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1 Preface for the Special Issue “Geology, Geodynamics and Mineral Resources of
2 SE Asia”. Insights from GeoSEA XV Congress, Hanoi, 2018

3

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5

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13

14 SE Asia is an assembly of Gondwana-derived crustal blocks, and an important piece
15 for the geodynamic understanding of the Asian continent. Since the Phanerozoic, this area
16 experienced several significant geodynamic events. The separation of many continents and
17 microcontinents from Gondwana through rifting lead to the opening of oceanic domains.
18 The closure of these oceanic basins and the subsequent continental collision is attested by
19 subduction related magmatism, accretionary complexes, high-pressure and high-
20 temperature metamorphisms, crustal melting and magmatism including volcanism and
21 plutonism. The Mesozoic tectono-magmatism, the Cenozoic intracontinental tectonics
22 related to the India collision, and the recent magmatism and tectonics are also significant
23 events recognized in SE Asia. These geodynamic events represent the general framework for
24 the numerous ore deposits recognized in the area.

25 Since several years, the geological knowledge of SE Asia underwent great advances in
26 many fields of Earth Sciences, including detailed mapping, magmatic and metamorphic
27 petrology, geochronology, structural analysis. This Special Issue of the Journal of Asian Earth
28 Sciences aims at providing some of the new results in stratigraphy, paleogeographic
29 reconstructions, magmatic and metamorphic petrology, geochronology, geochemistry,
30 mineral resources, tectonics, geophysics, and geodynamic reconstructions. Most of these
31 contributions were firstly presented during the GeoSEA XV International congress held in
32 Hanoi in October 2018. Both detailed contributions and large syntheses dealing with the
33 Indochina block, and its relationships with neighboring blocks such as South China, Sibumasu
34 and Philippines Mobile Belt are provided in this volume (Fig. 1).

35 **Tran et al.** present a wide synthesis of the Neoproterozoic to Early Triassic evolution
36 of the Indochina block. Among many new results, the authors clearly emphasize the
37 distinction between the two main orogenic events of SE Asia. The Early to Middle Triassic
38 *Indosinian orogeny* resulted from the south-directed oceanic subduction of a branch of the
39 Paleotethys, followed by continental collision of the South China block below Indochina. The
40 *Trans-Mekong orogeny*, a possible equivalent of the Cimmerian orogeny described more to
41 the west in Central Asia, was related to the collision of the Sibumasu block with Indochina
42 after the closure of another branch of the Paleotethys. In spite of numerous previous works,
43 the Kon Tum massif, in the central part of Indochina block, received attention by **Owada et**
44 **al.**, and **Bui et al.** that document the timing of magmatic and metamorphic events using
45 zircon and monazite geochronology. The detailed stratigraphic, sedimentological, and
46 structural analyses of the Triassic formations in the Truong Son belt and Sam Nua basins
47 provided by **Villeneuve et al.** bring new and important insights on the Triassic collision
48 between Indochina and South China blocks.

49 The geology and metallogeny of the Sibumasu block are addressed in the Singapore
50 area by **Dodd et al., Gillespie et al., and Leslie et al.** Up to date sedimentary,
51 lithostratigraphic, petrologic and structural information is now widely accessible for this
52 area. **Kanjapayont et al.** emphasize the importance of inherited zircons, and clarified the
53 Triassic age of the granites and gneiss related to the collision of the Sibumasu block with
54 Indochina in Thailand. During the pre-collision stage, the oceanic subduction gave rise to a
55 magmatic arc coeval with volcanic-hosted massive sulfide deposits. **Basori et al.**
56 documented the mineralogic and geochemical variations of the paragenetic succession, and
57 microthermometric evidence for the formation of Permian VHMS Tasik Chini ore deposits of
58 central Peninsular Malaysia.

59 It is also well acknowledged that after its Mesozoic integration to Asia, Indochina,
60 and more widely Sundaland, experienced an important reworking as a consequence of the
61 India collision. **Nguyen and Luong** present a detailed microtectonic analysis of the brittle
62 deformation observed in south central Vietnam that allowed them to reconstruct the
63 paleostress regime that affected eastern Indochina from Oligocene to present, and to
64 decipher the role played by the far-field effect of the Indian collision and Sunda subduction.
65 Recent tectonics have also important bearings for applied geology. A multidisciplinary
66 approach using field structural geology, seismic profiles, GPS velocity record was carried out
67 by **Nguyen V. H. et al.** to derive the present strain rate in the Ninh Thuan nuclear plant and
68 surrounding regions. The Pleistocene activity of SE Asia is also represented by an intraplate
69 volcanism such as the alkaline and tholeiitic basalts of the Krông Nô area of South Vietnam
70 that are petrologically and geochemically analyzed by **Hoang et al.**

71 From Kamchatka to East Indonesia, the Eurasian margin is bounded by several island
72 arcs. The Philippines archipelago exposes many ophiolitic belts. The Pujada ophiolite, in SE

73 Mindanao, provides a unique opportunity to elucidate the tectono-magmatic evolution of
74 the Molucca sea Collision Complex. **Olfindo et al.** document the late Cretaceous age, and the
75 back-arc setting of this ophiolite that belonged to the proto-Molucca lithosphere between
76 the Halmahera and Sangihe arcs. More to the North, in NW Luzon, **Pasco et al.** show that the
77 Dos Hermanos ophiolitic mélange is comparable to the Zambales ophiolite of Western
78 Luzon. Both ophiolitic suites record the complex convergence and emplacement history of a
79 paleo-oceanic lithosphere upon the Philippines Mobile Belt. The intense tectonic and
80 magmatic activities along the Philippines Mobile Belt represent highly favorable conditions
81 for the genesis of epithermal gold and porphyry copper deposits. The petrological and
82 geochemical similarities between the Baguio and Pacific Cordillera ore districts in Luzon and
83 East Mindanao, respectively are reviewed by **Yumul et al.** They emphasize the high potential
84 of metallic resources waiting to be discovered in the Philippines. The petrographic,
85 geochemical, and geochronological data from the Poboya and Sassak gold-copper districts in
86 Western Sulawesi of Indonesia provided by **Maulana et al.**, allow the authors to discuss the
87 mineralizing processes of this Mio-Pliocene ore district in relation with the central and
88 northern parts of Western Sulawesi. **Kyi Khin et al.** provided the geology setting, structural
89 and lithostratigraphic framework of the Rakhine Coastal Ranges in western Myanmar and its
90 implications for the collision of the India Plate and the West Myanmar Block.

91

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97

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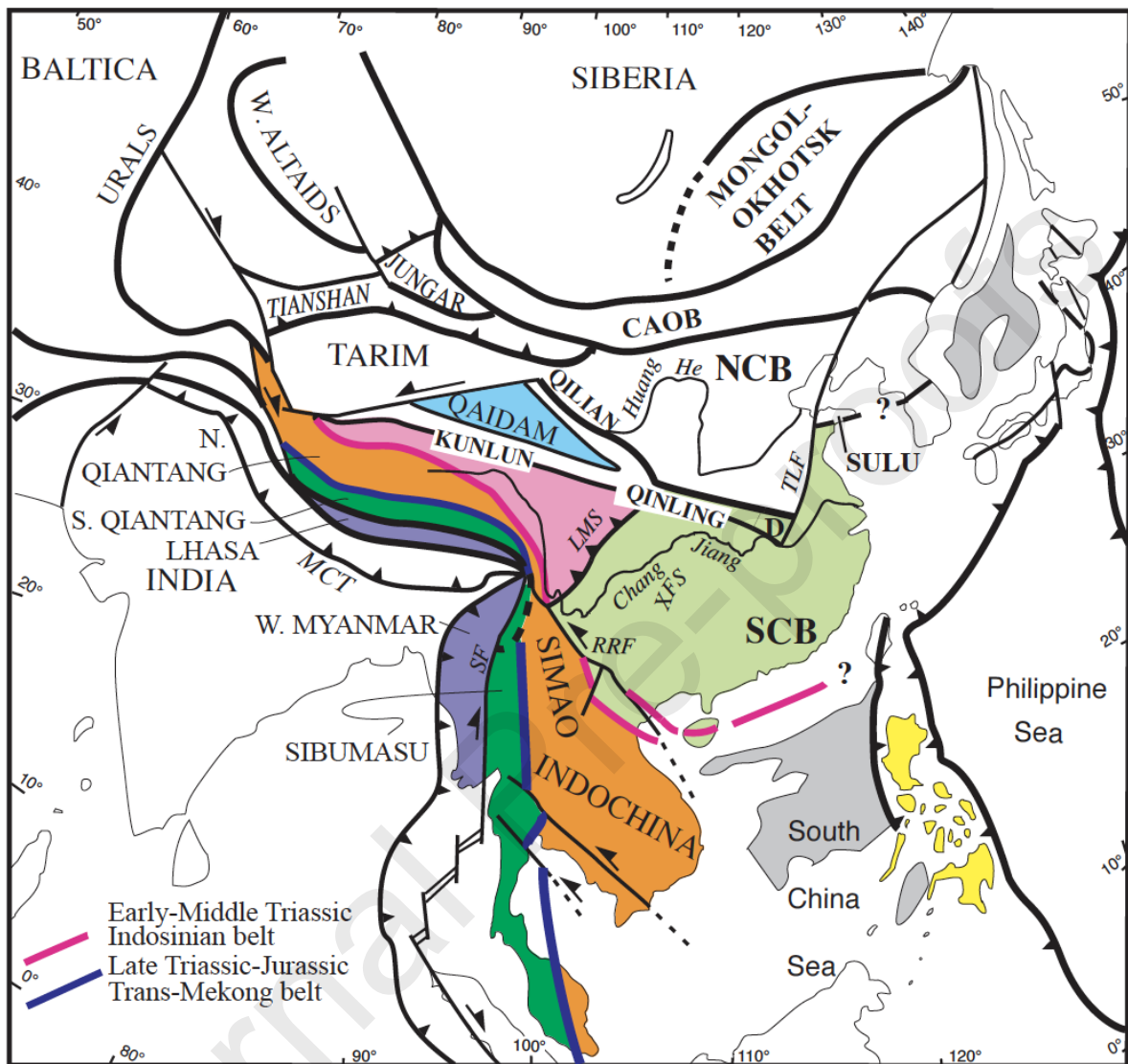
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181 **Figure Captions**

- 182 Fig. 1. Tectonic map of Asia showing the main continental blocks involved in the continental
183 assembly. Emphasis is placed on the Indochina-Simao-North Qiantang block, Sibumasu-
184 South Qiangtang, and South China Block (SCB) with their tectonic boundaries. Namely, the

185 Early-Middle Triassic Indosinian belt, and Late Triassic-Early Jurassic Trans-Mekong

186 (Cimmerian) belt. RRF=Red River Fault. SF=Sagaing Fault.



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195 **Suggested order of papers in the volume**

- 196
- 197 1. Tran et al.
- 198 **Neoproterozoic-Early Triassic tectono-stratigraphic evolution of Indochina and adjacent areas: a review**
- 199 **and new data**
- 200
- 201 2. Owada et al.
- 202 **Timing of magmatism and ultrahigh- to high-grade metamorphism in the Kannak Complex, Kon Tum**
- 203 **Massif, Vietnam: Magmatic activity and its tectonic implications**
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- 206 **Timing of high-grade metamorphism in the Kontum Massif, Vietnam: constraints from zircon-monazite**
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- 209 4. Villeneuve et al.
- 210 **New insights into the Triassic sedimentary environment of the eastern parts of the Song Da and Sam**
- 211 **Nua basins alongside the Indosinian Song Ma suture, Northern Vietnam**
- 212
- 213 5. Dodd et al.
- 214 **Paleozoic to Cenozoic sedimentary bedrock geology and lithostratigraphy of**
- 215 **Singapore**
- 216
- 217 6. Gillespie et al.
- 218 **The igneous rocks of Singapore: New insights to Palaeozoic and Mesozoic**
- 219 **assembly of the Sukhothai Arc**
- 220
- 221 7. Leslie et al.
- 222 **Ductile and brittle deformation in Singapore: A record of Mesozoic orogeny**
- 223 **and amalgamation in Sundaland, and of post-orogenic faulting**
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- 225 8. Kanjanapayont et al.
- 226 **Dating multiple generation of zircons from granites and gneiss from Thailand: Implication for the crustal**
- 227 **evolution of the Sibumasu terrane**
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- 229 9. Basori et al.
- 230 **Petrography and geochemistry of exhalites associated with the Permian VHMS deposits at Tasik Chini**
- 231 **district, Central Belt of Peninsular Malaysia**
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- 233 10. Nguyen V.V. and Luong
- 234 **Cenozoic paleostress evolution in south central Vietnam: Implication for changing dynamics of faulting**
- 235 **along the eastern Indochina continental margin**
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- 237 11. Nguyen V. H. et al.
- 238 **Recent tectonics, geodynamics and seismotectonics for the site selection of the Ninh Thuan Nuclear**
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- 242 **Pleistocene basaltic volcanism in the Krông Nô area and vicinity, Dac Nong Province (Vietnam)**
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- 247 **Collision Complex**
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251 **Petrogenesis of ultramafic-mafic clasts in the Dos Hermanos Mélange, Ilocos Norte: Insights to the**
252 **evolution of western Luzon, Philippines**
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- 254 15. Yumul et al.
255 **Mineralization parameters and exploration targeting for gold-copper deposits in the Baguio (Luzon) and**
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259 **Petrogenesis and Geochronology of intrusive rocks associated with gold and copper mineralization in**
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- 262 17. Khin et al.
263 **Geology, structure and lithostratigraphic framework of the Rakhine Coastal Ranges in western**
264 **Myanmar: implications for the collision of the India Plate and West Myanmar Block. J. Asian Earth Sci.**
265 **194, 104332**