

COGEAR

MODULE 2:

Overview of existing data in the Valais

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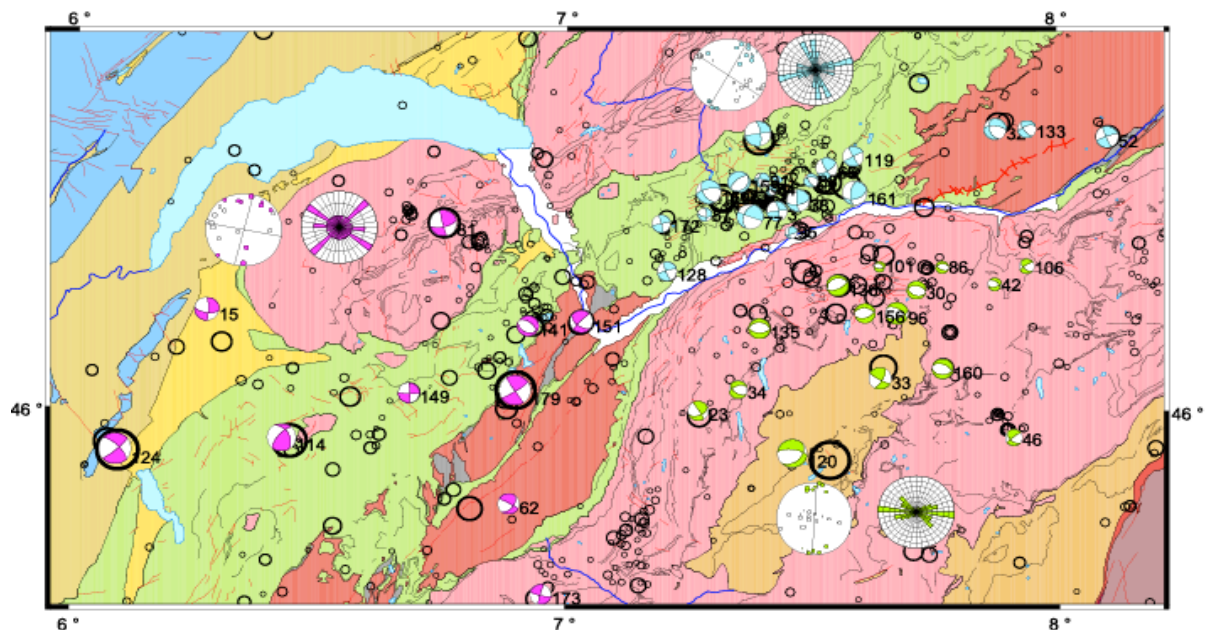
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Documentation of existing focal mechanism data in the Valais
(COGEAR Task 2a.1.1)
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The list ‘Overview of existing data in the Valais’ is a compilation of focal mechanisms of the 42 most important earthquakes that occurred in the Valais and adjacent areas, between 1975 and 2009 (Table 2a.1.1). The list includes all essential earthquake parameters such as date, time, epicentral location, focal depth, magnitude, strike, dip and rake of the nodal planes, orientations of P- and T-axes and the focal mechanism type. The data set includes only events for which completely documented fault-plane solutions (including first-motion polarities) or moment tensors have been published in the literature; the corresponding reference is listed for each event.

Magnitudes (M_L) range from 1.6 to 4.9. Focal depths do not exceed 17 km. The focal mechanisms are predominantly strike slip in the northern Valais and Haute Savoie, with P-axis orientations more or less NW-SE, and normal faulting in the southern Valais, with T-axes in a N-S direction. Several events were part of individual sequences of similar earthquakes; in these cases the total number of events in the given sequence is mentioned. For eight of the events that occurred as part of a sequence, the active fault-plane could be identified by applying a relative location procedure (Mauvoisin, two sequences of Anzère, Leukerbad, Samoëns, Martigny, Glarey and Vallorcine).

A comprehensive analysis of the state of stress in this region based on the focal mechanisms available up to the year 1998 was published by Kastrup et al. (2004). An update of this analysis based also on newer data is underway.



Tectonic map of the Valais and Haute Savoie with the earthquake focal mechanisms available up to 2007.

Table 2a1.1 Overview of available events and their parameters in the Valais and adjacent areas (1975-2009)

| Location | Date | Time [UTC] | Lat./Long | z [km] | Mag. | Nodal Plane 1 strike/dip/rake | Nodal Plane 2 strike/dip/rake | P-axis azi/dip | T-axis azi/dip | Nr. of events | Type | Ref. |
|------------------|------------|------------|--------------|--------|------|-------------------------------|-------------------------------|----------------|----------------|---------------|------|------------|
| Iffigenalp | 1977.03.05 | 13:31 | 46.420/7.390 | 9 | 4.1 | 351/73/0 | 260/90/163 | 307/12 | 214/12 | | SS | [2] |
| Zeuzier | 1977.07.27 | 07:50 | 46.320/7.420 | 7 | 3.2 | 351/73/0 | 260/90/163 | 307/12 | 214/12 | | SS | [2] |
| Mauvoisin | 1985.01.04 | 16:57 | 46.002/7.269 | 10 | 3.2 | 329/82/-40 | 65/50/-170 | 279/33 | 23/21 | 7 | UD | [23] |
| Vissoie | 1986.01.19 | 06:54 | 46.183/7.640 | 6 | 3.0 | 110/40/-80 | 277/51/-98 | 143/82 | 13/5 | | NF | [23] |
| Loetschental | 1986.01.28 | 11:50 | 46.433/7.877 | 12 | 3.5 | 162/50/-33 | 275/65/-135 | 136/49 | 35/9 | | NS | |
| Zermatt | 1986.02.15 | 01:43 | 46.051/7.638 | 5 | 3.6 | 27/70/170 | 120/80/20 | 252/7 | 345/21 | | SS | [23] |
| Dixence | 1986.02.26 | 13:07 | 46.034/7.350 | 7 | 2.9 | 249/51/-133 | 125/55/-50 | 94/58 | 188/2 | | NF | [23] |
| Zeuzier | 1986.10.09 | 10:08 | 46.319/7.472 | 4 | 3.6 | 79/61/167 | 175/79/30 | 304/12 | 41/28 | | SS | [20] |
| Stalden | 1987.03.22 | 01:36 | 46.192/7.872 | 4 | 2.1 | 311/51/-47 | 75/55/-130 | 286/58 | 192/2 | | NF | [15, 20] |
| M.Rosa | 1987.05.30 | 19:45 | 45.961/7.909 | 9 | 2.7 | 135/50/-10 | 231/82/-140 | 101/33 | 357/21 | | UD | [23] |
| Fiesch | 1987.11.05 | 22:07 | 46.413/8.103 | 13 | 3.5 | 249/84/-174 | 158/84/-6 | 114/8 | 204/0 | | SS | |
| M.Blanc | 1988.06.11 | 22:44 | 45.861/6.886 | 8 | 3.4 | 34/50/-174 | 300/85/-40 | 249/31 | 354/23 | | UD | [23] |
| Montana | 1989.01.07 | 02:29 | 46.342/7.539 | 4 | 3.4 | 57/68/170 | 151/81/22 | 282/9 | 16/22 | | SS | [20] |
| Anzere | 1989.09.30 | 04:41 | 46.317/7.394 | 7 | 4.1 | 110/90/140 | 200/50/0 | 163/27 | 57/27 | 7 | UD | [15,16,20] |
| Bonneveaux | 1990.02.14 | 15:56 | 46.283/6.749 | 17 | 4.2 | 75/65/175 | 167/85/25 | 298/14 | 34/21 | | SS | [36] |
| Montana | 1990.04.28 | 22:24 | 46.337/7.516 | 3 | 2.2 | 266/46/-145 | 150/65/-50 | 108/52 | 212/11 | | NF | [15, 20] |
| Anzere | 1990.05.07 | 16:06 | 46.323/7.404 | 7 | 1.6 | 175/45/-31 | 288/69/-131 | 153/49 | 46/14 | | NS | [15, 20] |
| S.Niklaus | 1990.05.11 | 08:16 | 46.218/7.765 | 1 | 2.0 | 263/40/-116 | 115/55/-70 | 76/72 | 191/8 | | NF | [15, 20] |
| Sanetsch | 1990.06.03 | 19:23 | 46.298/7.282 | 3 | 2.2 | 100/60/-151 | 354/65/-34 | 315/41 | 48/3 | | NS | [15, 20] |
| Anzere | 1990.07.26 | 12:30 | 46.325/7.395 | 7 | 2.4 | 285/80/-140 | 187/51/-13 | 154/35 | 50/19 | 14 | SS | [15,16,20] |
| S.Leonard | 1990.08.31 | 10:57 | 46.271/7.458 | 7 | 2.0 | 181/53/25 | 75/70/140 | 132/11 | 32/42 | | TS | [15, 20] |
| Vissoie | 1990.09.25 | 05:19 | 46.173/7.635 | 5 | 3.6 | 70/50/-130 | 303/54/-52 | 273/60 | 7/2 | | NF | [15, 20] |
| Vissoie | 1990.12.17 | 23:34 | 46.219/7.638 | 5 | 1.7 | 319/42/-49 | 90/60/-120 | 310/62 | 201/10 | | NF | [15, 20] |
| Stalden | 1991.09.07 | 18:09 | 46.219/7.937 | 8 | 2.4 | 135/55/-19 | 236/74/-144 | 101/37 | 2/12 | | SS | [15, 20] |
| Leukerbad | 1996.02.21 | 18:57 | 46.368/7.579 | 5 | 3.3 | 242/87/-178 | 152/88/-3 | 107/4 | 197/1 | 3 | SS | [21] |

| | | | | | | | | | | | | |
|-------------------|------------|--------|--------------|----|-----|-------------------|--------------------|--------|--------|-----|----|--------------|
| Valpelline | 1996.03.31 | 06:08 | 45.938/7.460 | 4 | 4.2 | 44/38/-137 | 278/65/-60 | 231/59 | 347/15 | | NF | [21] |
| Chamoson | 1996.12.25 | 12 :39 | 46.212/7.205 | 7 | 3.1 | 252/80/-170 | 160/80/-10 | 116/14 | 206/0 | | SS | [21web] |
| Loetschental | 1997.11.28 | 08:30 | 46.437/7.898 | 12 | 2.9 | 250/60/-150 | 144/64/-34 | 105/41 | 198/3 | | NS | [22] |
| V.d'Heremence | 1998.05.07 | 17:16 | 46.126/7.393 | 6 | 3.3 | 92/55/-90 | 272/35/-90 | 2/80 | 182/10 | | NF | [25] |
| Grimentz | 1998.12.09 | 22:08 | 46.191/7.552 | 4 | 3.4 | 256/28/-80 | 65/62/-95 | 323/72 | 159/17 | | NF | [25] |
| Salanfe | 1999.12.29 | 09:29 | 46.129/6.923 | 4 | 3.3 | 111/34/-105 | 309/57/-80 | 249/76 | 32/11 | | NF | [27] |
| Samoens | 2000.08.19 | 08:37 | 46.027/6.682 | 5 | 3.3 | 90/83/-170 | 359/80/-7 | 315/12 | 224/2 | 7 | SS | [36] |
| Martigny | 2001.02.23 | 22:20 | 46.136/7.031 | 6 | 3.6 | 129/52/-9 | 224/83/-142 | 93/31 | 350/20 | 27 | SS | [31] |
| Ayer | 2001.07.09 | 22:50 | 46.172/7.626 | 6 | 3.2 | 276/42/-72 | 72/50/-106 | 283/77 | 173/4 | | NF | [31] |
| Anzere | 2002.05.31 | 16:51 | 46.322/7.359 | 5 | 3.5 | 46/24/-94 | 231/66/-88 | 145/69 | 319/21 | | NF | [32] |
| Taesch | 2003.02.04 | 20:50 | 46.065/7.765 | 6 | 3.3 | 91/40/-106 | 292/52/-77 | 252/78 | 13/6 | | NF | [35] |
| Salgesch | 2003.04.29 | 04:55 | 46.341/7.570 | 10 | 3.9 | 67/48/138 | 188/60/50 | 305/7 | 45/55 | | TF | [35] |
| Glarey | 2003.08.22 | 09:22 | 46.323/7.316 | 6 | 3.9 | 151/54/-27 | 258/68/-141 | 120/43 | 22/8 | 34 | NS | [35],M&D |
| Derborence | 2004.05.30 | 09:46 | 46.284/7.193 | 9 | 2.9 | 347/89/-1 | 77/89/-179 | 302/1 | 32/0 | 173 | SS | [37] |
| Pre St.-Didier | 2004.06.12 | 04:45 | 45.715/6.937 | 12 | 3.3 | 104/80/-6 | 195/84/-170 | 60/11 | 329/3 | 17 | SS | [37] |
| Vallorcine | 2005.09.08 | 11:27 | 46.032/6.897 | 4 | 4.9 | 60/65/-180 | 150/90/-25 | 282/18 | 17/18 | 159 | SS | [38],Fréché. |
| Lac des Toules | 2008.02.17 | 12:42 | 45.920/7.171 | 7 | 3.6 | 2/46/169 | 100/82/45 | 223/23 | 331/36 | | UD | [44] |

Date: year.month.day

Time: hour:minute

z: focal depth

nodal planes: **bold**, if active fault plane could be determined by applying high precision relative location procedure

Nr. of events: if the event is part of an earthquake sequence the total number of the events is given

Type: focal mechanism – SS: strike slip, NF: normal faulting, TF: thrust faulting, UD: unidentified

Ref.: numbers of references are equivalent to the numbers of the seistec_ref list (\fps\seistec-ref.txt)

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Fr"ech.: Julien Fr"echet, Fran"ois Thouvenot, Michel Frogneux, Nicolas Deichmann, Michel Cara (2010) The Mw 4.5 Vallorcine (French Alps) earthquake of 8 September 2005 and its complex aftershock sequence Submitted to the *Journal of Seismology* - March 31, 2010

M&D: Glarey investigations concerning the determination of the active fault plane were done by Marschall and Deichmann, but not yet published