

Dynamic Contextualization: Redefining User-Driven Base Map Interaction within the Atlas of Switzerland Web

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Abstract:

As part of the reengineering of the National Atlas of Switzerland (AoS), away from a desktop application towards a web-based atlas, the base maps are being completely overhauled. This process starts with conceptual work and continues through to the visual design and technical implementation, as well as the integration into the new atlas's user experience. The previous version of the atlas (AoS 4) was released in 2016. Based on a digital globe, it covered mainly spatial topics within Switzerland or with reference to Switzerland on a global scale. Drawing on the idea that a base map is a "container" for further geospatial content, that enhances the map information and the user experience of a map and given the plethora of more than 400 thematic map topics, the concept of static base maps was redefined in the atlas (cf. Lambert and Zanin 2020, p. 193). Consequently, AoS 4 provided three "backgrounds" representing colored relief, shaded relief and a satellite image. On top of these rasterised layers, the atlas user could select vector-based "elements" representing waters, glaciers, mountain peaks and passes, forests, towns and villages, roads, railways, and administrative boundaries. Additionally, labels could be toggled on or off independently of their associated elements. All elements and labels had the same styling regardless of the background. The ability to customise the context of a map interactively was a significant part of the map-making experience, putting it into the hands of the users. This selection process, as part of the generalisation workflow, enabled users to enrich and file fixed thematic content according to their needs and spatial understanding. Previously, cartographers had classified, symbolised and simplified the base map content in accordance with cartographic principles, technical restrictions and editorial context, to maintain a meaningful balance between thematic content and base map (cf. Dent, et al. 2009). These fundamentals also serve as a foundation for the base maps in the new atlas version. There were three main reasons why new base maps were needed for the latest version of the atlas:

Efficient and more frequent base map updates.

Previously, all the necessary base map data was collected from different data providers, processed and stored on our own infrastructure. This made regular updates difficult. A fact that was offset by highly simplified map elements with a limited spatial detail. To keep up with data changes, the new atlas is using swisstopo [<https://www.swisstopo.admin.ch/en>] and OSM [<https://www.openstreetmap.org/>] data composed by MapTiler.

The switch from an exclusive 3D atlas to a new, 2D-focused atlas, while retaining the potential to display selected topics in 3D in a future release.

Creating base maps exclusively for 3D maps presents particular challenges, such as performance limitations at certain scales and levels of detail, and specific styling implications in a more dimensional virtual space. As the web version of the atlas is currently only in 2D, the focus of the base maps had to be shifted to 2D as well. Technical innovations in web-cartography now allow detailed, high-performance base maps with more details at larger scales. Mapbox Vector Tiles [<https://docs.mapbox.com/data/tilesets/guides/vector-tiles-standards/>] now enable us to utilise the extensive data sets provided by swisstopo and OSM. The cartographic styling of the new base maps, implemented with MapLibre style [<https://maplibre.org/maplibre-style-spec/>], balances the information load and visual appearance for map users.

Implementation of a new design language in the UI as well as an update to a contemporary UX. This encouraged significant changes to the base map structure and the styles.

In contrast to AoS 4, where vector elements remained stylistically static regardless of the background, the new version employs distinct style languages that unify backgrounds, vector elements, and labels for different base map styles. Technically comparable to a cartographic mashup, this design language facilitates a novel visual synthesis where the base map and thematic data are perceived as a single, cohesive entity (cf. Mericskay 2023). This framework allows

editors to create definite "map compositions" from base map and thematic layers, while simultaneously elevating user agency. Users are empowered to actively rearrange and redefine the map by toggling elements or switching backgrounds to expose complex spatial interdependencies according to their individual needs. This dynamic interaction is technically enabled by semantic layer interleaving, which ensures that even as users manipulate the content, a clear visual hierarchy is maintained, and essential labels remain prioritized (cf. Spiess 2023).

In addition to the standard provision of an imagery base map and a familiar base map style, such as swisstopo's Light Base Map [<https://www.swisstopo.admin.ch/en/web-maps-light-base-map>], three multipurpose styles have been created to cover a wide range of thematic contexts (Figure 1).

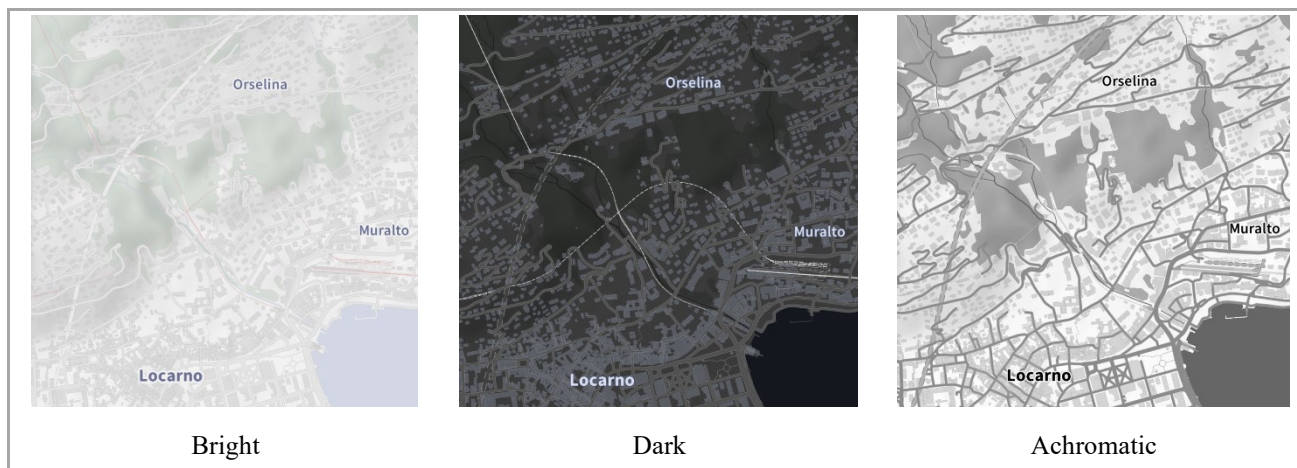


Figure 1. Newly created Base Map styles for the [Atlas of Switzerland](#) (beta). © swisstopo, MapTiler, OpenStreetMap contributors

Following the tradition of the colour shaded relief in AoS 4, the Bright base map style keeps forests, glaciers and waters in traditional, natural colours, while keeping the overall colour tone bright to allow for more contrasting colours within the thematic layer stack. The red colour of the railway and public transportation base map layers serves as a tribute to the colouring in the famous swisstopo base maps. The Dark base map is antithetical to the Bright base map and allows for even more vibrant colours in the thematic layer stack. Additionally, it conveys a sense of night-time or the darker times of the year, making it ideal for topics related to night, winter and Christmas. Furthermore, depending on the time of day, a darker colour scheme is perceived as easier on the eyes. The third new base map style is Achromatic. Designed to make the atlas more accessible to people with colour vision deficiencies, it keeps the focus of map compositions on the thematic content while minimising the visual prominence of the base map.

The next challenge will be the transfer of the newly created base maps into the 3D environment that is currently under development.

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