

## Tile-based web mapping for the era of open data

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**Abstract:** Geospatial Information Authority of Japan (GSI) has been operating a tile-based web mapping service since 2003. The service is named "GSI Maps," and its users are keeping increasing. GSI Maps provides topographic maps, orthophotos, more than 300 thematic layers, and disaster information. Moreover, GSI provides direct access to tile data for GSI Maps. The tile data are named "GSI Tiles" and are provided according to a specification called 'slippy map tilenames,' which many programming libraries support. Thanks to the adoption of a widely used specification, various applications are emerging and GSI itself got good choices of programming libraries for GSI Maps. For example, GSI Maps are once realized using two open source solutions named OpenLayers and OpenScales, while GSI Maps are now realized using Leaflet, other open source solution. This is realized because software and data are clearly separated using 'slippy map tilenames.' Because GSI Tiles are independent from any specific software, we believe tile-based web mapping is suited for the era of open data.

The GSI Tiles contain not only images, but also contain elevation data. Moreover, GSI started to provide vector tiles experimentally. These enabled the output of 3D models and tactile maps from 3D printers.

According to these experiences, tile-based web mapping is considered to be a scalable way for web mapping because it is based on the dissemination of static resources. The tile data can easily be cached in cache servers or moreover in a contents delivery network (CDN), or also be cached in browser caches. This nature enables higher performance and also wider applications such as off-line applications.

Since July 2014, GSI has also started GSI Maps Partner Network, where various developers who use GSI Tiles can exchange information and can address various issues. Currently about 100 partners are participating in this network. The first conference for the network was held in November 2014. Among other proposals, the need for small discussion workshops was emphasized. Several results from the second conference to be held in February 2014 would be provided.

Because close relationship with users and developers is essential, GSI makes use of social network services and also a social coding service. Tweets from the official twitter account for GSI Maps (@gsi\_cyberjapan) includes not only service update information or service maintenance information but also includes the announcement of the availability of disaster information for earthquakes, typhoons, heavy rains, etc. Various development and experiment projects are hosted under official GitHub account for GSI Maps (gsi-cyberjapan), and GSI is getting several feedbacks from various developers. Such social coding activities are good not only for code hosting, but also good for bug tracking, documentation, and capability development.

**Keywords.** tile-based web mapping, GSI Maps, GSI Tiles