Australian Hydrological Geospatial Fabric (Geofabric)

Data Product Specification

Surface Catchments

Version 2.1 – November 2012

Australian Government
Bureau of Meteorology

Water Information
DATA · INFORMATION · INSIGHT

Contact details

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Preface

This document is based upon the AS/NZS ISO 19131:2008 Geographic information - Data product specifications standard[1]. The document provides a framework for the completion of a Data Product Specification (DPS) for geographic data product produced as part of the Geofabric project.

[1] AS/NZS, "AS/NZS ISO 19131:2008 Geographic information - Data product specifications" (AS/NZS, July 21, 2008), www.saiglobal.com/online/.

1 Overview

1.1 Data product specification title

Geofabric Surface Catchments

1.2 Reference date

2012-08

1.3 Responsible party

Contact organisation: Bureau of Meteorology

Contact position: Geospatial Data Unit

Mail address: GPO Box 2334

Locality: Canberra

State: ACT

Country: Australia

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1.4 Data product specification language

English

1.5 Terms and definitions

Please refer to the Glossary on the Geofabric website.

1.6 Abbreviations and acronyms

AHGF	Australian Hydrological Geospatial Fabric
ANUDEM	Australian National University Digital Elevation Model
ANUDEM Streams	ANUDEM Derived Streams V1.1.2
ANZLIC	Australian and New Zealand Land Information Council
AWRC	Australian Water Resources Council
Bureau	Bureau of Meteorology
DEM	Digital Elevation Model
DEM-9S	GEODATA 9 Digital Elevation Model Version 3
GA	Geoscience Australia

GDA94	Geodetic Datum of Australia 1994
GIS	Geographic Information System
ISO	International Organization for Standardization
DPS	Data Product Specification
ESRI	Environmental Systems Research Institute Inc.
FGDC	Federal Geographic Data Committee
NCB	National Catchment Boundaries
SDE	Spatial Database Engine

1.7 Informal description of data product

Geofabric Surface Catchments is largely based on feature classes created from ANUDEM Derived Streams V1.1.2 (ANUDEM Streams) as supplied by Geoscience Australia (GA). The GA supplied data products were integrated into the Geofabric Maintenance Geodatabase using a series of scripted procedures that created additional features and unique IDs – HydroIDs – which are generated during the data post-processing load procedures carried out by the Australian Bureau of Meteorology (Bureau). The data product is delivered as a series of related feature classes as an ESRI File Geodatabase.

Geofabric Surface Catchments is intended to support the Geofabric and provide a topographic basis for classification and reporting of analyses of subcatchments.

The AHGFCatchment polygons are converted from a regular 9 second grid delineating the National Catchment Boundaries (NCB) for the Australian continent. The NCB delineate hierarchically nested catchments derived using an automated drainage analysis procedure, based on a multi-flow extension of the version 3.1 flow direction grid associated with the 9 second DEM (GEODATA National 9 Second Digital Elevation Model [DEM-9S] Version 3, ANZLIC unique identifier: ANZCW0703011541).

At the highest levels in the hierarchy the NCB aggregate the 9 second drainage basins into 12 topographically-defined Drainage Divisions (Level 1), and 191 catchment units (Level 2), approximating the Australian Water Resources Council (AWRC) River Basins where possible (Australia's River Basins v1 GA, 1997, v1. ANZLIC identifier: ANZCW0703005427). At lower levels, the Level 2 units are subdivided into successively finer sub-catchments using a modified version of the Pfafstetter reference system (Pfafstetter), (Verdin, K. L. and Verdin, J. P. (1999), A topological system for delineation and codification of the Earth's river basins, *Journal of Hydrology*, vol. 218, no. 1–2, pp. 1–12.

The data product extent is Geographic Australia (as defined by *Acts Interpretation Act 1901*). The product will be updated periodically to reflect changed attribution and new data sources.

2 Specification scope

2.1 Scope identification

Global

2.2 Level

Dataset

2.3 Level name

Global scope

2.4 Level description

This is the default root level global scope used by this data product and relates to all data within the product.

2.5 Extent

2.5.1 Description

Data for this scope relates to Australia, excluding external territories - Geographic Australia (as defined by *Acts Interpretation Act 1901*).

2.5.2 Geographic extent

West bound longitude

112.8 °

East bound longitude

154.1 °

South bound latitude

-44.0 °

North bound latitude

-8.9 °

2.5.3 Temporal extent

Start date

1992-01-01

End date

Now

3 Data product identification

3.1 Title

Geofabric Surface Catchments

3.2 Alternate title

Geofabric Surface Hydrology Catchments 1:250,000 scale 2012

3.3 Product ID

ANZCW0503900105

3.4 Abstract

Geofabric Surface Catchments is derived from the NCB V1.1.4. This data defines a catchment for every stream segment contained within the Geofabric Surface Network product according to the DEM-9S. These stream segment level boundaries may be used individually or in aggregation. The product is designed to represent geographic surface boundaries that have a hydrological relationship to surface water features. The NCB Level 1 and NCB Level 2 features are the top two levels in the NCB Catchment hierarchy and have been provided as polygon boundaries.

This product contains one Geofabric feature type called Catchment.

It also contains three NCB feature types: NCBLevel1Drainage Division, NCBLevel2Drainage Basin, and NCBPfafstetter.

3.5 Purpose

This product is intended to support the creation or definition of topologically consistent and hydrologically enforced streamflow aggregation boundaries. The catchment attributes can be extended by linking the NCB Pfafstetter table to include the Pfafstetter reference system for identifying and aggregating catchments.

This product is intended to supplement the Geofabric Surface Cartography and Geofabric Surface Network data products. This product is also used as the basis for building contracted catchments in Geofabric Hydrology Reporting Catchments and provides a spatial framework for analysis and assessment of streams and their catchments.

3.5.1 Use case

Stream network analysis and surface hydrologic analysis by aggregated catchment boundaries.

3.6 Topic category

003 - boundaries

007 - environment

012 - inland water

018 - transportation

3.7 Spatial representation

vector

3.8 Spatial resolution

3.8.1 Spatial denominator

250,000

3.8.2 Resolution distance

250 metres

3.9 Geographic bounding box

3.9.1 West bound longitude

112.8 °

3.9.2 East bound longitude

154.1 °

3.9.3 South bound latitude

-44 °

3.9.4 North bound latitude

-8.9 °

3.10 Geographic identifier

3.10.1 Identifier authority

ANZLIC – the Spatial Information Council

3.10.2 Identifier code

AUS

3.10.3 Code space (register URL)

ANZLIC

http://asdd.ga.gov.au/asdd/profileinfo/anzlic-allgens.xml

3.11 Reference to specification scope

Global

4 Data content and structure

4.1 Description

The product consists of the following components which combine to give a complete data product:

Vector data

The data is available as an ESRI File Geodatabase: Geofabric Surface Catchments. The ESRI File Geodatabase reflects the stored environment of the data Spatial Database Engine (SDE) export format. In its native ESRI File Geodatabase format, Geofabric Surface Catchments consists of a single feature dataset/theme – SH_Catchments – containing three feature classes, one relationship class and one ancillary lookup table. The geodatabase structure provides greater efficiencies in the management and revision of source topographic data, which are now reflected in a more sophisticated data product suitable for a range of hydrological applications.

Geofabric Product Guide

This guide describes the Geofabric Surface Catchments, particularly the geodatabase format, with the aim of describing:

- important and common geospatial data characteristics
- geodatabase components and data concepts
- hierarchy of feature structure and attributes
- accuracy of the data.

Licence Agreement Creative Commons

The licence agreement details the conditions of use for the data including any referencing requirements.

4.2 Feature information

4.2.1 Application schema

Refer to Geofabric Surface Catchments – Geodatabase Product Schema V2.1 2012 available from www.bom.gov.au/water/geofabric/documentation.shtml

4.2.2 Feature catalogue

The following table lists the feature classes, their geometry and AHGF feature type number for Geofabric Surface Catchments.

Table 1 - Product Feature Type Registry for Geofabric Surface Catchments

SH_Catchments - Feature Class/TableName.Subtype(Type)	Feature Class Geometry	AHGF Feature Type Number
AHGFCatchment	polygon	21
NCBPfafstetter	na	table
NCBLevel1DrainageDivision	polygon	na
NCBLevel2DrainageBasin	polygon	na

4.3 Reference to specification scope

Global

5 Reference systems

5.1 Spatial reference system

5.1.1 Name

GDA94

5.1.2 Code

4283

5.1.3 Code space

EPSG_v65

5.2 Temporal reference system

Gregorian calendar

5.3 Vertical reference system

Not applicable

5.4 Reference system scope

Global

6 Data quality

6.1 Data quality scope

6.1.1 Scope code

Dataset

6.1.2 Extent

Australia (excluding external Territories)

6.1.3 Scope description

The data quality metadata relates to the entire dataset comprising this data product.

6.2 Data quality lineage

6.2.1 Lineage statement

Data sources

Geofabric Surface Catchments is part of a suite of Geofabric products produced by the Bureau. The geometry of this product is largely derived from the NCB V1.1.4. It consists of catchments, NCB Level 1 Drainage Divisions, NCB Level 2 Drainage Basins and the NCB Pfafstetter table. The feature class terminology for Geofabric Surface Catchments components has been modified to distinguish it in terms of the product's underlying data model.

This AHGFCatchment feature is based upon polygons converted from a regular 9 second grid delineating the NCB for the Australian continent. The NCB delineate hierarchically nested catchments derived using an automated drainage analysis procedure, based on a multi-flow extension of the version 3.1 flow direction grid associated with the DEM-9S (ANZLIC unique identifier: ANZCW0703011541).

At the highest levels in the hierarchy the NCB aggregate the 9 second drainage basins into 12 topographically-defined Drainage Divisions (Level 1), and 191 Drainage Basins (Level 2), approximating the AWRC River Basins (Australia's River Basins, GA, 1997 ANZLIC identifier: ANZCW0703005427) where possible. At lower levels, the Level 2 units are sub-divided into successively finer sub-catchments using a modified version of the Pfafstetter procedure (Verdin, K. L. and Verdin, J. P. (1999) A topological system for delineation and codification of the Earth's river basins, *Journal of Hydrology*, vol. 218, no. 1–2, pp. 1–12. This layer delineates the lowest level catchment units being the sub-catchments draining directly to a stream segment in the ANUDEM stream layer or, where there are no ANUDEM Streams, the 9 second drainage basin. The higher level catchment membership of each of these sub-catchments is derived from its NCB code.

Processing steps:

1. V1.1.4 NCB dataset is received and loaded into the Geofabric development GIS environment.
2. Feature classes from NCB are recomposed into composited Geofabric Framework Dataset feature classes in the Geofabric Maintenance Geodatabase.
3. Re-composited feature classes in the Geofabric Maintenance Geodatabase Feature Dataset are assigned unique Hydro-IDs using ESRI ArcHydro for Surface Water (ArcHydro: 1.4.0.180 and ApFramework: 3.1.0.84).
4. Feature classes from the Geofabric Maintenance Geodatabase Feature Dataset are extracted and reassigned to the Geofabric Surface Catchments Feature Dataset within the Geofabric Surface Catchments Geodatabase.

A complete set of data mappings, from input source data to Geofabric Products, is included in the Geofabric Product Guide, Appendices, which is available at www.bom.gov.au/water/geofabric/documentation.shtml

6.3 Quality scope

Global

7 Data capture

7.1 Data capture statement

This is primarily a derived data product from AusHydro v1.7.2 (AusHydro) and ANUDEM Streams. Refer to the AusHydro data lineage in the Geofabric Product Guide for information about data capture and processing of source data used to create this product.

The Geofabric Product Guide is available at www.bom.gov.au/water/geofabric/documentation.shtml

7.2 Data capture scope

Global

8 Data maintenance

8.1 Maintenance and update frequency

Irregular

8.2 Other maintenance information

The product will be updated periodically, as deemed necessary, to reflect changed attribution and new data sources.

8.3 Maintenance scope

Global

9 Portrayal information

9.1 Portrayal information

Not applicable

9.2 Portrayal scope

Global

10 Data Product Delivery

10.1 Delivery format

10.1.1 Format name

ESRI ArcGIS File Geodatabase

10.1.2 Format version

ArcGIS v9.3

10.1.3 Language used within the dataset

English

10.1.4 Character set coding

Utf8

10.2 Delivery medium

10.2.1 Units of delivery

National dataset

10.2.2 Estimated size of a unit in the specified format

SH_Catchments.gdb = 873 MB

10.2.3 Medium name

onLine

10.2.4 Online delivery URL

www.bom.gov.au/water/geofabric/download.shtml

10.3 Other delivery information

Also supplied as ESRI Shapefiles (requires written request to ahgf@bom.gov.au)

10.4 Delivery scope

Global

11 Additional information

11.1 Additional information

Licensing and access constraints

Licensed for use under Creative Commons Australia Attribution.

We request attribution as © Commonwealth of Australia (Bureau of Meteorology) 2012.

Special features of the supplied data product or its component parts

Spatial data in the ESRI File Geodatabase, Geofabric Product Guide and Geofabric Data Product Specifications.

Limitation or constraints on product use

As per Creative Commons Australia Attribution licence.

Layer files or queries that operate on the data product

Geofabric Surface Catchments – V2.1.lyr

Related data products

- Geofabric Surface Cartography
- Geofabric Surface Network
- Geofabric Groundwater Cartography
- Geofabric Hydrology Reporting Catchments
- Geofabric Hydrology Reporting Regions.

11.2 Additional information scope

Global

12 Metadata

Metadata format requirements

Metadata compliant with ANZLIC Metadata Profile Version 1.1 of AS/NZS ISO 19115 was produced for this data product. The metadata profile is available at dataset level. Feature level metadata is provided within the ArcGIS ArcCatalog FGDC style sheet for all feature types included within this product and describes the lineage of feature.

Metadata encoding requirements

ArcGIS FGDC and ANZLIC compliant feature metadata.

References to metadata for data product and component parts

An ISO 19115 compliant XML file of the Geofabric Surface Catchments metadata statement accompanies the Product (SH_Catchments.xml) and is viewable using either the ArcGIS ISO 19139 ArcCatalog metadata style sheet or the ANZMet Lite version 1.0.1 metadata creation tool available from http://www.spatial.gov.au

Water Information
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Through the *Water Act 2007*, the Australian Government has given the Bureau of Meteorology responsibility for compiling and delivering comprehensive water information across Australia.

For more information
Visit our website at www.bom.gov.au/water
Send an email request to waterinfo@bom.gov.au

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