Gondwana Research 36 (2016) 219–274

Contents lists available at ScienceDirect

Gondwana Research

journal homepage: www.elsevier.com/locate/gr

GR Focus Review

Gold mineralization in China: Metallogenic provinces, deposit types and tectonic framework

Jun Deng *, Qingfei Wang

State Key Laboratory of Geological Processes and Mineral Resources, China University of Geosciences, Beijing 100083, China

ARTICLE INFO

Article history:
Received 7 May 2015
Received in revised form 3 October 2015
Accepted 10 October 2015
Available online 19 October 2015

Handling Editor: M. Santosh

Keywords:
Gold deposits
Tectonics
Jiaodong-type
Orogenic
Carlin-like

ABSTRACT

We present a review of major gold mineralization events in China and a summary of metallogenic provinces, deposit types, metallogenic epochs and tectonic settings. Over 200 investigated gold deposits are grouped into 16 Au-metallogenic provinces within five tectonic units such as the Central Asian orogenic belt comprising provinces of Northeast China and Tianshan-Altay; North China Craton comprising the northern margin, Jiaodong, and Xiaoqinling; the Qinling-Qilian-Kunlun orogenic belt consisting of the West Qingling, North Qilian, and East Kunlun; the Tibet and Sanjiang orogenic belts consisting of Lhasa, Garzê-Litang, Ailaoshan, and Daduhe-Jinpingshan; and the South China block comprising Youjiang basin, Jiangnan orogenic belt, Middle and Lower Yangtze River, and SE coast. The gold deposits are classified as orogenic, Jiaodong-, porphyry–skarn, Carlin-like, and epithermal-types, among which the first three types are dominant.

The orogenic gold deposits formed in various tectonic settings related to oceanic subduction and subsequent crustal extension in the Qinling-Qilian-Kunlun, Tianshan-Altay, northern margin of North China Craton, and Xiaoqinling, and related to the Eocene–Miocene continental collision in the Tibet and Sanjiang orogenic belts. The tectonic periods such as from slab subduction to block amalgamation, from continental soft to hard collision, from intracontinental compression to shearing or extension, are important for the formation of the orogenic gold deposits. The orogenic gold deposits are the products of metamorphic fluids released during regional metamorphism associated with oceanic subduction or continental collision, or related to magma emplacement and associated hydrothermal activity during lithospheric extension after ocean closure. The Jiaodong-type, clustered around Jiaodong, Xiaoqinling, and the northern margin of the North China Craton, is characterized by the involvement of mantle-derived fluids and a temporal link to the remote subduction of the Pacific oceanic plate concomitant with the episodic destruction of North China Craton. The Carlin-like gold metallogenesis is related to the activity of connate fluid, metamorphic fluid, and meteoric water in different degrees in the Youjiang basin and West Qinling; the former Au province is temporally related to the remote subduction of the Tethyan oceanic plate and the later formed in a syn-collision setting. Porphyry–skarn Au deposits are distributed in the Tianshan-Altay, the Middle and Lower Yangtze River region, and Tibet and Sanjiang orogenic belts in both subduction and continental collision settings. The magma for the porphyry–skarn Au deposits commonly formed by melting of a thickened juvenile crust. The epithermal Au deposits, dominated by the low-sulfidation type, plus a few high-sulfidation ones, were produced during the Carboniferous oceaic plate subduction in Tianshan-Altay, during Early Cretaceous and Quaternary oceanic plate subduction in SEt coast of South China Block, and during the Pliocene continental collision in Tibet. The available data of different isotopic systems, especially fluid D–O isotopes and carbonate C–O systems, reveal that the isotopic compositions are largely overlapping for different genetic types and different for the same genetic type in different Au belts. The isotopic compositions are thus not good indicators of various genetic types of gold deposit, perhaps due to overprinting of post-ore alteration or the complex evolution of the fluids.

Although gold metallogeny in China was initiated in Cambrian and lasted until Cenozoic, it is mainly concentrated in four main periods. The first is Carboniferous when the Central Asian orogenic belt formed by welding of microcontinental blocks and arcs in Tianshan-Altay, generating a series of porphyry–epithermal–orogenic deposits. The second period is from Triassic to Early Jurassic when the current tectonic mainframe of China started to take shape. In central and southern China, the North China Craton, South China Block and Simao block were amalgamated after the closure of Paleo-Tethys Ocean in Triassic, forming orogenic and Carlin-like gold deposits. The third period is Early Cretaceous when the subduction of the Pacific oceanic plate to the east and that of Neo-Tethyan oceanic plate to the west were taking place. The subduction in eastern China produced the Jiaodong-

* Corresponding author.
E-mail address: djun@cugb.edu.cn (J. Deng).

http://dx.doi.org/10.1016/j.gr.2015.10.003

type deposits in the North China Craton, the skarn-type deposits in the northern margin (Middle to lower reaches of Yangtze River) and the epithermal-type deposits in the southeastern margin in the South China Block. The subduction in western China produced the Carlin-like gold deposits in the Youjiang basin and orogenic ones in the Garzê-Litang orogenic belt. The Cenozoic is the last major phase, during which southwestern China experienced continental collision, generating orogenic and porphyry–skarn gold deposits in the Tibetan and Sanjiang orogenic belts. Due to the spatial overlap of the second and third periods in a single gold province, the Xiaoqinling, West Qinling, and northern margin of the North China Craton have two or more episodes of gold metallogeny.

Contents