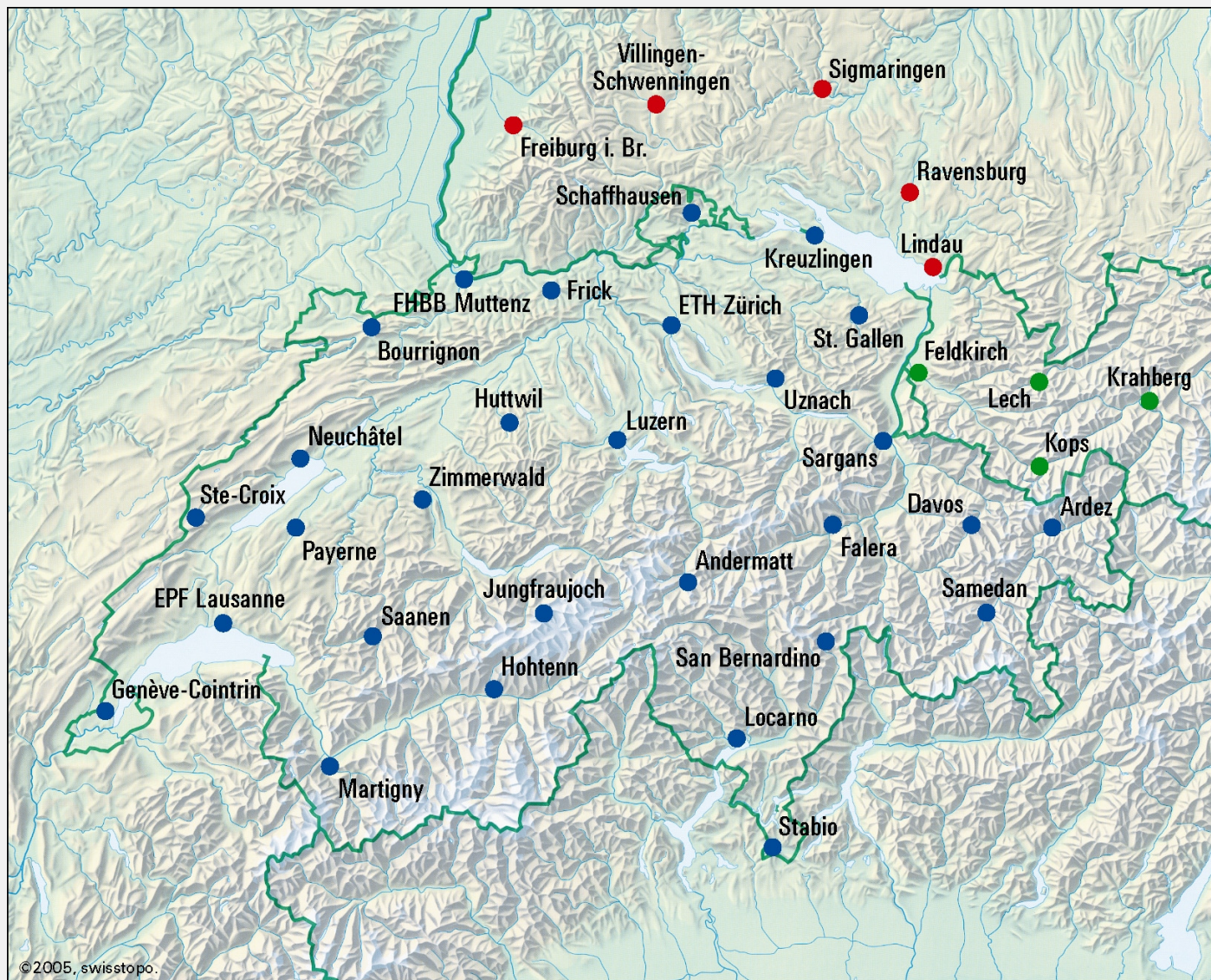


Bundesamt für Landestopografie
Office fédéral de topographie
Ufficio federale di topografia
Uffizi federal da topografia

Coordinate comparisons Germany-Austria-Switzerland

E. Brockmann

D-A-CH Positioning



Measurements: Border D-CH

- goal: estimation of the border CH /D near Basel in ETRS89 and comparison of SAPOS® -VRS / swipos® -VRS
- 66 points measured by LVA Baden-Württemberg (1. - 3. 2. 2005; non real time)



Analysis (Postprocessing)

- Download: a) SAPOS[®]-VRS (www.zentrale-stelle.sappos.de)
b) *swipos*[®]-VRS (www3.swisstopo.ch)
- Postprocessing with identical VRS-software (GPSNet from Trimble) using identical Rover data
- Differences of the GPSNet-Parameter (Reference coordinates, antenna offsets etc.)

Reference coordinates of the positioning services		
Country	DE	CH
Service	SAPOS [®] -VRS	<i>swipos</i> [®] -VRS (AGNES)
Reference system	ETRS89	ETRS89
Reference network	DREF91	LV95
Reference frame	ETRF91	CHTRF95= ETRF93

Results

- Good agreement of SAPOS[®] and swipos[®] in ETRS89
- Systematic differences of:

$$\mathbf{X} \text{ (swipos)} = \mathbf{X} \text{ (SAPOS)} - 0.010 \text{ m}$$

$$\mathbf{Y} \text{ (swipos)} = \mathbf{Y} \text{ (SAPOS)} + 0.009 \text{ m}$$

$$\mathbf{Z} \text{ (swipos)} = \mathbf{Z} \text{ (SAPOS)} + 0.022 \text{ m}$$

$$\mathbf{N} \text{ (swipos)} = \mathbf{N} \text{ (SAPOS)} + 0.021 \text{ m}$$

$$\mathbf{E} \text{ (swipos)} = \mathbf{E} \text{ (SAPOS)} + 0.010 \text{ m}$$

$$\mathbf{U} \text{ (swipos)} = \mathbf{U} \text{ (SAPOS)} + 0.010 \text{ m}$$

- Differences of same order also for the EUREF points 0055 (Chrischona) and 0060 (Pfänder) between ETRF93 and ETRF91

Differences of the Positioning Services

- Reference: swipos (CHTRF95)
- Differences < 1-2 cm

Differenz in [mm]		X	Y	Z
Austria	FLDK	2.4	5.6	7.4
	KOPS	-2.7	8.3	3.8
	KRBG	10.8	-0.2	-14.2
	LECH	-1.3	5.8	8.9
	FREI	0.0	3.0	14.0
Germany	LIND	0.4	7.2	3.0
	RAVE	-10.0	6.0	21.0
	SCHW	-9.0	7.0	12.0
	SIGM	-4.0	6.0	19.0

Conclusions

- Differences are mainly due to the different reference frame realizations
- Differences are 1-2 cm which is negligible for many practical applications of federal surveying. Single coordinates at the border (mean value)
- Reference stations have different station coordinates in different positioning services.
- Point of discussion: ETRF_{xx} -> ETRF_{yy} transformations necessary? For which applications?