

Grids & Datums

REPUBLIC OF SLOVENIA

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“Slovenia was originally settled by Illyrian and Celtic peoples. It became part of the Roman Empire in the first century *B.C.* The Slovenes were a south Slavic group that settled in the region in the 6th century *A.D.* During the 7th century, the Slavs established the state of Samu, which owed its allegiance to the Avars, who dominated the Hungarian plain until Charlemagne defeated them in the late 8th century” (*InfoPlease, 2011*).

“According to the 16th century French political philosopher, Jean Bodin, Slovenes practiced the unique custom of the Installation of the Dukes of Carinthia for almost 1,000 years, until the late 14th century. According to some scholars, Bodin’s account of how Slovene farmers contractually consented to be governed by the Duke influenced Thomas Jefferson’s drafting of the Declaration of Independence. From as early as the 9th century, Slovenia had fallen under foreign rulers, including partial control by Bavarian dukes and the Republic of Venice. With the exception of Napoleon’s 4-year tutelage of parts of Slovenia and Croatia – the ‘Illyrian Provinces’ – Slovenia was part of the Habsburg Empire from the 14th century until 1918. Nevertheless, Slovenia resisted Germanizing influences and retained its unique Slavic language and culture. In 1918, Slovenia joined with other southern Slav states in forming the Kingdom of Serbs, Croats, and Slovenes as part of the peace plan at the end of World War I. Renamed in 1929 under a Serbian monarch, the Kingdom of Yugoslavia fell to the Axis powers during World War II. Following communist partisan resistance to German, Hungarian, and Italian occupation and elimination of rival resistance groups, socialist Yugoslavia was born under the helm of Josip Broz Tito. On June 25, 1991, the Republic of Slovenia declared its independence” (*U.S. Dept. of State Background Notes, 2011*).

Slovenia is bordered by Austria (330 km) (*PE&RS, March 2004*), Croatia (455km), Hungary (102 km) (*PE&RS, April 1999*), and Italy (199 km) (*PE&RS, August 2005*). Slightly smaller than New Jersey, Slovenia has a 46.6 km coastline on the Adriatic Sea (0 m), and the highest point is Triglav (2,864 m), near the Italian/Austrian tripoint (*World Factbook, NGA Geonames Server and Google Earth, 2011*).

Thanks to Michael Rittri, “the MGI (Ferro) datum covered both Austria and former Yugoslavia, but when the countries switched to the Greenwich meridian, Austria assumed that Ferro was 17° 40’ 00” west of Greenwich, while Yugoslavia assumed it was 17° 39’ 46.02” west (the Albrecht value). So, when using MGI with Greenwich, one must distinguish between MGI (Greenwich, Austria) and MGI (Greenwich, Yugoslavia), since longitudes differ by 13.98”, about 300 meters. The MGI datum was finalized in 1901, but the switch to Greenwich occurred later (in the 1920s?). A new adjustment was made in Yugoslavia in 1948. This datum is known as D48, at least in Slovenia, and it was (probably) designed to be a minor improvement, in the sense that some distortion was removed,

but that coordinates are not changed more than a couple of meters (compared to MGI 1901). This D48 system was definitely adopted in Slovenia. Slovenia has later made a densification of the European ETRS89 datum; this is known as D96 in Slovenia, or ‘Slovenia Geodetic Datum 1996’ in the EPSG database (EPSG: 6765).

“I think the datum transformations currently published by EPSG from ‘MGI’ to WGS84 will work fine, if you respect their Area of Use. Just remember that if the Area of Use is in Austria, then ‘MGI’ is really the Austrian MGI. And if the Area of Use is in former Yugoslavia, (*PE&RS, September 1997 – Ed.*) then ‘MGI’ is really the Yugoslavian MGI (or possibly the 1948 version of the Yugoslavian MGI).”

The most common grid found on the D48 datum referenced to the Bessel 1841 ellipsoid of revolution where $a = 6,377,397.155$ meters and $1/f = 299.1528128$ is the Yugoslavia Reduced Gauss-Krüger Transverse Mercator, and is still used in Slovenia. The scale factor at origin ($m_0 = 0.9999$), the central meridian of the belt C.M. = $\lambda_0 = 15^\circ$ East of Greenwich and the False Easting at C.M. = 500 kilometers. The D48 datum, a readjustment of the Hermannskogel 1871 datum is still referenced to the Bessel 1841 ellipsoid. Recent adjustments and observations with GPS receivers have resulted in a new datum realization for Slovenia to the European Terrestrial Reference System of 1989 (ETRS89). The 7-parameter Helmert transformation published for Slovenia from SI_D48 datum to ETRS89 datum is where: $\Delta X = +426.9$ meters, $\Delta Y = +142.6$ meters, $\Delta Z = +460.1$ meters, Scale = $+17.1 \times 10^{-6}$, Z-rotation (ω) = -12.42 seconds, Y-rotation (ψ) = $+4.49$ seconds, and X-rotation (ξ) = $+4.91$ seconds. A test point provided is from SI_D48: $\phi = 45^\circ 36' 54.72''N$, $\lambda = 14^\circ 01' 59.52''E$, $X = 5,052,752.959$ m, $Y = 424,607.776$ m, ETRS89: $\phi = 45^\circ 36' 53.733''N$, $\lambda = 14^\circ 01' 42.771''E$, $X = 5,051,723.46$ m, $Y = 424,258.16$ m.

A complete series of datum transformations has been published in the open literature for Slovenia that are grouped according to specific areas within the country. Although the language used is Slovenian, the parameters are easily discerned. One series of parameters are grouped into three separate regions of the country, another series are grouped into seven separate (smaller) regions. Obviously, the smaller the region the greater the transformation accuracy.



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