

Site	Depth [m]	Ne [10^{-7} ccSTP/g]	Ar [10^{-4} ccSTP/g]	Kr [10^{-8} ccSTP/g]	Xe [10^{-8} ccSTP/g]	He [10^{-8} ccSTP/g]	$^3\text{He}/^4\text{He}$ [RA]	U [ppm]	Th [ppm]
Southern Plateau (M141-1186)	5.34	1.82 ± 0.03	3.27 ± 0.03	7.55 ± 0.09	1.14 ± 0.02	6.19 ± 0.04	2.3 ± 0.05	2.4 ± 1.0	4.9 ± 1.3
	4.74	2.09 ± 0.03	3.73 ± 0.04	8.59 ± 0.10	1.29 ± 0.02	6.58 ± 0.05	1.94 ± 0.05		
	3.74	1.71 ± 0.05	2.95 ± 0.09	6.75 ± 0.08	0.96 ± 0.02	5.65 ± 0.04	2.2 ± 0.05		
	3.34	3.36 ± 0.09	4.44 ± 0.13	9.86 ± 0.10	1.39 ± 0.03	10.2 ± 0.06	1.66 ± 0.04		
	37°36.977'N	2.73	3.72 ± 0.10	4.87 ± 0.15	11.0 ± 0.10	1.45 ± 0.03	10.2 ± 0.06	1.59 ± 0.03	
	27°32.522'W	2.34	3.25 ± 0.09	4.40 ± 0.13	9.68 ± 0.10	1.36 ± 0.03	8.59 ± 0.05	1.31 ± 0.04	
	water depth	1.74	2.86 ± 0.08	4.13 ± 0.12	9.11 ± 0.09	1.24 ± 0.03	8.85 ± 0.06	1.48 ± 0.03	
	2175 m	1.34	1.63 ± 0.05	3.16 ± 0.10	7.68 ± 0.07	1.16 ± 0.02	4.33 ± 0.03	1.68 ± 0.05	
	0.74	0.54 ± 0.02	1.34 ± 0.04	3.45 ± 0.04	0.48 ± 0.01	1.21 ± 0.02	1.46 ± 0.06	3.9 ± 1.1	8.6 ± 2.0
C_{ASW}		1.71	3.48	8.45	1.24	3.91	0.982		
Pico/Faial (M141-1219)	4.63	13.9 ± 0.17	11.3 ± 0.11	19.1 ± 0.20	2.16 ± 0.04	65.7 ± 0.38	4.06 ± 0.03		
	4.03	1.66 ± 0.02	3.22 ± 0.03	7.51 ± 0.08	1.12 ± 0.03	8.75 ± 0.06	4.82 ± 0.04	2.4 ± 0.3	3.2 ± 0.9
	3.63	1.72 ± 0.03	3.31 ± 0.03	7.72 ± 0.10	1.16 ± 0.02	8.84 ± 0.06	5.03 ± 0.08		
	38°44,787'N	3.03	5.67 ± 0.07	6.95 ± 0.07	13.3 ± 0.16	1.60 ± 0.03	28.6 ± 0.17	4.51 ± 0.05	
	28°35,128'W	2.63	0.62 ± 0.01	2.20 ± 0.02	6.02 ± 0.07	1.00 ± 0.02	2.22 ± 0.03	3.86 ± 0.12	
	water depth	2.03	1.88 ± 0.03	3.26 ± 0.03	7.23 ± 0.09	1.04 ± 0.02	7.74 ± 0.05	4.14 ± 0.06	
	1225 m	1.63	0.75 ± 0.01	2.21 ± 0.02	5.96 ± 0.07	1.00 ± 0.02	2.64 ± 0.03	3.03 ± 0.10	
	1.03	5.71 ± 0.07	6.43 ± 0.06	12.2 ± 0.13	1.47 ± 0.03	19.4 ± 0.12	2.42 ± 0.4		
	0.8	1.31 ± 0.02	3.17 ± 0.03	8.14 ± 0.09	1.28 ± 0.03	3.31 ± 0.03	1.07 ± 0.02	3.1 ± 0.50	4.2 ± 1.1
C_{ASW}		1.68	3.28	7.83	1.14	3.87	0.982		

Table 1: Pore water concentrations of noble gases, helium isotope ratios and U and Th concentrations for both sampling locations with absolute errors. C_{ASW} denotes the expected concentrations (or the $^3\text{He}/^4\text{He}$ isotope ratio) of air saturated water calculated for in situ water temperature and salinity using the solubility data set recommended by Kipfer et al. (2000). U and Th concentrations were only measured at the top and bottom of the core.

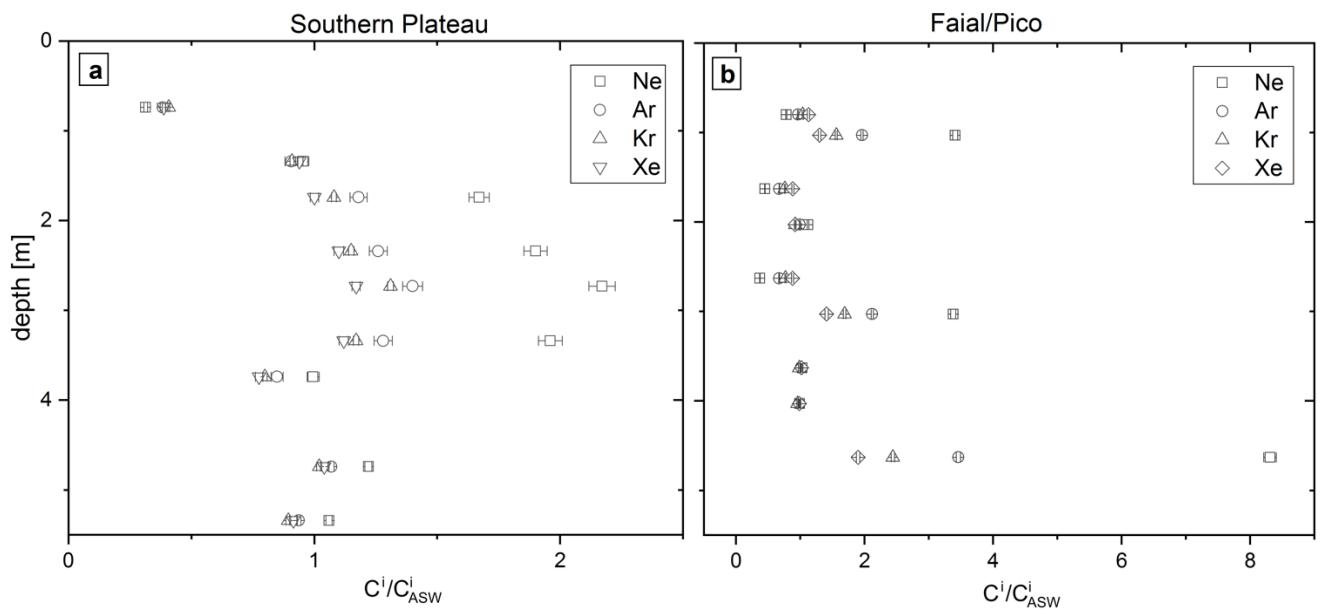


Fig 2: Concentrations of Ne-Xe divided by the respective ASW concentrations, a) for “Southern Plateau” sampling location, b) for “Faial/Pico” sampling location. A value of 1 indicates the concentration of air-saturated ocean water, while a higher concentration indicates the presence of an atmospheric air component.

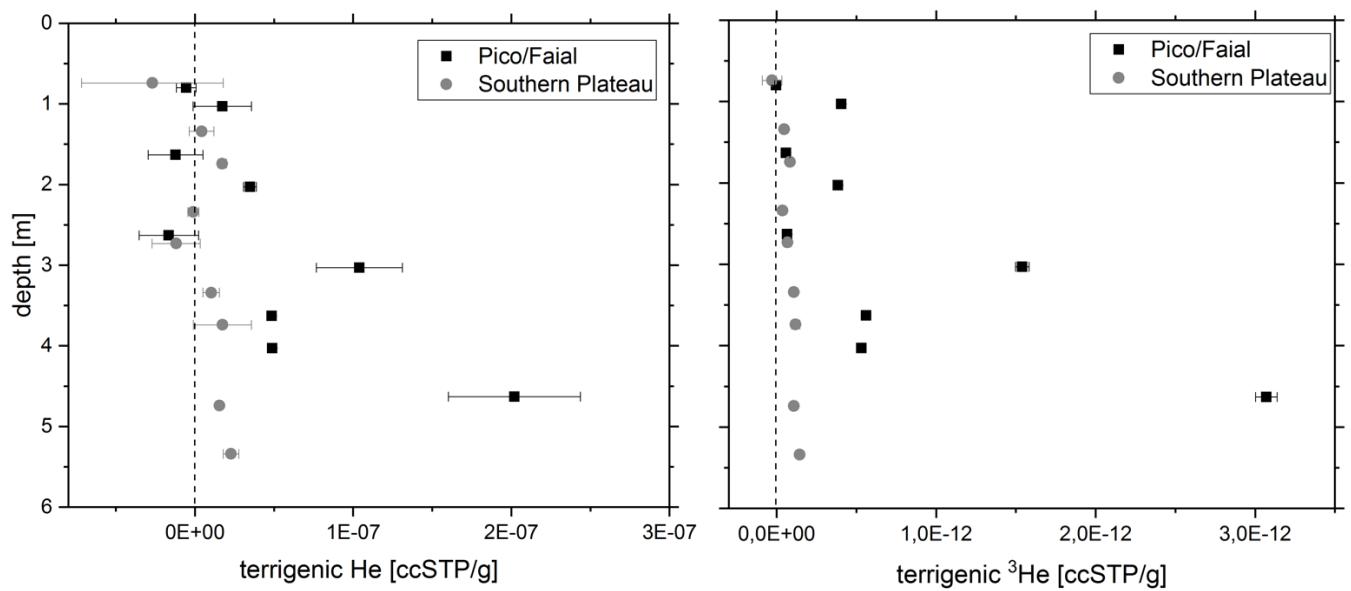


Fig 3: Terrigenic concentrations for both sampling locations a) for total helium, b) for ${}^3\text{He}$.

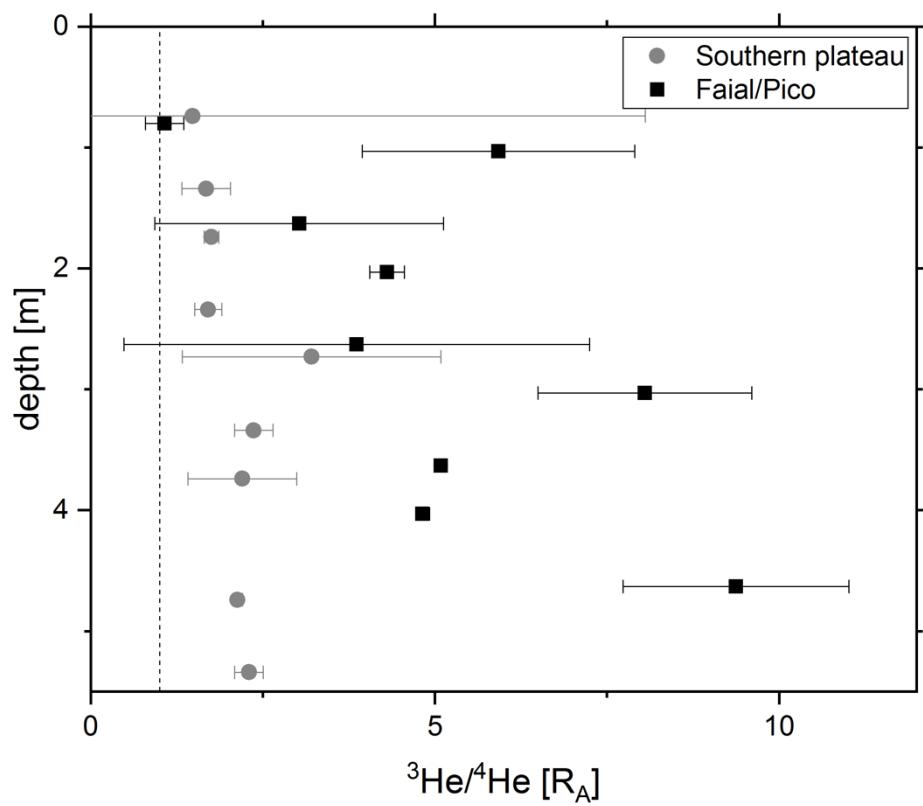


Fig 4: ${}^3\text{He}/{}^4\text{He}$ ratio for both sampling locations in the Azores region. Data has been corrected for air excess, thus the plotted values represent ASW concentrations and the terrigenic (terrigenous) component. The dashed line represents a value of 1 R_A .

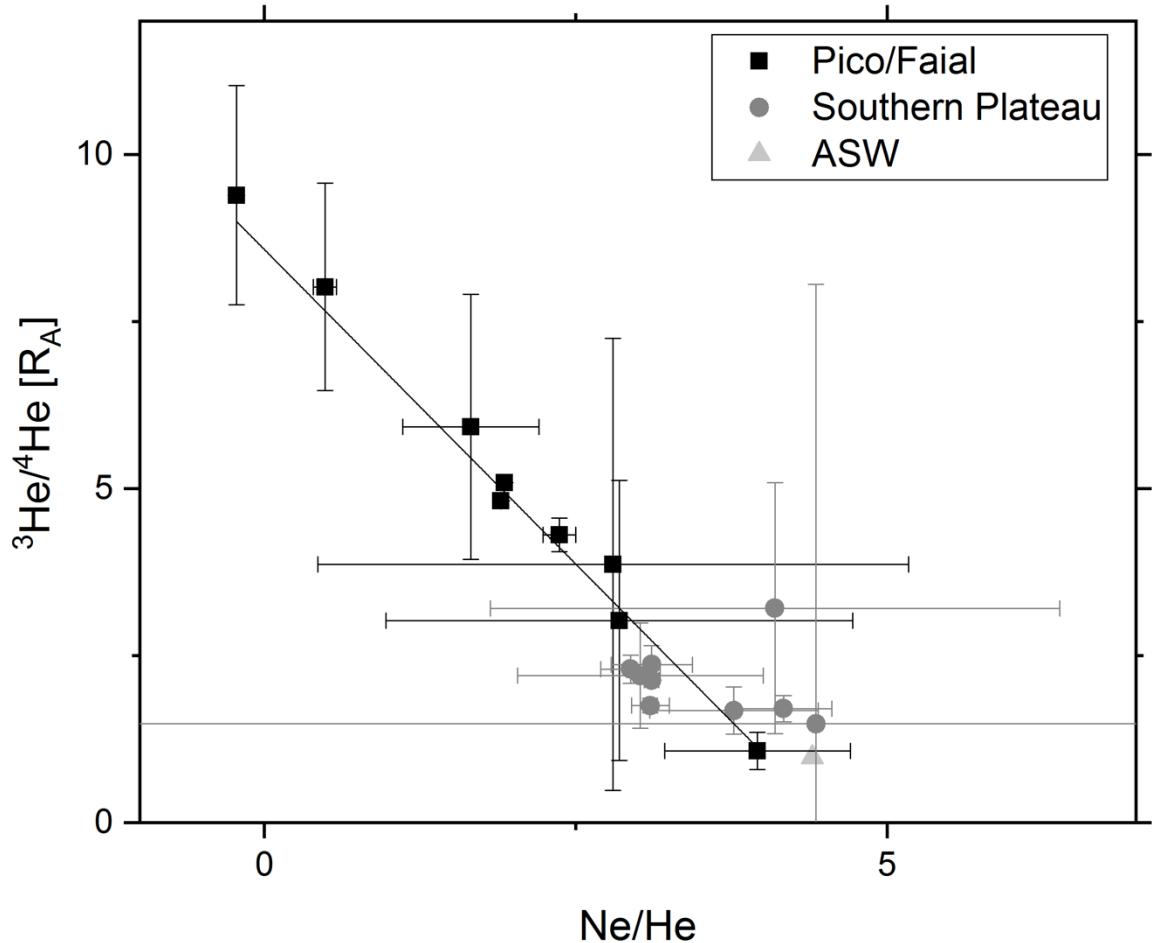


Fig 5: ${}^3\text{He}/{}^4\text{He}$ ratio vs. Ne/He at both sampling locations. The plot represents mixing between ASW and the endmember feeding the hydrothermal system of the Azores. Data has been corrected for air excess, thus the plotted values represent ASW concentrations and a potential terrigenic component for all gases. A linear fit was applied to the data from Pico/Faial (black data points). Tracing back the fitted line to $\text{Ne/He} = 0$ yields an estimate for the ${}^3\text{He}/{}^4\text{He}$ ratio of the original mantle source at this sampling location.

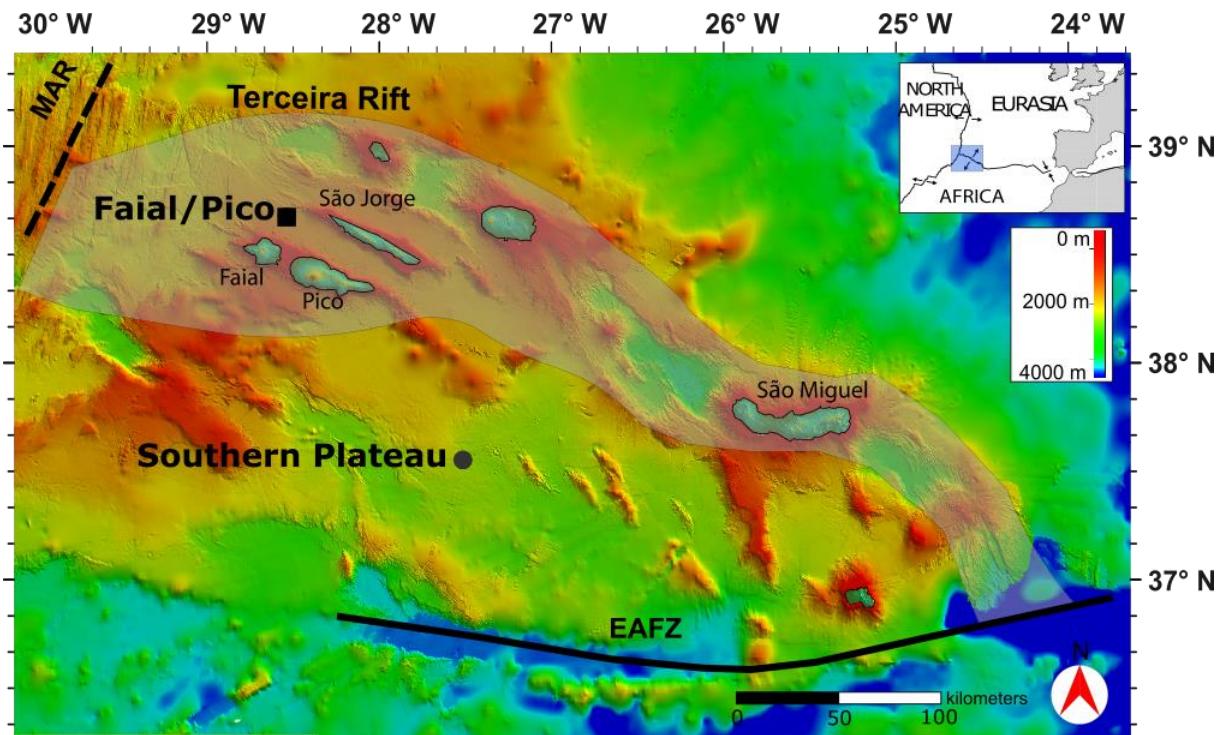


Fig 1: Bathymetric map of the sampling region in the Azores Plateau, adapted from Schmidt et al. (2020). The grey area depicts the diffuse plate boundary of the Terceira Rift based on Marques et al. (2013); MAR: Mid-Atlantic Ridge, EAFZ: East Azores Fracture Zone.