

# Engineers of Map Art – 170 Years of Cartography at ETH Zurich

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## Abstract:

The Institute of Cartography and Geoinformation (IKG) at ETH Zurich celebrates its 100<sup>th</sup> anniversary in 2025. Founded by Professor Eduard Imhof in 1925, its history is currently being explored by institute members. To commemorate this milestone, a commemorative volume will be published (Figure 1), and a scientific colloquium is scheduled on 4/5 September 2025 in Zurich to showcase historical insights and ongoing research. This abstract highlights the history, key persons (Figure 2), and contributions of ETH Zurich's cartography efforts.

ETH Zurich, established in 1855 as part of Switzerland's first major national projects, aimed to train specialists for industrialisation and infrastructure projects like the Gotthard Railway. Johannes Wild (1814–1894) was the first professor of cartography at the ETH. He oversaw the creation of the innovative Zurich cantonal map (1:25,000, 1840–1851) with contour lines and clearly defined colouring. His contribution laid the foundation for scientific cartography in Switzerland and his map inspired the national 1:100,000 Dufour Map and the 1:25,000/1:50,000 Siegfried Map. Despite being a dedicated teacher, his research output was limited, focusing instead on cartographic and geodetic instruction.

Wild's student, Fridolin Becker (1854–1922) continued the tradition by focussing on cartographic aesthetics and artistic representation. His map works were geometrically precise and artistically valuable. He became a pivotal figure, advancing terrain representation through innovative hand-drawn techniques, including shading and coloured reliefs, which later influenced Swiss school maps and tourist maps.

Becker's successor, Eduard Imhof (1895–1986), the third professor, left his mark on ETH cartography with pioneering mountain depictions and introduced the integration of (partly coloured) relief shading. He continued Becker's advancements in terrain depiction and elevating cartography with projects like the Swiss Middle School Atlas (now Swiss World Atlas). He later specialised in thematic cartography, producing works such as the Atlas of Switzerland and helping establish the International Cartographic Association. Imhof independently founded the Institute of Cartography in 1925, which is recognised as one of the world's oldest academic cartography institutes. His motto, 'Omit and omit again', still influences cartographic generalisation today.

Under Ernst Spiess (born 1930), a student of Imhof, the institute transitioned to digital production methods. Cutting-edge cartographic systems were introduced in the 1970s and 1990s, significantly enhancing the production of thematic maps for the Atlas of Switzerland. His work contributed significantly to the transformation towards modern digital maps.

Since 2011, the institute has been led by two professorships—Geoinformation Engineering (M. Raubal) and Cartography (L. Hurni, since 1996)—focusing on managing vast geospatial datasets, addressing energy and mobility challenges, and advancing interactive visualisation techniques.

The engineering environment of ETH Zurich has significantly shaped the activities of its professorships over the past 150 years. Initially, Wild and Becker took on numerous engineering projects, such as designing plans for hydraulic engineering and railway construction. Later, Imhof shifted the focus toward enhancing production and visualisation techniques for school and atlas map projects. Under Ernst Spiess, the era of digital transformation began, leading to significant advancements in the efficient production of maps while preserving and enhancing cartographic design. Today, the emphasis is on managing vast amounts of spatial data, with research driven by contemporary demands in

energy and mobility. Additionally, application-oriented interaction and visualisation play a crucial role in processing and developing this often highly diverse geodata.

This contribution also shows how ETH cartography has evolved over the decades, based on the research for the aforementioned commemorative publication. It can be demonstrated that the colouring and shading principles of today's coloured Swiss style relief maps are already based to some extent on Hans-Conrad Gyger's map of the Canton of Zurich from 1667. The depiction technique was adapted by Fridolin Becker in his map of the canton of Glarus and later perfected by Eduard Imhof in his relief maps for school atlases. In the field of thematic cartography, the preliminary work of Becker and Imhof's school atlases also made a decisive contribution to the current design of cartographic teaching aids for geography lessons. Finally, it can be shown that Imhof already had visionary ideas for mapping systems that extracted automatic features from overhead imagery and thus providing cartographic foundations for topographic maps. Today, such workflows have already been realised to some extent using machine learning methods and neural networks.



Figure 1. Commemorative volume celebrating 170 years of Cartography at ETH Zurich (English version under preparation).

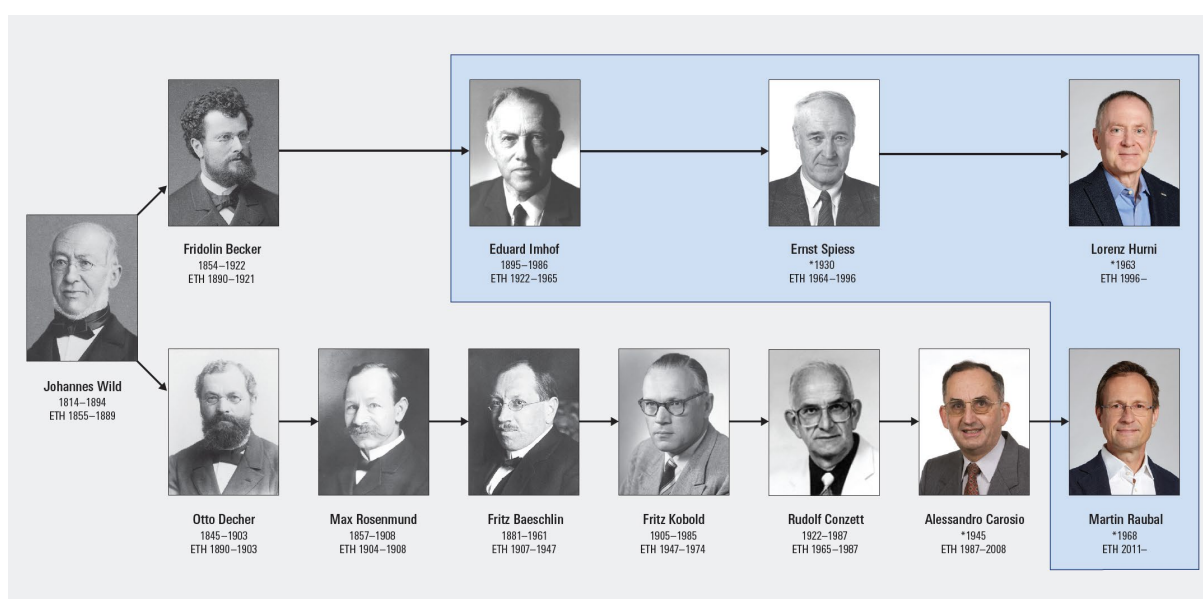


Figure 2. Genealogical tree of cartography and GIS professors at ETH Zurich. Members and former members of the institute are highlighted in blue.