



**Australian Government**

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**Geoscience Australia**

**Water Observations from Space Filtered Statistics 25m 2.1.5  
Product Description**

**eCat: #81568**

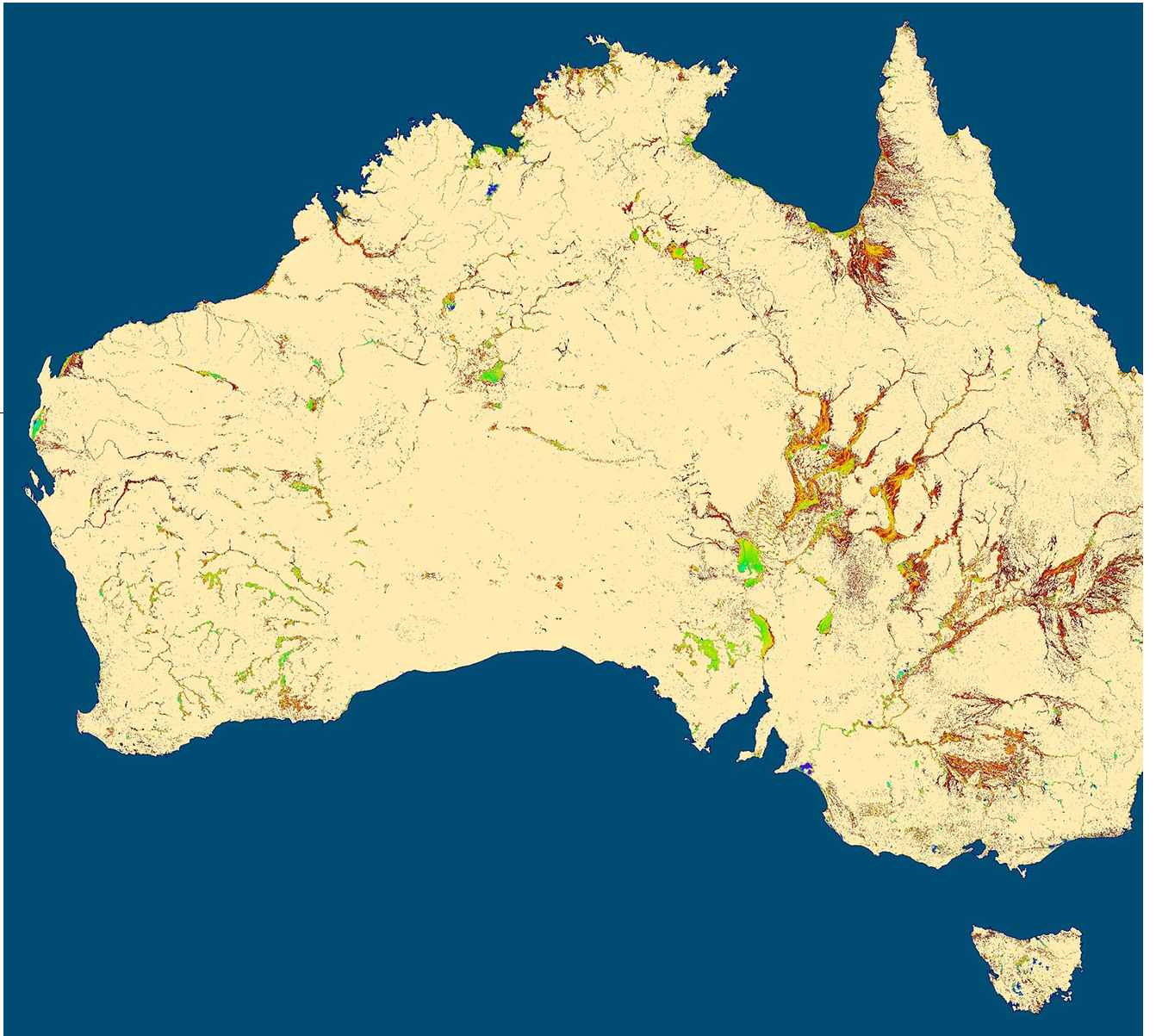
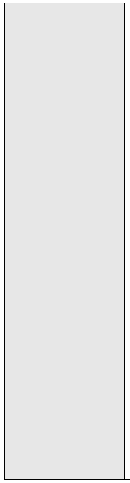
**[doi:Water Observations from Space article in Remote Sensing of Environment](#)**

**[Unclassified](#)**

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## Product Description: Summary Description

Sheet A.1 Definition and usage	
<b>Product Name</b>	Water Observations from Space Filtered Statistics 25m 2.1.5
<b>Title</b>	<a href="#">WO-FILT-STATS_25_2.1.5</a>
<b>Product Overview</b>	<p>Water Observations from Space Filtered Statistics (WO-FILT-STATS_2.1.5) is a set of gridded datasets derived from the WOfS-STATS dataset. WO-FILT-STATS provides two statistical datasets:</p> <ol style="list-style-type: none"> <li>1. the confidence (or probability) that a water observation in this location is correct. This is a percentage, based on a number of factors including the slope of the land and the existence of corroborative evidence.</li> <li>2. The percentage of clear observations on which water was detected, masked where the confidence is less than 10%.</li> </ol>
<b>Product Features</b>	<p>WO-FILT-STATS adds to the WO-STATS dataset to deliver surface water statistics of the WofS data filtered for a computed confidence level. The confidence is produced using a logistic regression that compares the WofS water summary to several other datasets that inform of the presence of water in the landscape. Once calculated the confidence is then used to mask the water summary to provide a filtered water summary that gives a reduced noise version of the water summary for public consumption. The two datasets available in WO-FILT-STATS are:</p> <ol style="list-style-type: none"> <li>1. Confidence: a value assigned to each pixel based on a statistical analysis of factors, including topographic position, elevation and slope and other independent satellite observations of water observation frequency. It indicates how well the Summary indicates the presence of water in a pixel.</li> <li>2. Filtered Water Summary: produced by combining the Water Summary and Confidence outputs to mask out those areas where Confidence is less than 10%. Online display of the Water C Space suite of products defaults to the Filtered Water Summary.</li> </ol>
<b>Product Versions</b>	2.1.5
<b>Product Background</b>	<p>The WOfS product is a key component of the National Flood Risk Information Portal (NFRIP), developed by GA. The objective of Water Observations from Space is to analyse GA's historic archival imagery to derive water observations, to help understand where flooding may have occurred in the past. The collection of many hundred thousand WOfS that make up WOfS are too cumbersome to present and deliver WOfS in a more easily digestible form, and provides understanding of water in the landscape. WO-FILT-STATS provides extra information to give a confidence in whether water is likely in the locations shown by the other WOfS products and provides a final, "cleaned" summary of water over time.</p> <p>WO-FILT-STATS is created from the WOfS-STATS statistics (WO-STATS_25_2.1.5) derived from water classification (WO_25_2.1.5).</p> <p>Reviews of prototype products identified the need to indicate the level of confidence for the surface water observations. The confidence level will help the user to distinguish between unusual detections (such as flood plains which might only be observed as water once in the 15 year interval) and 'false positives' which can be caused, for instance, by steep shady slopes. The confidence is determined through a multiple logistic regression of water observations against several factors that would either support or contradict the finding of water being present at the site. The factors used are:</p> <p><b>MrVBF</b>, a multi-resolution valley bottom flatness product (Gallant et al., 2012) derived from Shuttle RADAR Topographic Mission (SRTM) data as part of the Terrestrial Ecosystems Research Network. Surface water pixels identified in valley bottoms were more likely to be positively detected.</p> <p><b>Slope</b> derived from SRTM Digital Surface Models. Water pixels on a slope were considered less plausible than those on a flat surface.</p> <p><b>MODIS Open Water Likelihood (OWL)</b> (Ticehurst et al, 2010) provides a plausibility based on an independent water detection algorithm employing the MODIS sensor. If both detection algorithms agree on the presence of a surface water pixel, there is a greater plausibility that the detection is correct.</p> <p><b>Observation Frequency (P)</b>, the number of observations of water as a fraction of the number of clear observations of the target pixel. P is high for more permanent water bodies.</p> <p><b>Built-Up areas</b> indicating areas of dense urban development. In such areas the water detection algorithm struggles to cope with the deep shadows cast by multi-story buildings and the spectral response created by structures. The Built-Up layer is derived from the Australian Bureau of Statistics ASGS 2011 dataset, for urban centres of populations of 100 000 and over.</p> <p>Once calculated the Confidence is used to filter the Water Summary from WO-STATS where confidence is &lt;10% to create the Filtered Water Summary.</p>
<b>Potential Applications</b>	<p>The primary purpose of the WOfS product suite is to help understand where flooding may have occurred in the past. This has application in emergency management and risk assessment. The product has many secondary uses. For example the products provide an indication of the permanence of surface water in the Australian landscape by showing where water is observed rarely to where it is often observed. This has application in water management and mapping. The products have also been used for wetland analyses, water connectivity and surface-ground water recharge.</p>
<b>Expected Lifespan</b>	
<b>Images</b>	



## B Specification

Sheet B.1 Provenance and Algorithms	
<b>Data Sources</b>	<ol style="list-style-type: none"><li>1. <a href="#">WO-STATS_25_2.1.5</a></li><li>2. <a href="#">SRTM DSM/DEM data</a></li><li>3. <a href="#">Multi-resolution Valley Bottom Flatness</a></li><li>4. <a href="#">MODIS Open Water Likelihood</a></li><li>5. <a href="#">ASGS Built-up Areas</a></li></ol>
<b>Major Algorithms</b>	<ol style="list-style-type: none"><li>1. <a href="#">Water Observations from Space Detection Algorithm 1.2</a></li></ol>
<b>Processing Sequence</b>	<ol style="list-style-type: none"><li>1. <a href="#">WOfS Confidence calculation</a></li><li>2. <a href="#">WOfS Summary Filtering</a></li></ol>
<b>Validation of Underlying Algorithms</b>	The quality of WOfS-FILTERED-STATS is verified by visual inspection, to find instances of processing failure or issues relating to upstream data quality issues. Any detected issues are related to the DEA Pipeline and Core teams for checking and rectification.
<b>Accuracy and Limitations</b>	<p>Please refer to the SR-N_25_2.0.0 Product Description (GA, 2013) for the accuracy and limitations of the atmospheric, BRDF and topographic shading processing sequence. Please refer to Mueller et al. 2016 for details on the accuracy and limitations of WOfS, WOfS-STATS and WOfS-FILT-STATS.</p> <p>WO-FILT-STATS provides a filtered summary of water classification results from the WOfS product for all of Australia. As WOfS cannot perfectly filter out misclassifications due to clouds, cloud shadows and issues to do with satellite sensor problems (such as the Landsat 7 SLC-Off failure), the summary also contains these misclassifications. In general misclassifications occur in the very low frequency observations and so can cause a misrepresentation of flooded areas. The confidence filtering process in WO-FILT-STATS reduces the noise displayed in the Water Summary, making it easier to understand for the general user.</p>

## C Availability

Sheet C.1 Licencing and Access	
<b>Support</b>	Supported
<b>Licencing</b>	<a href="#">CC BY Attribution 4.0 International License</a>
<b>Search Tool</b>	
<b>Preview Facility</b>	
<b>Ordering and Distribution</b>	<a href="#">Commonwealth of Australia (Geoscience Australia)</a>

## References:

- WOfS v1.5 (previous version): Geocat #81568