Contents

Context, explanations, abbreviations, units1			
1 (Civilization based on metals5		
1.1 1.2 1.3 1.4	Metal prices		
	Data on metallic deposits and magnitude categories: the giant and world class deposits37		
2.1 2.2 2.3	Giant and world class ore deposits: definition and characteristics40		
2.4	deposits, districts		
3	From trace metals to giant deposits59		
3.1 3.2			
3.3	•		
	Geological divisions that contain ore giants: introduction and the role of mantle69		
4.1 4.2	Earth's mantle and its role in terrestrial (crustal)		
4.3	lithogenesis and metallogenesis		
5	Oceans and young island arc systems81		
5.1 5.2	,		
5.3			



VIII	Contents
5.4	Ocean floor sediments
5.5	Active to "young" (pre-orogenic) convergent
J.5	plate margins on sea floor and in islands90
5.6	Island arc metallogeny and giant deposits
5.7	Island arc-trench subenvironments and ore formation 94
5.8	Magmatic (volcano-plutonic) systems in island arcs
5.9	Back-arcs (marginal seas), inter-arcs, and other
	extensional basins
5.10	Magnetite beach sands
	ean-type convergent continental margins (upper
volca	nic-sedimentary level)109
6.1	Introduction
6.2	Metals fluxing and metallogenesis 113
6.3	Geothermal systems on land and in the shallow
0.5	subsurface
6.4	High-sulfidation epithermal ores
6.5	Low sulfidation (LS) deposits
0.5	Low surrounding (DD) deposits
	lilleran granitoids in convergent continental
mar	gins (lower, plutonic levels)169
7.1	Introduction
7.2	Metallogeny
7.3	Porphyry deposits: Cu, Cu–Mo, Au
7.4	Stockwork molybdenum deposits
7.5	Stockwork, vein and skarn Mo-W-Bi
7.6	Scheelite skarn deposits
7.7	Cordilleran Pb–Zn–Ag (Cu) deposits
7.8	Hydrothermal Fe, Mn, Sb, Sn, B, U, Th deposits in,
	and associated with, Cordilleran granitoids
7.9	Carlin-type micron-size Au (As, Hg, Sb, Tl)
	deposits
8 Intra	cratonic (intraplate) orogens, granites,
hydr	othermal deposits263
8.1	Introduction
8.2	Massif anorthosite association: Fe-Ti-V and Ni-Cu
8.2	deposits
0 2	Ores closely associated with granites & pegmatites 274
8.3	Mesothermal gold
8.4 8.5	Dominantly orogenic metamorphic-hydrothermal Au
0.3	deposits
0 6	Gold placers
8.6	(Syn)orogenic Sb and Hg deposits
8.7 8.8	Pb, Zn, Ag veins and replacements
0.0	ru, Zii, Ag veins and replacements

9 Volcano-sedimentary orogens341				
9.1	Introduction341			
9.2	Ophiolite allochthons, melanges and alpine			
	serpentinites346			
9.3	Oceanic successions			
9.4	Mafic and bimodal marine volcanic-sedimentary			
	successions			
9.5	Differentiated mafic-ultramafic intrusions			
9.6	(Alaska-Urals type)			
9.0	successions			
9.7	Miscellaneous metallic ores 374			
10 Pred	cambrian greenstone-granite terrains375			
10.1	Introduction			
10.2	Komatiite association and Ni ores			
10.3	Early Proterozoic paleo-ophiolites			
10.4	Mafic and bimodal greenstone sequences: Fe ores			
	in banded iron formations			
10.5	VMS deposits in bimodal volcanic-sedimentary			
10.6	association			
10.6	Granitoid plutons in greenstone setting and older			
10.7	Precambrian "porphyry" deposits			
10.7	greenstone terrains			
10.8	Synorogenic Cu (U, Ni, Au, Ag) deposits			
10.0	overprinting greenstone belts			
10.9	Ores in late orogenic sedimentary			
	rocks in greenstone belts421			
	terozoic-style intracratonic orogens and basins: ension, sedimentation, magmatism			
11.1	Introduction425			
11.2	Metallogeny and giant deposits428			
11.3	Sedex concept applied to Proterozoic Pb-Zn-Ag			
	deposits433			
11.4	Strata controlled Proterozoic copper deposits in			
11.5	(meta)sedimentary rocks			
11.5	Au and U in quartz-rich conglomerates (Wityptorgrand type)			
11.6	(Witwatersrand-type)			
11.7	Fe (BIF) and Mn in diamictites466			
11.7	Bedded and residual Mn deposits			
11.9	Miscellaneous, complex Zn, Pb, Cu, Co, V, Ag, Ge			
	Ga, (U) deposits in Proterozoic sedimentary rocks472			
11.10	Oxidic (nonsulfide) Zn and Pb deposits475			
11.11	Unconformity uranium deposits477			
11.12	Hydrothermal Fe oxide deposits with Cu, or U,			
	or Au, or REE: the IOCG group480			

12 Rifts, paleorifts, rifted margins, anorogenic						
and alkaline magmatism49						
12.1	Introduction	493				
12.1	Young rifts, hydrothermal activity					
12.3	Mantle plumes, continental breakup, rifted	770				
12.3	wante plumes, continental breakup, inted	409				
10.4	continental margins	498				
12.4	Plateau (flood) basalts					
12.5	Diabase, gabbro, rare peridotite dikes and sills					
12.6	Bushveld-style layered intrusions.	511				
12.7	Sudbury complex Ni, Cu, Co, PGE, Ontario:					
	an enigma related to meteorite impact	524				
12.8	Alkaline magmatic association					
12.9	Carbonatites	542				
13 Sed	imentary associations and regolith	551				
13.1	Introduction					
13.2	Marine clastics					
13.3	Combined clastic and chemical bedded sedimentary					
	deposits	559				
13.4	Marine carbonates and evaporites					
13.5	Marine evaporites and ores	601				
13.6	Hydrocarbons as a source of metals	603				
13.7	Ores in regolith and continental sediments					
13.8	Anthropogenic metal sources					
14 Hig	her-grade metamorphic associations	641				
14.1	Introduction	641				
14.2	Metallogeny					
14.3	High-grade associations and ores					
14.4	High-grade metamorphosed banded iron					
2	formations (BIF).	648				
14.5	Pb–Zn–Ag sulfide orebodies in gneiss >> marble,					
14.5	Ca–Mg–Mn silicates: (Broken Hill-type)	640				
14.6	Zn, Pb sulfides and Zn-Mn oxides in marble and	042				
14.0	Ca–Mg silicate hosts	652				
14.7	Zn, Cu, Pb sulfide deposits in gneiss, schist, marble	055				
14.7		(5)				
140	(meta-VMS?)	656				
14.8	Disseminated Cu sulfide deposits in gneiss, schist					
140	and marble	658				
14.9	Scheelite, uranian phosphates, magnesite,					
	borates in marble and Ca-Mg silicate gneiss	661				
14.10	High-grade metamorphic mafic-(ultramafic)-					
	association	662				
14.11	Retrograde metamorphosed and metasomatized					
	mineralized structures	668				

15	Giant deposits in geological context677
15.	Origin of the giant deposits677
15.	
15.	
15.	
16	Giant deposits: industry, economics, politics703
16.	1 Historical background703
16.	
16.	
16.	
17	Finding or acquiring giant deposits 725
17.	
17.	2 History of discovery of giant ore deposits/districts732
17.	Acquiring giant deposits for tomorrow742
Еp	ilogue749
Re	ferences755
Inc	lex of mineral deposits827
Su	bject index835
АP	PENDIX: Database of significant metallic accumulations 849