

# Geospatial Vector Data Formats within ESDIS



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# Motivation



- The ESDIS Standards Office (ESO) assists the ESDIS Project in formulating standards policy for NASA Earth Science Data Systems (ESDS), coordinates standards activities within ESDIS, and provides technical expertise and assistance to standards related tasks within the NASA Earth Science Data System Working Groups (ESDSWG).
- New missions are required (strongly encouraged?) to use standards and specifications taken from the list of approved standards. <https://earthdata.nasa.gov/user-resources/standards-and-references>
- ESO has been asked to investigate current geospatial vector data formats in order to inform new missions about choices in this area.

# Today's session

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- Discuss ESIP members' geospatial format needs
  - Audience participation encouraged
- Invite community input to ESO in the form of proposed standards, specifications, or technical notes, ideally via the ESO Standards Process

# ESO Standards Process



- Designed for community input
- Community member(s) propose use of a specification, best practice, etc. in the form of an RFP (Request for Proposal)
- ESO ensures RFP conforms to editorial quality requirements, works with authors, then solicits community input:
  - Technical evaluation and feedback
    - Is the RFP implementable? Will it result in interoperability?
  - Operational evaluation and feedback
    - How well do implementations work in practice? How do users like it?
- ESO collects responses, produces a recommendation based on strengths, weaknesses, applicability & limitations
- <https://earthdata.nasa.gov/user-resources/standards-and-references>

# ESDSWG Geospatial WG



- ESDSWG output is valuable to ESO as a potential source of RFPs
- The ESDSWG Geospatial Working Group released a recommendation document in March 2015 with a comprehensive list of Geospatial vector and raster formats as well as software and tools.
  - <http://bit.ly/esdswg-geospatial-rec>
  - Covered many vector formats.
  - Recommended one format (Shapefile)

# Geospatial Vector RFP?



- ESO has not received any Geospatial Vector Format RFPs yet.
  - KML was recommended as a publishing/visualization format
  - netCDF Classic netCDF4, HDF 5, and HDF EOS 5 were recommended as data formats, but are primarily considered gridded/swath data formats, with the ability to handle point and other data.
- ESDIS can provide guidance to missions on a case-by-case basis
- ESO would welcome one or more RFPs in this area!

# Candidate Formats



	<i>Standards body</i>	<i>ESO Standard</i>
<i>Arc-Info .E00</i>		
<i>DLG</i>	<i>SDTS</i>	
<i>DWG</i>		
<i>DXF</i>		
<i>ESRI File Geodatabase</i>		
<i>GeoCSV</i>		
<i>GeoJSON</i>	<i>IETF draft-butler-geojson-05</i>	
<i>GeoPackage</i>	<i>OGC 12-128r11</i>	
<i>GeoRSS</i>	<i>OGC 06-050r3 (white paper)</i>	
<i>GML</i>	<i>OGC 07-036</i>	
<i>HDF</i>		<i>yes (HDF-5, HDF EOS 5)</i>
<i>KML</i>	<i>OGC 07-147r2</i>	<i>yes</i>
<i>netCDF</i>	<i>OGC 10-090r3 / ESO</i>	<i>yes (classic and 4)</i>
<i>Shapefile</i>		
<i>TopoJSON</i>		
<i>OGC WKT/WKB</i>	<i>OGC 06-103r4</i>	

# What are people looking for?

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- Ease of use
- Good tools
  - Commercial and Open Source
- Open documentation / Open format
- Standards body approval



# What are people looking for?

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- Archival format
  - Long-term viability
  - Confidence about support in the future
  - Embedded metadata (?)
  - More rigorous
    - e.g. precision, coordinate/spatial reference systems
- Transfer format
  - Efficient conversion
  - Core format that's extensible
  - Metadata can be out of band

# Allan's Picks

(Not the opinion of ESO! Or ESDIS. Or NASA.)



	<i>Note...</i>
<i>Arc-Info .E00</i>	
<i>DLG</i>	
<i>DWG</i>	
<i>DXF</i>	
<i>ESRI File Geodatabase</i>	
<i>GeoCSV</i>	<i>Could be interesting to ESDSWG ASCII WG</i>
<i>GeoJSON</i>	<i>Great transfer format</i>
<i>GeoPackage</i>	<i>Archival format?</i>
<i>GeoRSS</i>	<i>Specialized for Atom/RSS results</i>
<i>GML</i>	<i>The big one - needs a lot of investment</i>
<i>HDF</i>	
<i>KML</i>	<i>OK for visualization, pretty limited set of clients</i>
<i>netCDF</i>	
<i>Shapefile</i>	<i>If you have to</i>
<i>TopoJSON</i>	<i>Interesting transfer format for bigger data sets</i>
<i>OGC WKT/WKB</i>	<i>Useful as component of others</i>

# References



	<b>Reference</b>
<b>Arc-Info .E00</b>	<a href="http://www.digitalpreservation.gov/formats/fdd/fdd000291.shtml">http://www.digitalpreservation.gov/formats/fdd/fdd000291.shtml</a>
<b>DLG</b>	<a href="https://lta.cr.usgs.gov/Guides/usgs_dlg.html">https://lta.cr.usgs.gov/Guides/usgs_dlg.html</a>
<b>DWG</b>	<a href="https://en.wikipedia.org/wiki/.dwg">https://en.wikipedia.org/wiki/.dwg</a>
<b>DXF</b>	<a href="http://www.autodesk.com/techpubs/autocad/acad2000/dxf/">http://www.autodesk.com/techpubs/autocad/acad2000/dxf/</a>
<b>ESRI File Geodatabase</b>	<a href="http://www.esri.com/apps/products/download/#File_Geodatabase_API_1.4">http://www.esri.com/apps/products/download/#File_Geodatabase_API_1.4</a>
<b>GeoCSV</b>	<a href="http://giswiki.hsr.ch/GeoCSV">http://giswiki.hsr.ch/GeoCSV</a>
<b>GeoJSON</b>	<a href="https://tools.ietf.org/html/draft-butler-geojson-05">https://tools.ietf.org/html/draft-butler-geojson-05</a>
<b>GeoPackage</b>	<a href="http://www.geopackage.org/">http://www.geopackage.org/</a>
<b>GeoRSS</b>	<a href="http://www.georss.org/">http://www.georss.org/</a>
<b>GML</b>	<a href="http://www.opengeospatial.org/standards/gml">http://www.opengeospatial.org/standards/gml</a>
<b>HDF</b>	<a href="https://earthdata.nasa.gov/standards/hdf5">https://earthdata.nasa.gov/standards/hdf5</a>
<b>KML</b>	<a href="http://www.opengeospatial.org/standards/kml">http://www.opengeospatial.org/standards/kml</a>
<b>netCDF</b>	<a href="http://www.opengeospatial.org/standards/netcdf">http://www.opengeospatial.org/standards/netcdf</a> <a href="https://earthdata.nasa.gov/standards/netcdf-4hdf5-file-format">https://earthdata.nasa.gov/standards/netcdf-4hdf5-file-format</a>
<b>Shapefile</b>	<a href="https://www.esri.com/library/whitepapers/pdfs/shapefile.pdf">https://www.esri.com/library/whitepapers/pdfs/shapefile.pdf</a>
<b>TopoJSON</b>	<a href="https://github.com/mboostock/topojson">https://github.com/mboostock/topojson</a>
<b>OGC WKT/WKB</b>	<a href="http://www.opengeospatial.org/standards/sfa">http://www.opengeospatial.org/standards/sfa</a>