

Best Practices for Coordinate System Notation

SCAUG 2014





What is the EPSG?

- Formerly a scientific organization based around geodesy.
- Absorbed into the OGP in 2007
- OGP is the International Oil Gas Producers
- Currently Geomatics Committee of the OGP
- ISO member
- Mainly focus' on modern SRS's used for data transmission (you won't see winkel tripel here).

A note on

- FIPS codes are based on geographic areas.
- The updated standard, based on the 2010 census, is not official.
- Based on old data.
- Doesn't encompass all areas.



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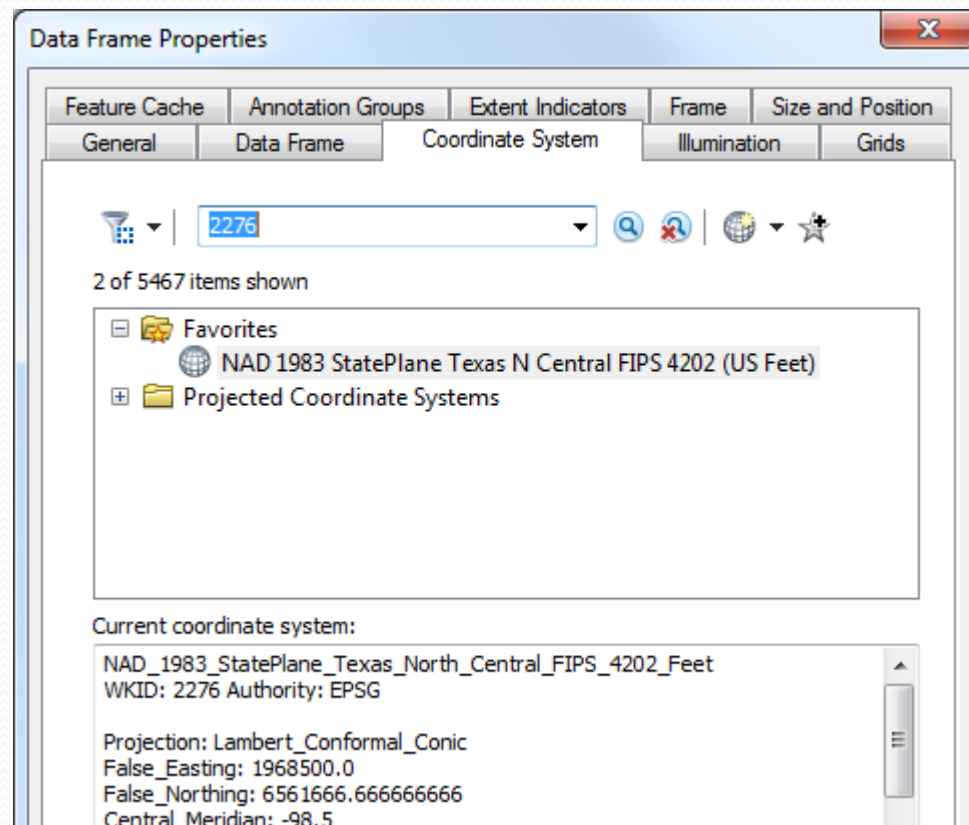


Vocabulary Lesson

- SRID – Spatial reference identifier. This is often the EPSG code, but is not always so.
- EPSG – European Petroleum Survey Group
- OGP – International Oil and Gas Producers
- WKT – In the context of spatial references, this is the string that fully defines the spatial reference system (this is what comes in the .prj files of shapefiles)

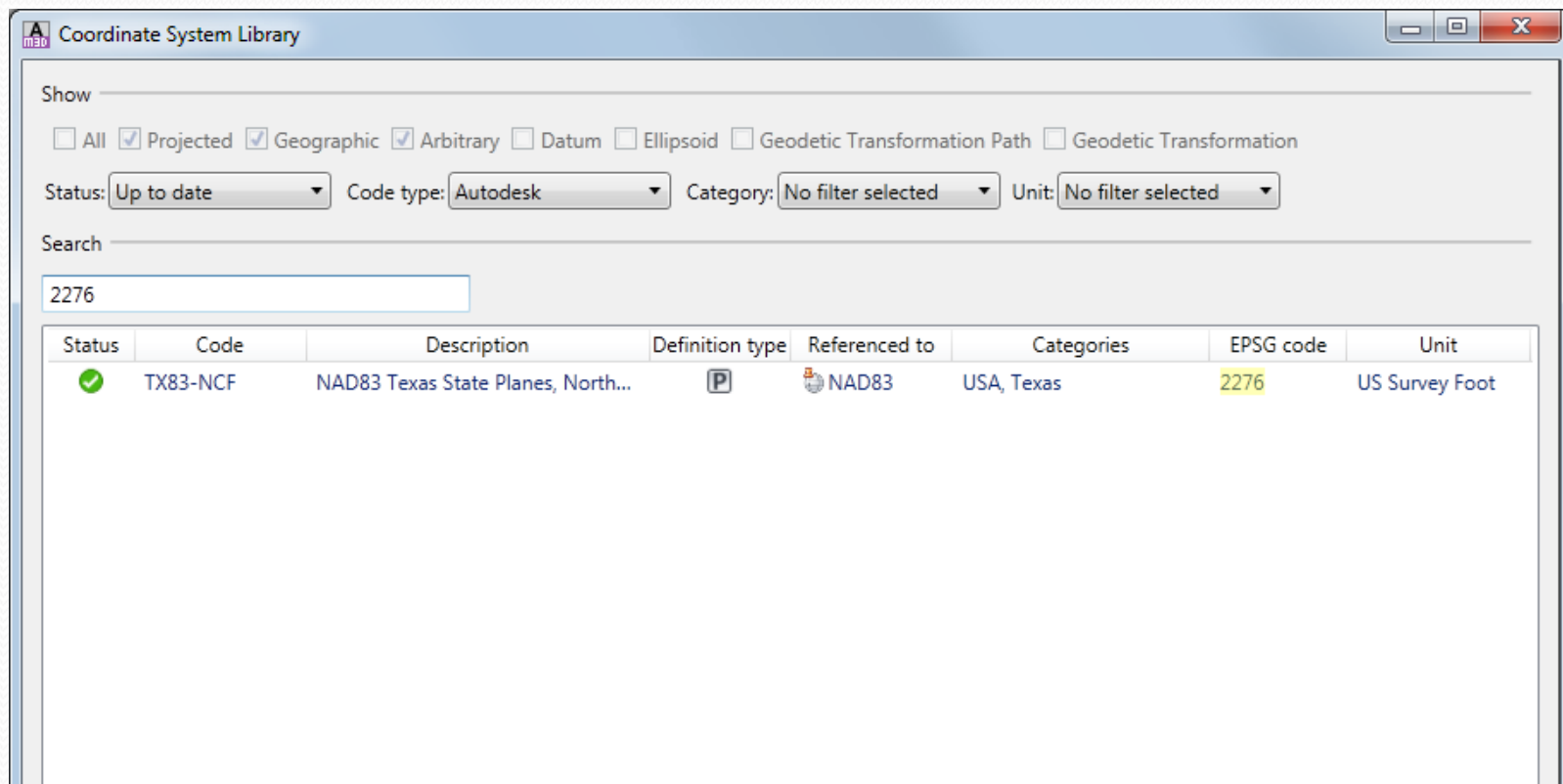
What supports it?

- ArcGIS 10.1+
 - ArcGIS 10 has the codes, but you cannot search by them



What supports it?

- AutoCAD Map3d and Civil3d
- `_ADESETCRDSYS` and `CSASSIGN`, respectively



Coordinate System

-Projection

-Parameters

-WKT

Datum

Ellipsoid

WKT

WKT OGC:

```
PROJCS["TX83-NCF",GEOGCS["LL83",DATUM["NAD83",SPHEROID["GRS1980",6378137.000,298.25722210],TOWGS84  
[0.0000,0.0000,0.0000,0.000000,0.000000,0.000000,0.00000000]],PRIMEM["Greenwich",0],UNIT  
["Degree",0.017453292519943295]],PROJECTION["Lambert_Conformal_Conic_2SP"],PARAMETER  
["false_easting",1968500.000],PARAMETER["false_northing",6561666.667],PARAMETER  
["central_meridian",-98.50000000000000],PARAMETER["latitude_of_origin",31.66666666666670],PARAMETER  
["standard_parallel_1",33.96666666666670],PARAMETER["standard_parallel_2",32.13333333333330],UNIT  
["Foot_US",0.30480060960122]]
```

WKT Oracle:

```
PROJCS["NAD83 / Texas North Central (ftUS)",GEOGCS["NAD83",DATUM["North American Datum 1983 (EPSG ID  
6269)",SPHEROID["GRS 1980 (EPSG ID 7019)",6378137.000,298.25722210],TOWGS84  
[0.0000,0.0000,0.0000,0.000000,0.000000,0.000000,0.00000000]],PRIMEM["Greenwich",0],UNIT["Decimal  
Degree",0.017453292519943295]],PROJECTION["Lambert Conformal Conic"],PARAMETER  
["False_Easting",1968500.000],PARAMETER["False_Northing",6561666.667],PARAMETER  
["Central_Meridian",-98.50000000000000],PARAMETER["Latitude_Of_Origin",31.66666666666670],PARAMETER  
["Standard_Parallel_1",33.96666666666670],PARAMETER["Standard_Parallel_2",32.13333333333330],UNIT  
["foot",0.30480060960122]]
```

WKT ESRI:

```
PROJCS["NAD_1983_StatePlane_Texas_North_Central_FIPS_4202_Feet",GEOGCS["GCS_North_American_1983",DATUM  
["D_North_American_1983",SPHEROID["GRS_1980",6378137.000,298.25722210],TOWGS84  
[0.0000,0.0000,0.0000,0.000000,0.000000,0.000000,0.00000000]],PRIMEM["Greenwich",0],UNIT  
["Degree",0.017453292519943295]],PROJECTION["Lambert_Conformal_Conic"],PARAMETER  
["False_Easting",1968500.000],PARAMETER["False_Northing",6561666.667],PARAMETER  
["Central_Meridian",-98.50000000000000],PARAMETER["Latitude_Of_Origin",31.66666666666670],PARAMETER  
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["Foot_US",0.30480060960122]]
```

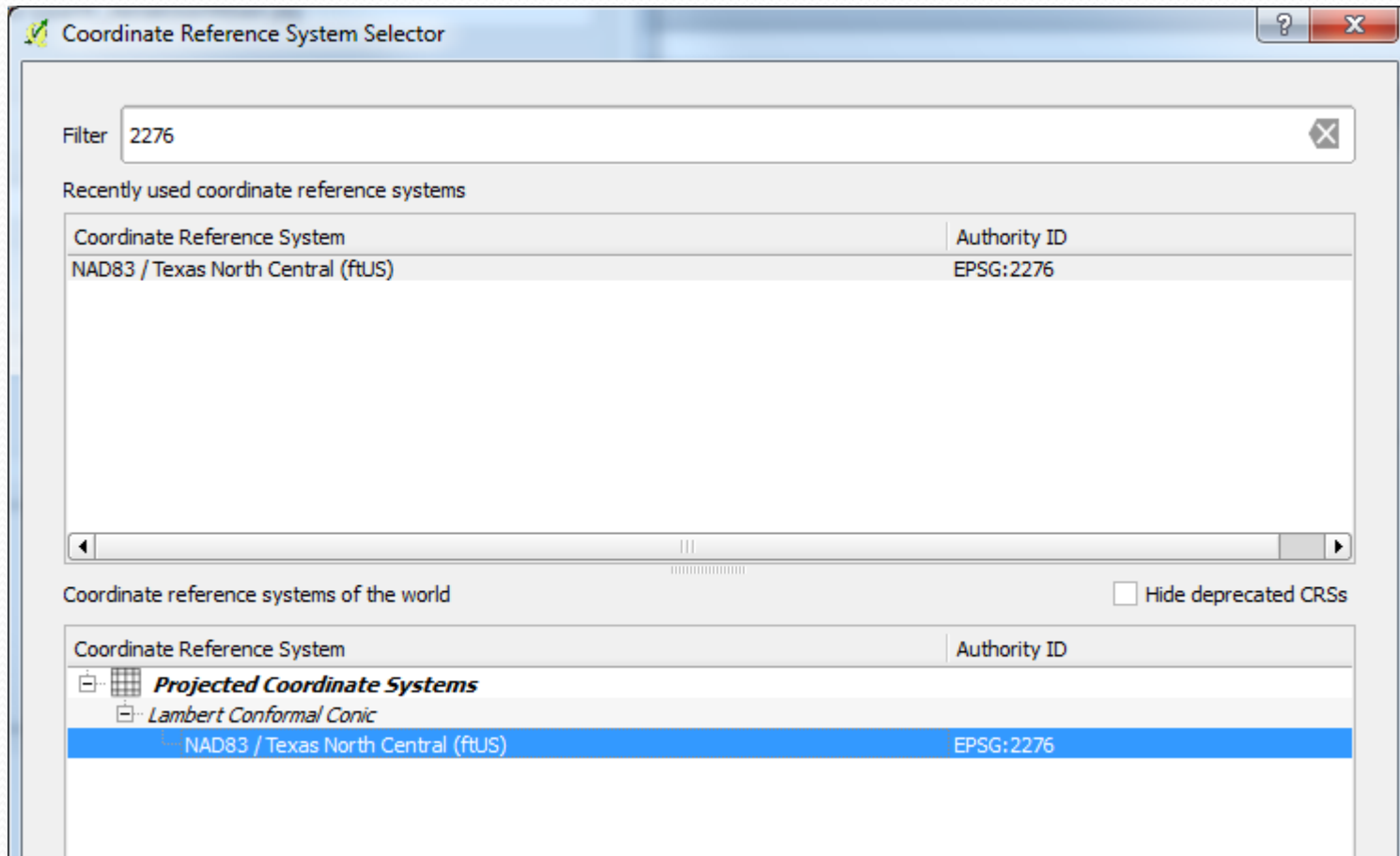
Edit

Close

Help

What supports it?

- QGIS





Databases

- MSSQL Spatial
- PostGIS
- SDE
- Oracle 10+
- MySQL



Notes

- EPSG codes explicitly define lat/long, but most systems use long/lat internally for geometry.
- EPSG codes are still often used in these cases despite ignoring axis order (IE for WGS84/4326 or NAD83/4269)
- Most software is aware of this distinction and works around it.
 - Only important if you are handling data at a very low level, such as in raw SQL.



What won't work

- For survey data, scale factors will have to be encoded in custom WKT strings that preferably reference the originating EPSG codes.
- Every software package uses a different version of the database, and figuring out the versions can sometimes be difficult
 - For most codes, this doesn't matter because they are well established and the codes don't change.
 - For newer codes (NSRS2007 and NA2010) you may not be able to explicitly use them in all software.



More Notes

- Very generally the EPSG takes code suggestions from entities that create them (NGS, USGS, States, etc.) votes on them twice a year and adds them to the database.
- Vendors often create their own SRID codes before EPSG ratifies them (IE ESRI has the NA2010 codes in 10.2)



Some resources

- All of the latest databases can be found here:
 - www.epsg-registry.com
- There is also www.spatialreference.org
 - Spatialreference is a good resource for getting WKT, SQL insert strings, and every other way you can slice and dice SRS.
 - However, like a lot of systems, it isn't up-to-date with the latest EPSG database.

http://spatialreference.org/ref/epsg/4326/

APAI | Environmental Engineer...

WGS 84: EPSG Projection -- ... x

EPSG:4326

WGS 84 ([Google it](#))

- **WGS84 Bounds:** -180.0000, -90.0000, 180.0000, 90.0000
- **Projected Bounds:** -180.0000, -90.0000, 180.0000, 90.0000
- **Scope:** Horizontal component of 3D system. Used by the GPS satellite navigation system and for NATO military geodetic surveying.
- **Last Revised:** Aug. 27, 2007
- **Area:** World

- [Well Known Text as HTML](#)
- [Human-Readable OGC WKT](#)
- [Proj4](#)
- [OGC WKT](#)
- [JSON](#)
- [GML](#)
- [ESRI WKT](#)
- [.PRJ File](#)
- [USGS](#)
- [MapServer Mapfile](#) | [Python](#)
- [Mapnik XML](#) | [Python](#)
- [GeoServer](#)
- [PostGIS spatial_ref_sys INSERT statement](#)
- [Proj4js format](#)

Input Coordinates: Output Coordinates:



[About](#)

Codes

Survey Feet projection EPSG State Plane codes

NAD Realization

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Zone	1986 HARN	NSRS2007	NA2010
T North	2275	2916	3668
e North Central	2276	2917	3666
x Central	2277	2918	3664
a South Cental	2278	2919	3674
s South	2279	2920	3672
O North	2267	2911	3640
K South	2268	2912	3641
M West	2255	2900	2590
S East	2254	2899	2598
L North	3451	3456	3551
A South	3452	3457	3553

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