

An equal area projection may be the most useful way to present demagnetization data from a sample with several strongly overlapping remanence components (such as in Fig 9.12). In order to represent the vector nature of paleomagnetic data, it is necessary to plot intensity information. Intensity can be plotted versus demagnetization step in an *intensity decay curve* (Figure 9.12c). However, if there are several components with different directions, the intensity decay curve cannot be used to determine, say, the blocking temperature spectrum, because it is the vector sum of the two components. It is therefore advantageous to consider the decay curve of the *vector difference sum* (VDS.) The VDS “straightens out” the various components by summing up the vector differences at each demagnetization step, so the total magnetization is plotted, as opposed to the resultant.

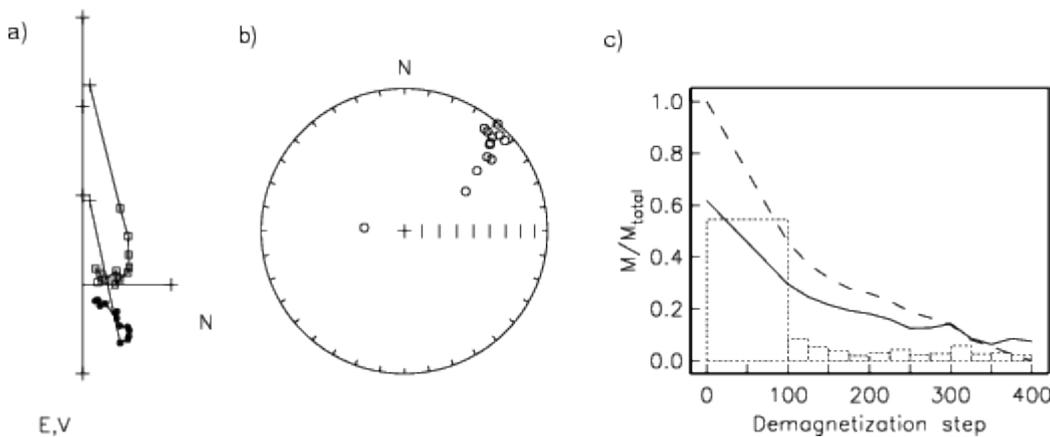
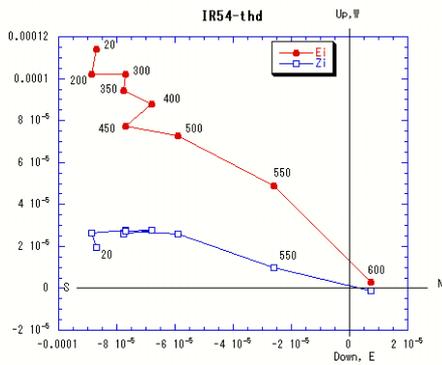


Figure 9.12: a) Specimen with strongly overlapping remanence components, in an orthogonal projection. b) Same data as in a) plotted on an equal area projection. c) Decay of NRM intensity during the demagnetization procedure (solid line). The dashed line is the decay of the vector difference sum. Boxes represent the intensity removed after each step.

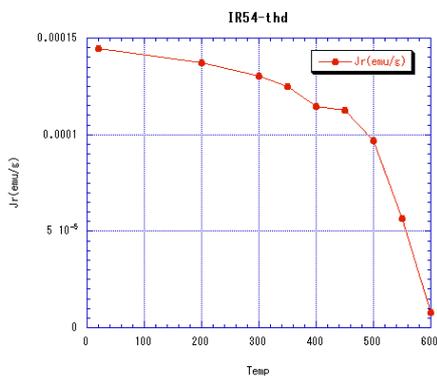
具体的には、岩内岳の蛇紋岩のデータを例にする。

sample(IR54) not orientated

Level	C-Dec	C-Inc	cX	cY	cZ	Jr(Am ² /kg)
20	127.5	7.7	-8.70E-05	1.14E-04	1.93E-05	1.44E-04
200	131.1	11	-8.86E-05	1.02E-04	2.62E-05	1.37E-04
300	127.2	12.3	-7.70E-05	1.02E-04	2.78E-05	1.30E-04
350	129.6	12	-7.77E-05	9.41E-05	2.59E-05	1.25E-04
400	127.8	14	-6.81E-05	8.80E-05	2.77E-05	1.15E-04
450	134.9	14	-7.69E-05	7.74E-05	2.72E-05	1.12E-04
500	129.1	15.5	-5.89E-05	7.27E-05	2.59E-05	9.71E-05
550	123.9	22.5	-2.60E-05	4.91E-05	9.71E-06	5.94E-05
600	-8.6	77.3	7.21E-06	3.11E-06	-1.34E-06	1.20E-05



磁化強度変化



VDS を計算する。

1. 磁化を x、y、z の 3 成分にする。
2. x 成分の差、y 成分の差、z 成分の差、磁化強度の差、のデータを作る。

$$dx(200) = x(200) - x(20) = (-8.86e-5) - (-8.7e-5) = -1.58e-6$$

$$dx(300) = x(300) - x(200) = (-7.70e-5) - (-8.86e-5) = 1.16e-5$$

$$dt(200) = \sqrt{(dx(200))^2 + dy(200)^2 + dz(200)^2} \\ = \text{SQRT}((-1.58e-6)^2 + (-1.19e-5)^2 + (6.87e-6)^2) = 1.38e-5$$

Level	Dec	Inc	Jr (Am ² /kg)	X	Y	Z	dX	dY	dZ	dT	sumT
20	127.5	7.7	1.44E-04	-8.70E-05	1.14E-04	1.93E-05					1.79E-04
200	131.1	11	1.37E-04	-8.86E-05	1.02E-04	2.62E-05	-1.58E-06	-1.19E-05	6.87E-06	1.38E-05	1.65E-04
300	127.2	12.3	1.30E-04	-7.70E-05	1.02E-04	2.78E-05	1.16E-05	-1.48E-07	1.57E-06	1.17E-05	1.53E-04
350	129.6	12	1.25E-04	-7.77E-05	9.41E-05	2.59E-05	-7.22E-07	-7.51E-06	-1.85E-06	7.77E-06	1.45E-04
400	127.8	14	1.15E-04	-6.81E-05	8.80E-05	2.77E-05	9.55E-06	-6.08E-06	1.82E-06	1.15E-05	1.34E-04
450	134.9	14	1.12E-04	-7.69E-05	7.74E-05	2.72E-05	-8.82E-06	-1.06E-05	-5.42E-07	1.38E-05	1.20E-04
500	129.1	15.5	9.71E-05	-5.89E-05	7.27E-05	2.59E-05	1.80E-05	-4.75E-06	-1.27E-06	1.87E-05	1.01E-04
550	123.9	22.5	5.94E-05	-2.60E-05	4.91E-05	9.71E-06	3.30E-05	-2.36E-05	-1.62E-05	4.37E-05	5.77E-05
600	-8.6	77.3	1.20E-05	7.21E-06	3.11E-06	-1.34E-06	3.32E-05	-4.60E-05	-1.11E-05	5.77E-05	0.00E+00

3. 差を total に直して足し合わせ、その比をプロットする。

ここで

$$\text{sumT}(20) = \Sigma (dt) = 1.79e-4$$

$$\text{sumT}(200) = \text{sumT}(20) - dt(200) = (1.79e-4) - (1.38e-5) = (1.65e-4)$$

$$\text{sumT}(300) = \text{sumT}(100) - \Delta t(200) = (1.97e-4) - (1.28e-5) = (1.85e-4)$$

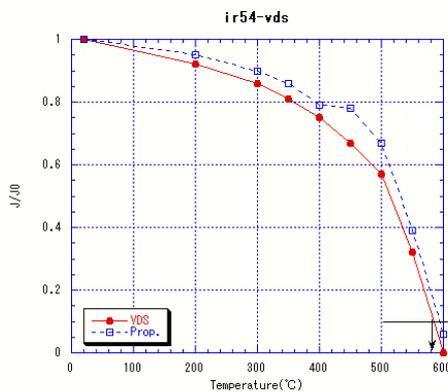
...

$$\text{VDS}(i) = \text{sumT}(i) / \text{sumT}(20)$$

Level	VDS	Proportion
20.000	1.0000	1.0000
200.00	0.92000	0.95000
300.00	0.86000	0.90000
350.00	0.81000	0.86000
400.00	0.75000	0.79000
450.00	0.67000	0.78000
500.00	0.57000	0.67000
550.00	0.32000	0.39000
600.00	0.0000	0.060000

白四角：従来の NRM を 1 とした磁化強度

赤丸：VDS



磁化強度がほぼ 10%になる温度を読み取ると、NRM を 1 とした比では 594°C、VDS では 584°Cとなる。