INSTRUCTIONS FOR LOCATING THE EPICENTER OF AN IRISH EARTHQUAKE

Objective:

To locate the epicenter of an Irish earthquake using the recorded waveform data from Raspberry Shake seismometer stations in Ireland. These are small seismometers that record ground motion and are used to detect signals such as earthquakes.

Materials:

- Worksheet titled 'Irish Earthquake 06-May-2023' this is the waveform data from three Irish Raspberry Shake seismometer stations (R0FF0, RBE6A, RF7A3)
- Worksheet with the map of Ireland including Raspberry Shake stations (R0FF0, RBE6A, RF7A3)
- Worksheet titled 'Workings Table'
- Pencil or pen
- Ruler
- Compass
- Calculator

Procedure:

Step 1: Look at the sheet titled 'Irish Earthquake 06-May-2023'. This shows waveforms of an earthquake recorded by three different Irish Raspberry Shake stations.

Step 2: Start picking where you think the P-Wave starts on station R0FF0 (where you start to see a change in amplitude), with your ruler draw a line down from this point. Write down this time in seconds to one decimal place in the 'workings' table provided. Then pick where you think the S-Wave starts, write this time in seconds to one decimal place in the 'workings' table provided.

Step 3: In the workings table subtract the P wave time from the S wave time (S-P) to get the time difference in seconds.

Step 4: In the workings table multiply this time by 8 (this is a multiplication factor that comes from using average P and S wave speeds for Ireland). Then divide this number by 33 (this is the scaling factor of the map as 1cm=33km). This gives you the distance of the earthquake from the station in cm on the map worksheet.

Step 5: Using a ruler and a compass place the pointy end at 0cm and open it to the distance you have from Step 4 along the length of the ruler.

Step 6: Gently lift your compass away from the ruler and bring it to the map. Locate station R0FF0. Place your compass point on the white circle inside the raspberry icon and draw a circle from this point.

Step 7: Repeat steps 5 and 6 for Stations RBE6A and RF7A3.

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QUAKE SHAKE

WORKINGS TABLE

Station	P Arrival Time (Seconds)	S Arrival Time (Seconds)	Time Difference in Seconds (S-P)	Multiply By	Distance of Earthquake from Station (in km)	Divide By	Length on map [cm]
R0FF0				→x8→		→÷33→	
RBE6A				→x8→		→÷33→	
RF7A3				→x8→		→÷33→	

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QUAKE SHAKE

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When all 3 circles have been drawn you should now be able to see an area where the three circles come closest to touching each other. This is a rough location of where the epicenter of the earthquake could be.

If you have completed the exercise you can begin thinking about the following questions:

1. *In what County do the circles overlap in?*

2.Why would the circles not all intersect each other at one point?

3.How many stations are required to accurately locate an earthquake?

4.How accurate was your picking of the P and S waves?

5.Are the rocks in Ireland all the same composition?

6.Are earthquakes a point?

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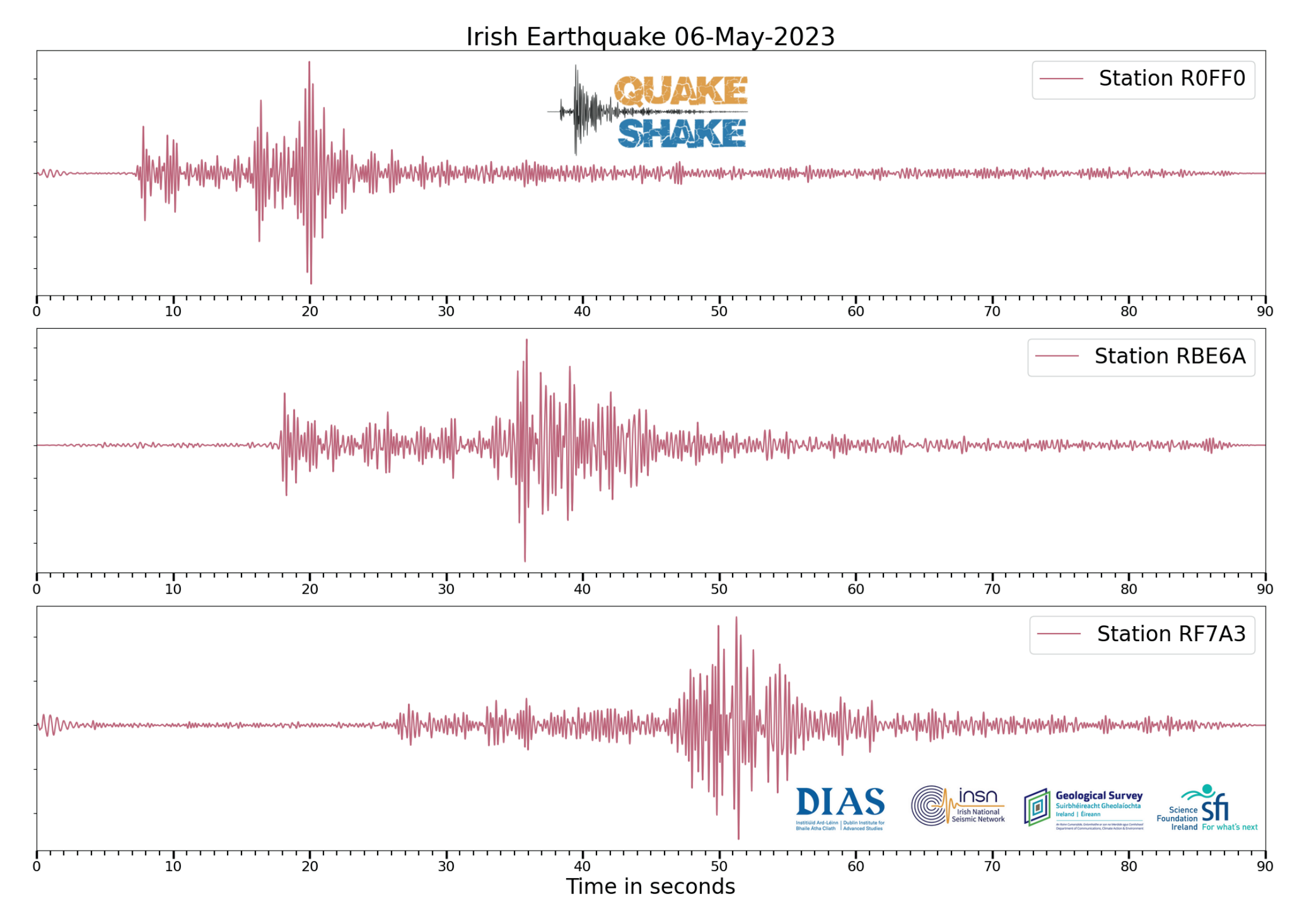
Irish Earthquake 06-May-2023
Station R0FF0
Station RBE6A
Station RF7A3
QUAKE
SHAKE
0
10
20
30
40
50
60
70
80
90
Time in seconds
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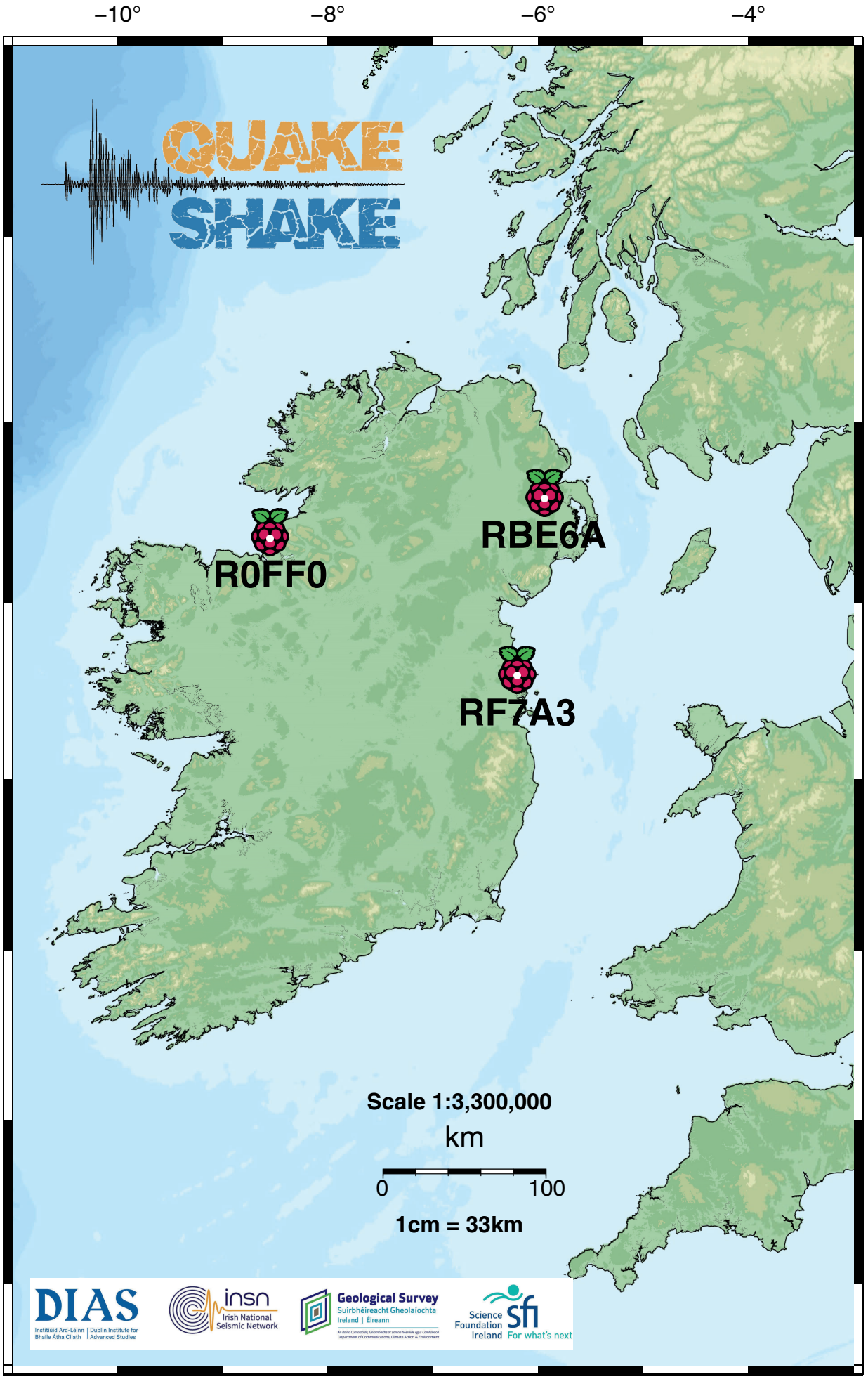
−10°
−8°
−6°
−4°
56°
54°
52°
50°
QUAKE SHAKE
R0FF0
RBE6A
RF7A3
Scale 1:3,300,000
km
0
100
1cm = 33km
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