

Supplement

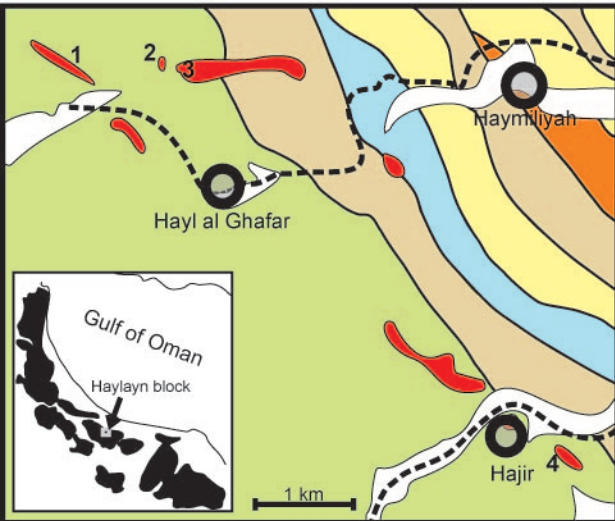
Analytical methods

Fresh cores from samples were cut with a rock saw, washed in deionized H₂O, crushed and pulverized in an agate mill. We determined the loss on ignition (LOI) by weighing the rock powder before and after drying: 1) 12 hours at 105 °C in a cabinet dryer and 2) 12 hours at 1030°C in a muffle furnace. The major element concentrations (SiO₂, TiO₂, Al₂O₃, Fe₂O₃^T, MnO, MgO, CaO, Na₂O, K₂O, P₂O₅) of whole rocks were measured by X-ray fluorescence (Spectro XEPOS plus) at the GeoZentrum Nordbayern in Erlangen. Averages of our analyses and recommended values of international rock standards (basalt BE-N and granite GA) are given in supplementary Table 1.

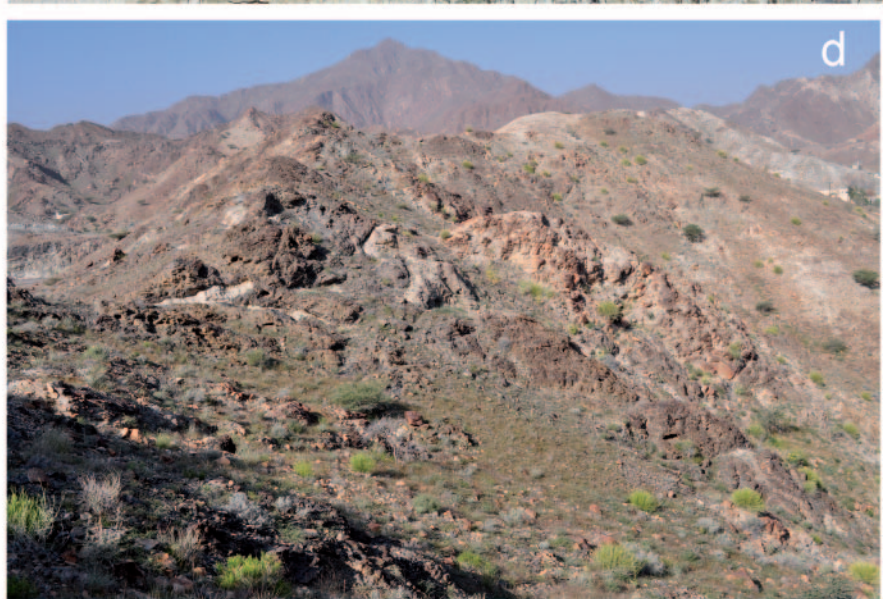
Trace elements were analysed using a Merchantek 266 LUV (266nm) Laser coupled with an Agilent 7500i (Inductively Plasma Mass Spectrometer: LA-ICP-MS) at the GeoZentrum Nordbayern following the procedure described in Schulz et al. (2006). Each glass disc (produced from sample powder for the XRF) was measured four times and the used values are averages. The external calibration was conducted by using NIST 610 (given values from Pearce et al. (1997)). Average values of repeated analyses of international rock standards (GH, JA-2) are given in supplementary Table 1. For example, repeated analyses (n=4) of granitic rock standard GH give a standard deviation for precision $1\sigma < 5.5\%$ for all elements (except Rb $< 8\%$), accuracy $< 10\%$ for all elements (except Rb, Zr, Ba, Tb, Ho, Th $< 15\%$, Sr, Dy, Er, Yb, Lu, Hf $< 19\%$, Nb $< 24\%$) and reproducibility of $< 6\%$ for all elements (except for Eu $< 14\%$). Repeated analyses (n=16) of basaltic rock standard NIST 612 give a standard deviation for precision $1\sigma < 4\%$ for all elements, accuracy $< 5\%$ for all elements (except Y, Gd, Er, Tm $< 10\%$, Nb, Ta $< 14.5\%$) and reproducibility of $< 5\%$ for all elements (except Ta $< 11\%$) respectively. Due to more available values and therefore better discrimination between the crustal plagiogranites we use XRF measurements of Zr concentrations during following text. For comparing Zr concentrations measured by XRF and LA-ICPMS please see Table 1.

Strontium, Nd and Hf isotope ratios were analysed at GEOMAR Helmholtz Centre for Ocean Research Kiel. Strontium and Nd isotope ratios were analysed in static mode on a TRITON thermal ionization mass spectrometer and Hf isotopes on a MC ICPMS at IFM-GEOMAR, Kiel. Sample data is reported relative to $^{87}\text{Sr}/^{86}\text{Sr} = 0.710250$ ($2\sigma = 0.000006$) for NBS987 (n = 8), $^{143}\text{Nd}/^{144}\text{Nd} = 0.511850$ ($2\sigma = 0.000007$) for the La Jolla standard (n = 8) and $^{176}\text{Hf}/^{177}\text{Hf} = 0.282170$ ($2\sigma = 0.000004$) for the inhouse SPEX monitor (n = 16), which corresponds to $^{176}\text{Hf}/^{177}\text{Hf} = 0.282163$ for JMC-475 (Blichert-Toft et al., 1997). ϵ values were calculated using the following CHUR (Chondritic Uniform Reservoir) parameters: present-day reference values are $^{143}\text{Nd}/^{144}\text{Nd}_{\text{CHUR}} = 0.512630$ and $^{147}\text{Sm}/^{144}\text{Nd}_{\text{CHUR}} = 0.196$, $^{176}\text{Hf}/^{177}\text{Hf}_{\text{CHUR}} = 0.282785$ and $^{176}\text{Lu}/^{177}\text{Hf}_{\text{CHUR}} = 0.0336$ (Bouvier et al., 2008), $^{87}\text{Sr}/^{86}\text{Sr}_{\text{CHUR}} = 0.7045$ and $^{87}\text{Rb}/^{86}\text{Sr}_{\text{CHUR}} = 0.0827$ following Tsuchiya et al (2013) and $\lambda_{\text{Sm}} = 6.54 \times 10^{-12} \text{ yr}^{-1}$, $\lambda_{\text{Lu}} = 1.867 \times 10^{-11} \text{ yr}^{-1}$ and $\lambda_{\text{Rb}} = 1.42 \times 10^{-11} \text{ yr}^{-1}$. The measured isotope ratios from plagiogranites and mafic wall rocks were age-corrected to 96 Ma (assumed ophiolite age).

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Harzburgite with minor dunite and lherzolite
 Cumulate interlayered peridotite and gabbro
 Cumulate interlayered peridotite
 Cumulate layered gabbro
 Cumulate planar laminated gabbro
 Felsic intrusion
 1,2,... Sample locations
 Alluvial fan
 Road
 Village



Supplementary photographs of the outcrops of granitic intrusions in the mantle section of the Haylayn Block, Oman.

a. OM11-HA-1

b. Small N-S trending wadi near Al Ghafar, outcrop at the eastern side, OM11-HA-2.

c. Small N-S trending wadi near Al Ghafar, outcrop at the western side, OM11-HA-3. Note the darker xenolithic portion in the leucogranite intrusion.

d. Outcrops of granite in harzburgite near Agir, some 5 km distant from Al Ghafar, OM11-HA-3

e. Outcrop of granite in harzburgite near Agir, some 5 km distant from Al Ghafar, OM11-HA-5

Supplementary Table 1 (geochemical data)

Supplementary Table 2. Composition of mixing end-members

	SiO ₂ (wt.%)	TiO ₂ (wt.%)	FeO ^I (wt.%)	Nd (ppm)	Hf (ppm)	εNd (96Ma)	εHf (96Ma)
Mafic melt	50	1.2	10	15	2.3	8.6	17
Granitic melt	78	0.1	0.1	50	3.6	-6	2