DR2005172

G21724

Repository data item

Methods

Sampling. This investigation is based on 38 samples from core 90-22 drilled by Platinova Resources Ltd. in 1990 for Au-PGE exploration. The drill core is ~1050 metres long and sampled continuous and extremely fresh rocks of the Upper Zone (~950 m) and the upper part (~100 m) of the Middle Zone 100 (Fig. 2) and was described by Tegner (1997).

Analysis. To determine the bulk major element composition we have applied broad beam electron microprobe techniques to average the composition of the finely crystallized melt inclusions. Both thin sections and crystal mounts were analysed using a JEOL Superprobe 8600 at the Department of Earth Sciences, University of Aarhus, Denmark, and CAMECA SX-50 at GeoForschungsZentrum Potsdam, Germany. The JEOL probe was operated with a 20 μm beam at 15 KeV accelerating voltage and 10 nA current, using synthetic and natural standards for calibration and ZAF correction procedures. Four wavelength dispersive spectrometers were used for determining Na, Mg, P, K, Ca, Ti, Mn and Fe and an energy dispersive spectrometer was used for determining Si and Al. Electron microprobe analyses at GFZ Potsdam were carried out using wavelength dispersive spectrometers, at 15 KV accelerating voltage and 10 nA beam current with spot sizes ranging from 3 to 40 μm depending on the properties and compositions of the analysed material. When the size of the inclusion was large enough, the inclusion was analyzed several times and results were averaged.

The relatively large variation in the average compositions reported in Table 1 and the Supplementary Dataset is largely due to inhomogeneity of the finely crystallized material and partly to true compositional variation. The dark, iron-rich inclusions in apatite of UZb and UZc have, on average, low sums (~94 and ~96 wt%, see Table 1 and Repository dataset 2) indicative of high volatile contents. This is attributed to post-entrapment diffusional exchange with the host apatite that can contain up to several wt. % volatiles Nash (1976). However, the composition of the major elements other than Ca and P will not be affected by diffusional exchange. The compositional variation reported in Repository dataset 2 can be ascribed to accidental combination of minerals of the analysed target area. This is most pronounced in the light-coloured silicic melt inclusions. Least squares fitting have shown that the scatter in these largely can be explained by varying proportions of quartz (1-69%), orthoclase (0-91%), anorthit (0-16%) and albite (0-88%).

REFERENCES CITED:

Nash, W.P., 1976, Fluorine, chlorine, and OH-bearing minerals in the Skaergaard Intrusion: American Journal of Science, v. 276, p. 546-557.

Tegner, C., 1997, Iron in plagioclase as a monitor of the differentiation of the Skaergaard intrusion: Contributions to Mineralogy and Petrology, v. 128, p. 45-51.

Tables

Table DR1 Microprobe analysis (wt%) of Fe-rich melt inclusions in apatite

Sample #	Zone	SiO_2	TiO_2	Al_2O_3	FeO_t	MnO	MgO	CaO	Na_2O	K_2O	P_2O_5	Sum
90-22 441.7	UZb	40.34	3.28	8.55	27.45	0.33	2.97	9.91	2.71	0.35	0.04	95.93
90-22 401.3	UZb	40.13	2.57	10.39	26.88	0.44	3.96	9.21	2.83	0.44	0.00	96.85
90-22 401.3	UZb	40.27	2.72	8.50	29.33	0.43	4.44	7.41	2.47	0.29	0.00	95.85
90-22 401.3	UZb	43.49	1.63	6.93	26.75	0.59	4.62	9.39	1.79	0.40	0.05	95.64
90-22 401.3	UZb	41.20	2.60	7.66	32.08	0.39	3.11	6.58	2.21	0.83	0.00	96.67
90-22 401.3	UZb	40.18	2.56	9.72	28.65	0.42	3.63	9.09	2.42	0.28	0.00	96.95
90-22 401.3	UZb	39.95	2.71	9.56	29.33	0.43	3.73	8.52	2.38	0.28	0.01	96.91
90-22 401.3	UZb	39.72	2.00	11.98	27.15	0.44	2.72	9.76	2.06	0.33	0.02	96.16
90-22 401.3	UZb	37.86	2.45	9.18	29.01	0.24	4.54	5.24	0.97	4.59	0.00	94.08
90-22 401.3	UZb	40.09	3.30	9.78	29.38	0.34	3.63	8.89	2.55	0.27	0.06	98.29
90-22 401.3	UZb	40.29	1.21	5.65	32.90	0.29	4.82	6.66	0.89	0.40	0.00	93.12
90-22 401.3	UZb	40.42	2.78	9.94	28.16	0.41	3.90	8.01	3.37	0.24	0.04	97.28
90-22 401.3	UZb	40.71	2.79	9.77	28.25	0.40	4.25	7.91	3.28	0.23	0.00	97.60
90-22 401.3	UZb	39.94	0.67	13.63	28.62	0.27	1.87	9.65	0.97	1.25	0.00	96.86
90-22 401.3	UZb	40.77	2.97	9.43	25.00	0.39	4.78	9.46	2.71	0.38	0.02	95.93
90-22 401.3	UZb	39.74	3.51	9.90	28.24	0.37	3.82	9.41	2.64	0.35	0.00	97.98
90-22 401.3	UZb	40.55	2.08	9.98	30.73	0.59	4.59	5.87	2.14	0.18	0.02	96.72
90-22 401.3	UZb	42.78	2.36	6.18	29.18	0.20	4.20	8.75	1.49	0.21	0.00	95.35
90-22 401.3	UZb	39.58	2.53	9.66	27.83	0.41	4.02	8.39	2.48	0.84	0.05	95.80
90-22 401.3	UZb	40.46	2.31	10.61	27.01	0.49	3.78	9.11	2.31	0.40	0.13	96.60
90-22 401.3	UZb	39.90	3.42	9.46	27.57	0.50	3.73	9.31	2.57	0.33	0.09	96.89
90-22 401.3	UZb	40.98	3.10	9.93	27.53	0.42	3.76	7.82	3.30	0.24	0.05	97.13
90-22 384.0	UZb	41.42	3.16	9.53	27.52	0.41	3.86	10.36	2.69	0.58	0.04	99.58
90-22 290.8	UZb	40.34	3.28	8.55	27.45	0.33	2.97	9.91	2.71	0.35	0.04	95.93
90-22 229.4	UZb	41.09	4.01	11.18	25.16	0.55	1.75	10.60	2.84	0.51	0.07	97.77
90-22 189.9	UZb	48.17	0.38	1.43	31.04	1.07	2.22	14.90	0.39	0.00	0.04	99.64
90-22 189.9	UZb	46.66	0.69	3.31	30.32	0.61	2.09	13.64	0.80	0.19	0.01	98.31
90-22 189.9	UZb	37.82	3.36	10.67	30.38	0.53	1.62	9.63	2.12	0.54	0.01	96.67
90-22 189.9	UZb	38.18	3.13	10.45	29.47	0.40	1.61	9.52	2.10	0.55	0.05	95.46
90-22 189.9	UZb	45.51	0.38	0.79	27.66	0.78	2.65	17.97	0.33	0.01	0.05	96.13
90-22 189.9	UZb	45.68	0.11	4.80	34.04	0.53	2.32	5.91	0.34	0.83	0.13	94.68
90-22 189.9	UZb	41.72	3.62	2.62	28.30	0.41	3.16	14.80	0.21	0.10	0.08	95.04
90-22 189.9	UZb	34.08	1.84	9.64	35.75	0.09	3.73	2.58	0.11	4.82	0.03	92.68
90-22 189.9	UZb	39.52	3.22	8.82	30.23	0.53	1.68	10.33	2.80	0.62	0.11	97.85
90-22 189.9	UZb	48.17	0.38	1.43	31.04	1.07	2.22	14.90	0.39	0.00	0.04	99.64
90-22 148.9	UZb	39.59	3.61	9.43	29.85	0.32	2.10	10.47	1.61	0.65	0.08	97.71
90-22 129.6	UZb	31.49	0.28	11.41	41.23	0.12	2.59	0.78	0.18	3.29	0.04	91.41
90-22 129.6	UZb	42.94	0.34	6.03	33.91	0.25	1.12	10.43	0.82	0.55	0.05	96.43
90-22 129.6	UZb	39.22	4.40	9.06	30.10	0.63	0.84	9.99	2.56	0.42	0.05	97.27
90-22 129.6	UZb	45.58	0.01	3.09	34.11	0.61	0.89	10.24	0.62	0.27	0.05	95.48
90-22 129.6	UZb	31.81	0.31	10.98	41.21	0.13	2.72	1.16	0.23	2.84	0.05	91.43
90-22 129.6	UZb	43.85	0.51	5.16	32.41	0.44	1.58	10.77	0.84	0.56	0.01	96.13
90-22 129.6	UZb	38.62	0.17	5.86	36.60	0.36	2.50	5.17	0.40	0.52	0.00	90.21

Table DR1 continued

Sample #	Zone	SiO_2	TiO_2	Al_2O_3	FeO_t	MnO	MgO	CaO	Na_2O	K_2O	P_2O_5	Sum
90-22 46.2	UZc	40.57	0.18	6.95	39.68	0.94	0.34	0.84	0.14	3.82	0.02	93.48
90-22 46.2	UZc	42.01	0.05	5.61	39.72	1.01	0.23	0.33	0.07	3.61	0.05	92.68
90-22 46.2	UZc	41.85	0.00	7.09	38.73	0.99	0.21	0.58	0.65	2.95	0.00	93.05
90-22 46.2	UZc	44.58	0.29	4.21	34.52	1.29	0.38	8.48	0.86	1.41	0.06	96.09
90-22 46.2	UZc	45.46	0.42	2.43	30.01	0.83	0.81	17.67	0.39	0.49	0.00	98.51
90-22 31.1	UZc	37.87	1.19	8.17	32.61	0.41	0.29	10.26	1.61	1.68	0.08	94.17
90-22 31.1	UZc	36.54	1.23	8.24	31.52	0.19	0.28	13.18	1.31	1.65	2.32	96.45
90-22 31.1	UZc	47.25	0.79	8.33	26.73	0.35	0.20	8.59	2.28	1.86	0.00	96.38
90-22 31.1	UZc	37.44	2.50	8.32	33.17	0.88	0.22	10.31	2.31	1.05	0.08	96.30
90-22 31.1	UZc	33.93	2.91	8.41	31.19	0.71	0.21	13.01	2.00	1.08	3.23	96.68
90-22 31.1	UZc	39.95	1.53	9.22	21.38	0.66	0.06	10.36	2.38	1.63	4.94	92.12
Average		**40.67**	**1.86**	**7.87**	**30.85**	**0.51**	**2.35**	**8.97**	**1.58**	**1.03**	**0.25**	**95.94**
S.D.		3.56	1.30	2.95	4.17	0.26	1.52	3.89	1.02	1.18	0.85	2.11

Table DR 2 Microprobe analysis (wt%) of Si-rich melt inclusions in apatite

Sample #	Zone	SiO_2	TiO_2	Al_2O_3	FeO_t	MnO	MgO	CaO	Na_2O	K_2O	P_2O_5	Sum
90-22 441.7	UZb	66.55	0.00	15.36	4.50	0.12	0.45	0.38	8.94	0.26	0.07	96.63
90-22 421.0	UZb	59.92	0.18	16.26	10.91	0.11	1.53	0.42	7.89	1.37	0.01	98.59
90-22 401.3	UZb	58.69	0.22	16.34	12.07	0.15	0.76	1.81	8.85	0.13	0.06	99.08
90-22 401.3	UZb	61.17	0.03	22.42	1.38	0.08	0.09	4.59	8.65	0.22	0.04	98.67
90-22 310.2	UZb	59.61	0.75	17.11	8.84	0.08	1.54	1.06	8.25	0.08	0.02	97.34
90-22 229.4	UZb	71.56	0.64	14.65	5.64	0.09	0.44	2.47	6.84	0.17	0.12	102.61
90-22 129.6	UZb	63.57	0.63	4.00	20.97	0.34	0.65	3.72	0.57	1.31	0.00	95.75
90-22 129.6	UZb	56.13	0.05	15.23	15.23	0.12	0.81	0.56	7.45	0.56	0.02	96.15
90-22 107.9	UZb	75.10	0.07	2.88	13.96	0.07	1.23	0.55	0.26	0.90	0.03	95.04
90-22 46.2	UZc	62.99	0.04	16.90	2.85	0.13	0.00	0.19	0.21	14.78	0.06	98.16
90-22 46.2	UZc	63.31	0.02	16.96	0.99	0.02	0.00	0.19	0.38	15.46	0.00	97.33
90-22 46.2	UZc	61.37	0.05	15.71	4.45	0.11	0.05	2.21	0.32	13.67	0.03	97.97
90-22 46.2	UZc	58.65	0.00	13.95	7.18	0.24	0.12	4.94	0.22	11.59	0.00	96.90
90-22 31.1	UZc	71.96	0.44	3.94	16.03	0.26	0.17	4.96	0.88	0.77	0.06	99.46
90-22 31.1	UZc	83.83	0.02	6.54	4.16	0.00	0.01	0.49	3.54	0.12	0.01	98.72
90-22 31.1	UZc	68.97	0.58	7.50	14.24	0.16	0.09	4.67	2.92	0.67	0.05	99.85
90-22 31.1	UZc	71.53	0.02	14.35	3.39	0.14	0.03	0.85	7.43	0.57	0.00	98.30
Average		**65.58**	**0.22**	**12.95**	**8.63**	**0.13**	**0.47**	**2.00**	**4.33**	**3.68**	**0.03**	**98.03**
S.D.		7.30	0.27	5.70	5.94	0.08	0.54	1.85	3.75	5.89	0.03	1.78

Table DR3. Microprobe analysis (wt%) of Si-rich melt inclusions in olivine

Sample #	Zone	SiO_2	TiO_2	Al_2O_3	FeO_t	MnO	MgO	CaO	Na_2O	K_2O	P_2O_5	Sum
90-22 401.3	UZb	62.66	0.04	6.55	16.79	-	7.66	0.79	1.84	3.10	0.29	99.71
90-22 401.3	UZb	57.35	0.01	21.38	6.48	-	2.31	3.48	4.72	4.15	0.04	99.92
90-22 401.3	UZb	56.40	1.96	7.45	14.20	-	9.13	7.88	3.81	0.79	0.10	101.73
90-22 401.3	UZb	59.16	0.92	14.10	10.66	-	5.44	2.53	6.93	0.20	0.01	99.94
Average		**58.89**	**0.73**	**12.37**	**12.03**	-	**6.14**	**3.67**	**4.32**	**2.06**	**0.11**	**100.33**
S.D.		2.39	0.80	5.96	3.87	-	2.57	2.61	1.83	1.62	0.11	0.82

Table DR4 Compositions of plagiogranites and melanogranophyre (wt%)

	SiO_2	TiO_2	Al_2O_3	FeO_t	MnO	MgO	CaO	Na_2O	K_2O	P_2O_5	Sum
Plagiogranite*	70.71	0.41	13.68	4.15	0.06	1.36	2.88	4.81	0.32	0.17	98.98
S.D.	5.71	0.28	2.07	1.82	0.04	1.49	1.82	1.85	0.35	0.29	
Melanogranophyre [#]	63.49	1.10	10.94	11.67	0.13	0.47	2.00	4.33	3.68	0.03	97.85
S.D.	8.95	0.62	0.39	5.82	0.11	0.34	1.9	0.49	0.52	0.33	

*Plagiogranite is an average of samples from 6 different ophiolite suites and is from Dixon and Rutherford (1979)

[#]Melanogranophyre from the Skaergaard intrusion is an average of 3 representative compositions. From McBirney (1989)

REFERENCES CITED IN TABLES:

Dixon, S., and Rutherford, M.J., 1979, Plagiogranites as late-stage immiscible liquids in ophiolite and mid-ocean rigde suites: An experimental study: Earth and Planetary Science Letters, v. 45, p. 45-60.

McBirney, A.R., 1989, The Skaergaard Layered Series: I. Structure and Average Compositions: Journal of Petrology, v. 30, p. 363-399.