Towards a Distortion Free National Spatial Data Infrastructure in Switzerland: Approach, Developed Tools and Internet Services for the Change of the Reference Frame

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Key words: Cadastre; Geoinformation/GI; GSDI; Reference frames; Reference systems; Internet Transformation Services; Rectification of Reference Frames

SUMMARY

In the nineties, the national mapping agency of Switzerland, swisstopo, established a new, distortion free reference frame LV95 in Switzerland related to the European one ETRF93. Following this task, different transformation methods, e.g. FINELTRA (affine transformation by finite elements), have been developed in collaboration with the Swiss Federal Institute of Technology to be able to transform the data of the National Spatial Data Infrastructure SDI from the historical reference frame LV03 to the new one in high accuracy. The federal law for geo-information stipulates now that all the reference datasets have to be transformed until 2016 the latest and for the other base data sets until 2020. So swisstopo was requested to develop different software tools, libraries and services for the reference frame change to support the different stakeholders best possible. In a first step, the client solution GeoSuite with the modules REFRAME and TRANSINT have been developed. This software is not only able to transform or inter-polate geo data sets in different formats, it also provides direct access to all data sets in the SDI of Switzerland over an integrated application programming interface API as well as to any Web Map Services WMS available. With this visualization module, the results of a transformation or interpolation can be easily analysed or documented. Furthermore, all the transformation and interpolation algorithms are available as dynamic link library DLL for the integration in third part products, e.g. in GIS extensions for cadastral works, or for the development of Plugin's, e.g. realized for FME by swisstopo itself. In a second step, a set of Internet services have been developed: 1. Transformation services as Machine2Human M2H service for all the usual geo formats and as Machine 2Machine M2M service for real-time transformation in the federal geoportal > map.geo.admin.ch or for the Swiss positioning service swipos. swipos can offer so GNSS corrections for the two reference frames 2. Interpolation services for the conversion of geodata sets on the very local level with big distortions based on deformation grids 3. Visualisation services for desktop and mobile devices, e.g. all the survey mark protocols with old and new coordinates and different metadata are available or a map with the expected transformation accuracy for all Switzerland 4. Download services for DLL's and transformation data sets With these different tools, the georeferencing of the SDI of Switzerland can be easily converted to the new reference frame LV95 in the next couple of years. Some cantons (state level) have already transformed their SDI's successfully.