classes	PseudoCylindricalProjection

11.16.55. Class: geosrs:WagnerIVProjection

Table 310 — geosrs:WagnerIVProjection

URI	https://w3id.org/geosrs/projection/WagnerIVProjection
Super-classes	PseudoCylindricalProjection

11.16.56. Class: geosrs:WagnerVIProjection

Table 311 — geosrs:WagnerVIProjection

URI	https://w3id.org/geosrs/projection/WagnerVIProjection
Super-classes	PseudoCylindricalProjection

11.16.57. Class: geosrs:WagnerVProjection

Table 312 — geosrs:WagnerVProjection

URI	https://w3id.org/geosrs/projection/WagnerVProjection
Super-classes	PseudoCylindricalProjection

11.16.58. Class: geosrs:WerenskioldIProjection

Table 313 — geosrs:WerenskioldIProjection

URI	https://w3id.org/geosrs/projection/WerenskioldIProjection
Super-classes	PseudoCylindricalProjection

11.16.59. Class: geosrs:PutninsP3'Projection

Table 314 — geosrs:PutninsP3'Projection

URI	https://w3id.org/geosrs/projection/PutninsP3'Projection
Super-classes	PseudoCylindricalProjection

11.16.60. Class: geosrs:PutninsP4'Projection

Table 315 — geosrs:PutninsP4'Projection

URI	https://w3id.org/geosrs/projection/PutninsP4'Projection
Super-classes	PseudoCylindricalProjection

11.16.61. Class: geosrs:PutninsP5'Projection

Table 316 — geosrs:PutninsP5'Projection

URI	https://w3id.org/geosrs/projection/PutninsP5'Projection
Super-classes	PseudoCylindricalProjection

11.16.62. Class: geosrs:PutninsP6'Projection

Table 317 — geosrs:PutninsP6'Projection

URI	https://w3id.org/geosrs/projection/PutninsP6'Projection
Super-classes	PseudoCylindricalProjection

11.17. Stereographic Projections

REQUIREMENT 37: STEREOGRAPHIC PROJECTIONS

IDENTIFIER /req/Stereographic_Projections

STATEMENT Implementations shall allow the RDFS classes geosrs:MillerOblatedStereographicProjection, geosrs:RoussilheProjection to be used in SPARQL graph patterns.

11.17.1. Class: geosrs:MillerOblatedStereographicProjection

Table 318 — geosrs:MillerOblatedStereographicProjection

URI	https://w3id.org/geosrs/projection/MillerOblatedStereographicProjection
Super-classes	StereographicProjection

11.17.2. Class: geosrs:RoussilheProjection

Table 319 — geosrs:RoussilheProjection

URI	https://w3id.org/geosrs/projection/RoussilheProjection
Super-classes	StereographicProjection



12

PLANET MODULE

This clause establishes the **PLANET** Requirements class, with IRI `/req/planet`, which has a corresponding Conformance Class, **PLANET**, with IRI `/conf/planet`.

REQUIREMENTS CLASS 7: 12-PLANET_MODULE.ADOC EXTENSION

IDENTIFIER	<code>/req/12-planet_module.adoc</code>
TARGET TYPE	Implementation Specification
REQUIREMENT	<code>/req/Interstellar_Body</code>

12.1. Interstellar Body

REQUIREMENT 38: INTERSTELLAR BODY

IDENTIFIER	<code>/req/Interstellar_Body</code>
STATEMENT	Implementations shall allow the RDFS classes <code>geosrs:ArtificialSatellite</code> , <code>geosrs:Asteroid</code> , <code>geosrs:Comet</code> , <code>geosrs:DwarfPlanet</code> , <code>geosrs:InterstellarBody</code> , <code>geosrs:Moon</code> , <code>geosrs:NaturalSatellite</code> , <code>geosrs:Planet</code> , <code>geosrs:PlanetStatus</code> , <code>geosrs:Plutoid</code> , <code>geosrs:Star</code> to be used in SPARQL graph patterns.

12.1.1. Class: `geosrs:ArtificialSatellite`

Table 320 — `geosrs:ArtificialSatellite`

URI	https://w3id.org/geosrs/planet/ArtificialSatellite
-----	---

12.1.2. Class: `geosrs:Asteroid`

Table 321 — `geosrs:Asteroid`

URI	https://w3id.org/geosrs/planet/Asteroid
-----	---

12.1.3. Class: geosrs:Comet

Table 322 — geosrs:Comet

URI	https://w3id.org/geosrs/planet/Comet
-----	---

12.1.4. Class: geosrs:DwarfPlanet

Table 323 — geosrs:DwarfPlanet

URI	https://w3id.org/geosrs/planet/DwarfPlanet
-----	---

12.1.5. Class: geosrs:InterstellarBody

Table 324 — geosrs:InterstellarBody

URI	https://w3id.org/geosrs/planet/InterstellarBody
-----	---

12.1.6. Class: geosrs:Moon

Table 325 — geosrs:Moon

URI	https://w3id.org/geosrs/planet/Moon
-----	---

12.1.7. Class: geosrs:NaturalSatellite

Table 326 — geosrs:NaturalSatellite

URI	https://w3id.org/geosrs/planet/NaturalSatellite
-----	---

12.1.8. Class: geosrs:Planet

Table 327 — geosrs:Planet

URI	https://w3id.org/geosrs/planet/Planet
-----	---

12.1.9. Class: geosrs:PlanetStatus

Table 328 — geosrs:PlanetStatus

URI	https://w3id.org/geosrs/planet/PlanetStatus
-----	---

12.1.10. Class: geosrs:Plutoid

Table 329 — geosrs:Plutoid

URI	https://w3id.org/geosrs/planet/Plutoid
-----	---

12.1.11. Class: geosrs:Star

Table 330 — geosrs:Star

URI	https://w3id.org/geosrs/planet/Star
-----	---



13

COMMON INSTANCES

This clause establishes common instances which are needed in CRS specifications as Requirement class **INSTANCES**, with IRI `/req/instances`, which has a corresponding Conformance Class, **INSTANCES**, with IRI `/conf/instances`.

REQUIREMENTS CLASS 8: 13-INSTANCES.ADOC EXTENSION

IDENTIFIER	<code>/req/13-instances.adoc</code>
TARGET TYPE	Implementation Specification
	<code>/req/SRS_Literal_Types</code>
REQUIREMENT	<code>/req/Coordinate_System_Axis</code>
	<code>/req/Spheroids</code>

13.1. Coordinate System Axis

REQUIREMENT 39: COORDINATE SYSTEM AXIS

IDENTIFIER	<code>/req/Coordinate_System_Axis</code>
STATEMENT	Implementations shall allow the RDFS instances <code>geosrs:down</code> , <code>geosrs:east</code> , <code>geosrs:north</code> , <code>geosrs:south</code> , <code>geosrs:up</code> , <code>geosrs:west</code> to be used in SPARQL graph patterns.

13.1.1. Instance: `geosrs:down`

Table 331 — `geosrs:down`

URI	https://w3id.org/geosrs/down
Type	<code>geosrs:AxisDirection</code>
Definition	Downwards axis direction

13.1.2. Instance: geosrs:east

Table 332 — geosrs:east

URI	https://w3id.org/geosrs/east
Type	geosrs:AxisDirection
Definition	east axis direction

13.1.3. Instance: geosrs:north

Table 333 — geosrs:north

URI	https://w3id.org/geosrs/north
Type	geosrs:AxisDirection
Definition	North axis direction

13.1.4. Instance: geosrs:south

Table 334 — geosrs:south

URI	https://w3id.org/geosrs/south
Type	geosrs:AxisDirection
Definition	South axis direction

13.1.5. Instance: geosrs:up

Table 335 — geosrs:up

URI	https://w3id.org/geosrs/up
-----	---

Type	geosrs:AxisDirection
Definition	Up axis direction

13.1.6. Instance: geosrs:west

Table 336 — geosrs:west

URI	https://w3id.org/geosrs/west
Type	geosrs:AxisDirection
Definition	West axis direction

13.2. SRS Literal Types

REQUIREMENT 40: SRS LITERAL TYPES

IDENTIFIER	/req/SRS_Literal_Types
STATEMENT	Implementations shall allow the RDFS instances geosrs:proj4Literal , geosrs:projJSONLiteral , geosrs:wktLiteral to be used in SPARQL graph patterns.

13.2.1. Instance: geosrs:proj4Literal

Table 337 — geosrs:proj4Literal

URI	https://w3id.org/geosrs/proj4Literal
Type	rdf:Datatype[rdf:Datatype]
Definition	A literal which stores a proj4 String
Example	geosrs:proj4Literal

13.2.2. Instance: geosrs:projJSONLiteral

Table 338 — geosrs:projJSONLiteral

URI	https://w3id.org/geosrs/projJSONLiteral
Type	rdf:Datatype[rdf:Datatype]
Definition	A literal which stores a projection JSON (ProjJSON) String
Example	geosrs:projJSONLiteral

13.2.3. Instance: geosrs:wktLiteral

Table 339 — geosrs:wktLiteral

URI	https://w3id.org/geosrs/wktLiteral
Type	rdf:Datatype[rdf:Datatype]
Definition	A literal which stores a WKT for CRS String
Example	geosrs:wktLiteral

13.3. Spheroids

REQUIREMENT 41: SPHEROIDS

IDENTIFIER /req/Spheroids

Implementations shall allow the RDFS instances geosrs:GRS1980, geosrs:GRS67, geosrs:PZ90, geosrs:Airy1830, geosrs:AiryModified1849, geosrs:International1924, geosrs:AustralianNationalSpheroid, geosrs:Everest1930, geosrs:Clarke1866, geosrs:Plessis1817, geosrs:Danish1876, geosrs:Struve1860, geosrs:IAG1975, geosrs:Clarke1858, geosrs:Clarke1880, geosrs:Helmert1906, geosrs:CGCS2000, geosrs:GSK-2011, geosrs:Zach1812, geosrs:Clarke1880ARC, geosrs:Clarke1880IGN, geosrs:WGS66, geosrs:WGS72, geosrs:WGS84, geosrs:Krassowsky1940 to be used in SPARQL graph patterns.

13.3.1. Instance: geosrs:GRS1980

Table 340 — geosrs:GRS1980

URI	https://w3id.org/geosrs/GRS1980
Type	geosrs:Ellipsoid
Definition	GRS 1980 Ellipsoid
Example	geosrs:GRS1980

13.3.2. Instance: geosrs:GRS67

Table 341 — geosrs:GRS67

URI	https://w3id.org/geosrs/GRS67
Type	geosrs:Ellipsoid
Definition	GRS 67 Ellipsoid
Example	geosrs:GRS67

13.3.3. Instance: geosrs:PZ90

Table 342 — geosrs:PZ90

URI	https://w3id.org/geosrs/PZ90
Type	geosrs:Ellipsoid
Definition	PZ 90 Ellipsoid
Example	geosrs:PZ90

13.3.4. Instance: geosrs:Airy1830

Table 343 — geosrs:Airy1830

URI	https://w3id.org/geosrs/Airy1830
Type	geosrs:Ellipsoid
Definition	Airy 1830 Ellipsoid
Example	geosrs:Airy1830

13.3.5. Instance: geosrs:AiryModified1849

Table 344 — geosrs:AiryModified1849

URI	https://w3id.org/geosrs/AiryModified1849
Type	geosrs:Ellipsoid
Definition	Airy 1849 Modified Ellipsoid
Example	geosrs:AiryModified1849

13.3.6. Instance: geosrs:International1924

Table 345 — geosrs:International1924

URI	https://w3id.org/geosrs/International1924
Type	geosrs:Ellipsoid
Definition	International 1924 Ellipsoid
Example	geosrs:International1924

13.3.7. Instance: geosrs:AustralianNationalSpheroid

Table 346 — geosrs:AustralianNationalSpheroid

URI	https://w3id.org/geosrs/AustralianNationalSpheroid
Type	geosrs:Ellipsoid
Definition	Australian National Spheroid
Example	geosrs:AustralianNationalSpheroid

13.3.8. Instance: geosrs:Everest1930

Table 347 — geosrs:Everest1930

URI	https://w3id.org/geosrs/Everest1930
Type	geosrs:Ellipsoid
Definition	Everest 1930 Spheroid

13.3.9. Instance: geosrs:Clarke1866

Table 348 — geosrs:Clarke1866

URI	https://w3id.org/geosrs/Clarke1866
Type	geosrs:Ellipsoid
Definition	Clarke 1866 Spheroid
Example	geosrs:Clarke1866

13.3.10. Instance: geosrs:Plessis1817

Table 349 — geosrs:Plessis1817

URI	https://w3id.org/geosrs/Plessis1817
Type	geosrs:Ellipsoid
Definition	Plessis 1817 Spheroid
Example	geosrs:Plessis1817

13.3.11. Instance: geosrs:Danish1876

Table 350 — geosrs:Danish1876

URI	https://w3id.org/geosrs/Danish1876
Type	geosrs:Ellipsoid
Definition	Danish 1876 Spheroid
Example	geosrs:Danish1876

13.3.12. Instance: geosrs:Struve1860

Table 351 — geosrs:Struve1860

URI	https://w3id.org/geosrs/Struve1860
Type	geosrs:Ellipsoid
Definition	Struve 1860 Spheroid
Example	geosrs:Struve1860

13.3.13. Instance: geosrs:IAG1975

Table 352 — geosrs:IAG1975

URI	https://w3id.org/geosrs/IAG1975
-----	---

Type	geosrs:Ellipsoid
Definition	IAG 1975 Spheroid
Example	geosrs:IAG1975

13.3.14. Instance: geosrs:Clarke1858

Table 353 — geosrs:Clarke1858

URI	https://w3id.org/geosrs/Clarke1858
Type	geosrs:Ellipsoid
Definition	Clarke 1858 Spheroid
Example	geosrs:Clarke1858

13.3.15. Instance: geosrs:Clarke1880

Table 354 — geosrs:Clarke1880

URI	https://w3id.org/geosrs/Clarke1880
Type	geosrs:Ellipsoid
Definition	Clarke 1880 Spheroid
Example	geosrs:Clarke1880

13.3.16. Instance: geosrs:Helmert1906

Table 355 — geosrs:Helmert1906

URI	https://w3id.org/geosrs/Helmert1906
Type	geosrs:Ellipsoid

Definition	Helmert 1906 Spheroid
Example	geosrs:Helmert1906

13.3.17. Instance: geosrs:CGCS2000

Table 356 — geosrs:CGCS2000

URI	https://w3id.org/geosrs/CGCS2000
Type	geosrs:Ellipsoid
Definition	CGCS2000 Spheroid
Example	geosrs:CGCS2000

13.3.18. Instance: geosrs:GSK-2011

Table 357 — geosrs:GSK-2011

URI	https://w3id.org/geosrs/GSK-2011
Type	geosrs:Ellipsoid
Definition	GSK-2011 Spheroid

13.3.19. Instance: geosrs:Zach1812

Table 358 — geosrs:Zach1812

URI	https://w3id.org/geosrs/Zach1812
Type	geosrs:Ellipsoid
Definition	Zach 1812 Spheroid
Example	geosrs:Zach1812

13.3.20. Instance: geosrs:Clarke1880ARC

Table 359 — geosrs:Clarke1880ARC

URI	https://w3id.org/geosrs/Clarke1880ARC
Type	geosrs:Ellipsoid
Definition	Clarke 1880 (Arc) Spheroid
Example	geosrs:Clarke1880ARC

13.3.21. Instance: geosrs:Clarke1880IGN

Table 360 — geosrs:Clarke1880IGN

URI	https://w3id.org/geosrs/Clarke1880IGN
Type	geosrs:Ellipsoid
Definition	Clarke 1880 (Ing) Spheroid
Example	geosrs:Clarke1880IGN

13.3.22. Instance: geosrs:WGS66

Table 361 — geosrs:WGS66

URI	https://w3id.org/geosrs/WGS66
Type	geosrs:Ellipsoid
Definition	WGS 66 Spheroid

13.3.23. Instance: geosrs:WGS72

Table 362 — geosrs:WGS72

URI	https://w3id.org/geosrs/WGS72
Type	geosrs:Ellipsoid
Definition	WGS 72 Spheroid
Example	geosrs:WGS72

13.3.24. Instance: geosrs:WGS84

Table 363 — geosrs:WGS84

URI	https://w3id.org/geosrs/WGS84
Type	geosrs:Ellipsoid
Definition	WGS 84 Spheroid
Example	geosrs:WGS84

13.3.25. Instance: geosrs:Krassowsky1940

Table 364 — geosrs:Krassowsky1940

URI	https://w3id.org/geosrs/Krassowsky1940
Type	geosrs:Ellipsoid
Definition	Krassowsky 1940 Spheroid
Example	geosrs:Krassowsky1940









ANNEX A (INFORMATIVE) ALIGNMENTS



ANNEX A (INFORMATIVE) ALIGNMENTS

Overview

Overview

The prefixes used for the ontologies mapped to in all following sections are given in the following table.

Table A.1 — Alignment: Namespaces

ign:	http://data.ign.fr/def/ignf#
iso19111:	http://def.isotc211.org/iso19112/2019/SpatialReferencingByGeographicIdentifier#
geosrs:	http://www.opengis.net/ont/geosparql#
ifc:	https://standards.buildingsmart.org/IFC/DEV/IFC4/ADD2_TC1/OWL/
owl:	http://www.w3.org/2002/07/owl#
prov:	http://www.w3.org/ns/prov#
rdf:	http://www.w3.org/1999/02/22-rdf-syntax-ns#
rdfs:	http://www.w3.org/2000/01/rdf-schema#

A.1. IGN Ontology

Table A.2 – Alignment: IGN Ontology

FROM ELEMENT	MAPPING RELATION	TO ELEMENT	NOTES
geosrs:CoordinateSystem	owl:equivalentClass	ign:CoordinateSystem	-
geosrs:Datum	owl:equivalentClass	ign:Datum	-
geosrs:Ellipsoid	owl:equivalentClass	ign:Ellipsoid	-
geosrs:Conversion	owl:equivalentClass	ign:Conversion	-
geosrs:CoordinateOperation	owl:equivalentClass	ign:CoordinateOperation	-
geosrs:OperationMethod	owl:equivalentClass	ign:OperationMethod	-
geosrs:OperationParameter	owl:equivalentClass	ign:OperationParameter	-
geosrs:OperationParameterValue	owl:equivalentClass	ign:OperationParameterValue	-
geosrs:SingleOperation	owl:equivalentClass	ign:SingleOperation	-
geosrs:Transformation	owl:equivalentClass	ign:Transformation	-
geosrs:CartesianCoordinateSystem	owl:equivalentClass	ign:CartesianCS	-
geosrs:CoordinateSystem	owl:equivalentClass	ign:CoordinateSystem	-
geosrs:CoordinateSystemAxis	owl:equivalentClass	ign:CoordinateSystemAxis	-
geosrs:EllipsoidalCoordinateSystem	owl:equivalentClass	ign:EllipsoidalCS	-
geosrs:VerticalCoordinateSystem	owl:equivalentClass	ign:VerticalCS	-
geosrs:Datum	owl:equivalentClass	ign:Datum	-
geosrs:Ellipsoid	owl:equivalentClass	ign:Ellipsoid	-
geosrs:GeodeticDatum	owl:equivalentClass	ign:GeodeticDatum	-
geosrs:PrimeMeridian	owl:equivalentClass	ign:PrimeMeridian	-
geosrs:VerticalDatum	owl:equivalentClass	ign:VerticalDatum	-
geosrs:AxesList	owl:equivalentClass	ign:AxesList	-

FROM ELEMENT	MAPPING RELATION	TO ELEMENT	NOTES
geosrs:CRS	owl:equivalentClass	ign:CRS	-
geosrs:CompoundCRS	owl:equivalentClass	ign:CompoundCRS	-
geosrs:Extent	owl:equivalentClass	ign:Extent	-
geosrs:GeodeticCRS	owl:equivalentClass	ign:GeodeticCRS	-
geosrs:GeographicBoundingBox	owl:equivalentClass	ign:GeographicBoundingBox	-
geosrs:ProjectedCRS	owl:equivalentClass	ign:ProjectedCRS	-
geosrs:SingleCRS	owl:equivalentClass	ign:SingleCRS	-
geosrs:SingleCRSList	owl:equivalentClass	ign:SingleCRSList	-
geosrs:VerticalCRS	owl:equivalentClass	ign:VerticalCRS	-

A.2. ISO19111 Ontology

Table A.3 – Alignment: ISO19111 Ontology

FROM ELEMENT	MAPPING RELATION	TO ELEMENT	NOTES
geosrs:CoordinateSystem	owl:equivalentClass	iso19111:CoordinateSystem	-
geosrs:Datum	owl:equivalentClass	iso19111:Datum	-
geosrs:Ellipsoid	owl:equivalentClass	iso19111:Ellipsoid	-
geosrs:CRS	owl:equivalentClass	iso19111:CRS	-
geosrs:CompoundCRS	owl:equivalentClass	iso19111:CompoundCRS	-
geosrs:EngineeringCRS	owl:equivalentClass	iso19111:EngineeringCRS	-
geosrs:GeodeticCRS	owl:equivalentClass	iso19111:GeodeticCRS	-

FROM ELEMENT	MAPPING RELATION	TO ELEMENT	NOTES
geosrs:GeographicCRS	owl:equivalentClass	iso19111:GeographicCRS	-
geosrs:ParametricCRS	owl:equivalentClass	iso19111:ParametricCRS	-
geosrs:ProjectedCRS	owl:equivalentClass	iso19111:ProjectedCRS	-
geosrs:SingleCRS	owl:equivalentClass	iso19111:SingleCRS	-
geosrs:TemporalCRS	owl:equivalentClass	iso19111:TemporalCRS	-
geosrs:VerticalCRS	owl:equivalentClass	iso19111:VerticalCRS	-

A.3. IFC Ontology

Table A.4 – Alignment: IFC Ontology

FROM ELEMENT	MAPPING RELATION	TO ELEMENT	NOTES
geosrs:AxisDirection	owl:equivalentClass	ifc:IfcDirection	-
geosrs:CRS	owl:equivalentClass	ifc:IfcCoordinateReferenceSystem	-
geosrs:CoordinateOperation	owl:equivalentClass	ifc:IfcCoordinateOperation	-
geosrs:ProjectedCRS	owl:equivalentClass	ifc:IfcProjectedCRS	-
geosrs:axis	owl:equivalentProperty	ifc:axis_IfcAxis1Placement	-
geosrs:sourceCRS	owl:equivalentProperty	ifc:sourceCRS	-
geosrs:targetCRS	owl:equivalentProperty	ifc:targetCRS	-



ANNEX B (INFORMATIVE) SHACL SHAPES



ANNEX B (INFORMATIVE) SHACL SHAPES

Overview

Overview



ANNEX C (INFORMATIVE) REVISION HISTORY



ANNEX C (INFORMATIVE) REVISION HISTORY

DATE	RELEASE	AUTHOR	PRIMARY CLAUSES MODIFIED	DESCRIPTION
2016-04-28	0.1	G. Editor	all	initial version



BIBLIOGRAPHY





BIBLIOGRAPHY

NOTE: The TC has approved Springer LNCS as the official document citation type. Springer LNCS is widely used in technical and computer science journals and other publications. For citations in the text please use square brackets and consecutive numbers: [1], [2], [3]. Actual References: [n] Journal: Author Surname, A.: Title. Publication Title. Volume number, Issue number, Pages Used (Year Published)

- [1] ISO: ISO 19142, *Geographic information – Web Feature Service*. International Organization for Standardization, Geneva <https://www.iso.org/standard/42136.html>.
- [2] W3C: **Data Catalog Vocabulary**, W3C Recommendation 16 January 2014, <https://www.w3.org/TR/vocab-dcat/>
- [3] IANA: **Link Relation Types**, <https://www.iana.org/assignments/link-relations/link-relations.xml>
- [4] W3C/OGC: **Spatial Data on the Web Best Practices**, W3C Working Group Note 28 September 2017, <https://www.w3.org/TR/sdw-bp/>
- [5] W3C: **Data on the Web Best Practices**, W3C Recommendation 31 January 2017, <https://www.w3.org/TR/dwbp/>
- [6] Ben-Kiki, O., Evans, C., Ingy döt Net: **YAML Ain't Markup Language**, <https://yaml.org/>
- [7] OGC: **Web Feature Service 2.0**, <http://docs.openeospatial.org/is/09-025r2/09-025r2.html>
- [8] Berners-Lee, T., Fielding, R., Masinter, L.: **IETF RFC 3986 – Uniform Resource Identifier (URI): Generic Syntax**, <http://tools.ietf.org/rfc/rfc3986.txt>