PRACTICAL 1: THE EULER POLE FOR AFRICA-S.AMERICA

The table below lists spreading rates V measured from seafloor magnetic anomalies at five sites along the mid–Atlantic ridge between Africa and South America. The table also lists the geocentric angles ($D1$, $D2$, $D3$) in degrees to each site from three trial Euler poles (1, 2, 3) for the motion of Africa relative to South America and some calculations based on these three trial poles.

site	latitude °S	longitude °W	V km/Ma	$D1$ °	$V/\sin D1$ km/Ma	$D2$ °	$V/\sin D2$ km/Ma	$D3$ °	$V/\sin D3$ km/Ma
a	7.5	13.0	37.0	78.0	37.8	72.7	38.8	79.6	37.6
b	28.0	13.0	40.0	98.3	40.4	92.6	40.0	99.7	40.6
c	38.0	17.0	39.0	108.1	–	101.8	–	109.0	–
d	51.9	5.5	35.0	122.6	–	117.2	–	124.3	–
e	53.8	1.2	33.0	124.9	–	119.8	–	126.8	–

The latitudes and longitudes of the three Euler poles are
    $1: (70.2°N, 25.3°W);$ $2: (62.5°N, 39.4°W);$ $3: (69.7°N, 42.5°W).$

Three questions posed in the lecture notes pertain to this practical.

• How are Az (the azimuth from site to Euler Pole) and θ (the strike of the transform fault) related?

• What is the maximum spreading rate and where does it occur?

• Can you see why the average value of $V/\sin D$ corresponds to the maximum spreading rate?

Make sure you can answer them before you start.

Complete the table above and use your results to decide which Euler pole fits the observations best.

PRACTICAL 1: THE EULER POLE FOR AFRICA-S.AMERICA (CTD)

The next table (below) lists the strike of transform faults observed at a further six sites along the mid–Atlantic ridge between Africa and South America. This table also lists the calculated azimuths, or bearings, ($Az1$, $Az2$, $Az3$) in degrees from each site to the three trial Euler poles.

site	latitude °N	longitude °W	strike °	$Az1$ °	——	$Az2$ °	——	$Az3$ °	——
u	14.5	46.0	91.0	8.2		4.1		1.5	
v	10.2	40.9	94.0	6.0		0.9		−0.6	
w	7.2	34.3	91.0	3.4		−2.9		−3.2	
x	1.1	26.0	87.0	0.3		−7.0		−6.1	
y	−1.9	12.9	85.0	−4.4		−13.0		−10.3	
z	−7.5	12.3	78.0	−4.5		−12.8		−10.3	

How well do these data fit the three Euler poles?

Explain how you can decide which Euler pole fits the observations best and comment on your results.