

2012년도 대한지질학회 춘계야외지질답사

대한지질학회는 2012년도 춘계야외지질답사를 아래와 같이 개최합니다. 이번 야외지질 답사는 충남 탄전일대를 대상으로 여러분들과 함께 관찰하고 현장토론을 실시하여 마음으로 함께하는 답사가 되도록 준비하고자 합니다. 야외지질답사에 참가를 원하시는 회원님께서는 수고스럽지만 등록에 앞서 우선 아래 설명된 사전예약 신청서를 작성해 학회 사무국으로 보내주시면 답사준비에 큰 도움이 되겠습니다. 여러 회원님들의 많은 관심과 협조에 미리 감사드립니다.

아래

- 일 시 : 2012년 5월 18일(금) - 2012년 5월 19일(토)
- 답사제목 : “충남분지의 지질구조와 대보조산운동”
- 주 관 : 대한지질학회
- 가 이 드 : 서울대학교 임철 박사, 조문섭 부회장
- 참고논문 : Lim, C. and Cho, M., 2012, Two-phase contractional deformation of the Jurassic Daebo Orogeny, Chungnam Basin, Korea, and its correlation with the early Yanshanian movement of China. *Tectonics*, 31, TC1004 (붙임참고).

세부일정

5월 18일(금)

09:00	대절버스 서울출발 (사당역 부근)
10:00	대절버스 대전출발 (한국지질자원연구원) (※대전출발 신청자 숫자가 작을 경우 취소될 수도 있습니다)
11:30	충남 보령시 오천면 오천항 도착, 등록
12:00	중식
13:00-18:00	야외지질답사(오천면 일대)
19:00	충남 대천해수욕장 숙소 도착(숙소배정, 저녁식사)
21:00-22:00	세미나 및 토의

5월 19일(토)

08:00	아침식사
09:00 - 13:00	야외지질답사(충남 대천 및 청양 일대)
13:00	중식 후 해산

참가비

※ 준비과정에서 금액은 약간 변동될 수 있습니다.

▶자가운전

- ① 110,000원 (※ 2인 1실, 숙박, 식사 4회, 여행자보험 포함 등)
- ② 140,000원 (※ 1인 1실, 숙박, 식사 4회, 여행자보험 포함 등)

▶대절버스

- ① 150,000원 (※ 2인 1실, 숙박, 식사 4회, 대절버스, 여행자보험 포함 등)
- ② 190,000원 (※ 1인 1실, 숙박, 식사 4회, 대절버스, 여행자보험 포함 등)

사전예약 및 등록방법

- ① 사전예약 : 2012년 4월 02일(월) - 4월 13일(금) 18:00까지
- ② 참가등록 : 2012년 4월 16일(월) - 4월 27일(금) 18:00까지
- ③ 등록방법 : 온라인 등록시스템 (<http://www.gskorea.or.kr>)
- ④ 참가인원 : 40명 (선착순 접수)

※ 사전예약은 숙소, 식당예약 뿐만 아니라 참가비용의 결정에 참고가 되므로
회원여러분의 많은 협조 부탁드립니다.

사전예약 신청방법

첨부된 사전예약 신청서를 작성하여, 학회사무국으로 E-mail(office@gskorea.or.kr)
또는 Fax(02-3453-1550)로 보내주시기 바랍니다.

대한지질학회

서울 강남구 테헤란로7길 22 한국과학기술회관 신관 813호 (우.135-703)
T. 02-3453-1550 F. 02-3453-1824
office@gskorea.or.kr www.gskorea.or.kr

Two-phase contractional deformation of the Jurassic Daebo Orogeny, Chungnam Basin, Korea, and its correlation with the early Yanshanian movement of China

Chul Lim¹ and Moon-sup Cho¹

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[1] The Daebo Orogeny is a major orogenic event in Korea that affected the Early to Middle Jurassic Daedong Supergroup. Our investigation of the Nampo Group (part of the supergroup) in the Chungnam Basin reveals the occurrence of two phases of shortening. The majority of the Nampo Group and a basement slab were folded and displaced toward the WNW along the Ocheon thrust during the first phase (Middle Jurassic – early Late Jurassic). Field relationships suggest a ramp-flat geometry for the Ocheon thrust. Mechanical stratigraphy within the slice is consistent with a detachment fold model. Geometric modeling suggests 5.5 km and 3.3 km as the minimum amount of shortening accommodated by the Ocheon thrust and its slice for the ramp slopes of 15° and 30°, respectively. The second phase (late Late Jurassic) was a N-S shortening which produced roughly E-W-trending reverse faults and folds to form a dome-and-basin structure. These shortening events occurred over the entire Chungnam Basin, and coincide in orientation and timing with those reported from the Ogcheon Belt and the Gyeonggi massif. The first and second phases of the Daebo Orogeny are respectively correlated with the shortening in eastern China and the sinistral transpression along the Tan-Lu Fault, both belonging to the early Yanshanian movement. Subsequently in the Early Cretaceous, a regional extension commenced over Korea and eastern China. These remarkable correlations suggest that two stages of crustal thickening occurred throughout the eastern Asia during the Middle to Late Jurassic, followed by regional thinning in the Early Cretaceous.

Citation: Lim, C., and M. Cho (2012), Two-phase contractional deformation of the Jurassic Daebo Orogeny, Chungnam Basin, Korea, and its correlation with the early Yanshanian movement of China, *Tectonics*, 31, TC1004, doi:10.1029/2011TC002909.

1. Introduction

[2] The Daebo Orogeny (*sensu stricto*) has been recognized as a major event that involved widespread plutonism and tectonism over the Korean Peninsula during the Jurassic [Kim, 1987; Kim, 1996; Chough *et al.*, 2000]. Effects of the tectonism have been described primarily in the Ogcheon Belt (Figure 1) by NE-trending thrusts and folds [Geological Investigation Corps of Taebaegsan Region (GICTR), 1962; Cluzel, 1992; Kim *et al.*, 1992; Kihm and Kim, 2003; Han *et al.*, 2006] and in the Gyeonggi massif as well [Cluzel, 1992; Kee *et al.*, 2008; Kihm and Hwang, 2009]. Jurassic folds and thrusts have been also reported from the Pyeongnam Basin, North Korea [Paek, 1993]. A possible linkage of the Daebo Orogeny (*s.s.*) with the early Yanshanian movement in China has been also postulated [Kim, 1987].

[3] Geologic correlations between Korea and eastern China have been recognized in many aspects [Lee, 1987]

and confirmed using modern analytical tools. In particular, geochronologic data on various episodes of magmatism and metamorphism suggest that the Korean Peninsula has been linked to the Chinese blocks at least since the Neoproterozoic [Zhao *et al.*, 2006; Cho *et al.*, 2008] through the Paleoproterozoic [Lee *et al.*, 2000; Kim and Cho, 2003; Sagong *et al.*, 2003; Kim *et al.*, 2008] to the Neoproterozoic [Lee *et al.*, 2003; Kim *et al.*, 2006a, 2008]. The litho- and biostratigraphy of most Paleozoic sedimentary sequences and the middle Paleozoic unconformity in Korea are well correlated with those in the North China block [Kim *et al.*, 2001; Lee and Lee, 2003; Kang and Choi, 2007; Zhai *et al.*, 2007]. By contrast, the Devonian sequence in the Imjingang belt (Figure 1) [Om *et al.*, 1993; Cho *et al.*, 2007] suggests a possible linkage with the South China block. Based on such correlation and Triassic eclogite-facies metamorphism, the Qinling-Dabie-Sulu collision belt in China has been suggested to continue eastward to the Imjingang belt and/or the Gyeonggi massif in Korea [Cluzel *et al.*, 1991; Ree *et al.*, 1996; Oh *et al.*, 2005; Kim *et al.*, 2006b; Cho *et al.*, 2007; Ernst *et al.*, 2007; Kim *et al.*, 2008; Kwon *et al.*, 2009]. These recent advances confirm that the Permo-Triassic events in Korea occurred in connection with the Indosinian

¹School of Earth and Environmental Sciences, Seoul National University, Seoul, South Korea.

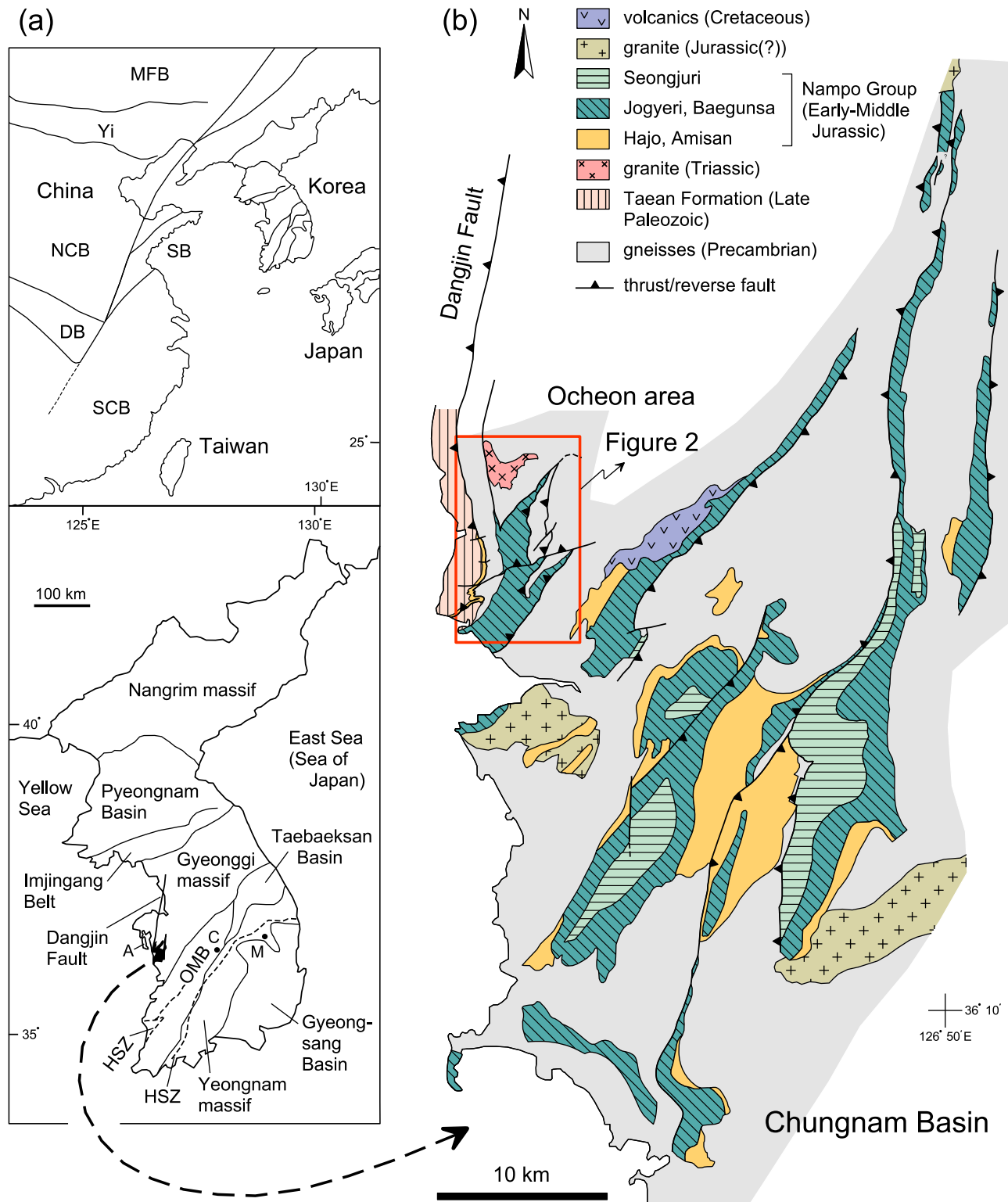


Figure 1. (a) Distribution of tectonic units and boundaries in eastern China and Korea. (b) A simplified geologic map of the Chungnam Basin. OMB, Ogcheon metamorphic belt; HSZ, Honam shear zone; A, Anmyeondo Island; C, Cheongsan area; M, Myogog Formation. Tectonic units in China are: NCB, North China Block; SCB, South China Block; DB, Dabie orogenic belt; SB, Sulu orogenic belt; MFB, Mongolian fold belt; Yi, Yinshan belt. Compiled from Yang [1987], Lee *et al.* [1996], Ree *et al.* [1996], Chough *et al.* [2000], Davis *et al.* [2001], Chwae and Choi [2009], Choi *et al.* [2008], Egawa and Lee [2009], Kee *et al.* [2010], and this study.

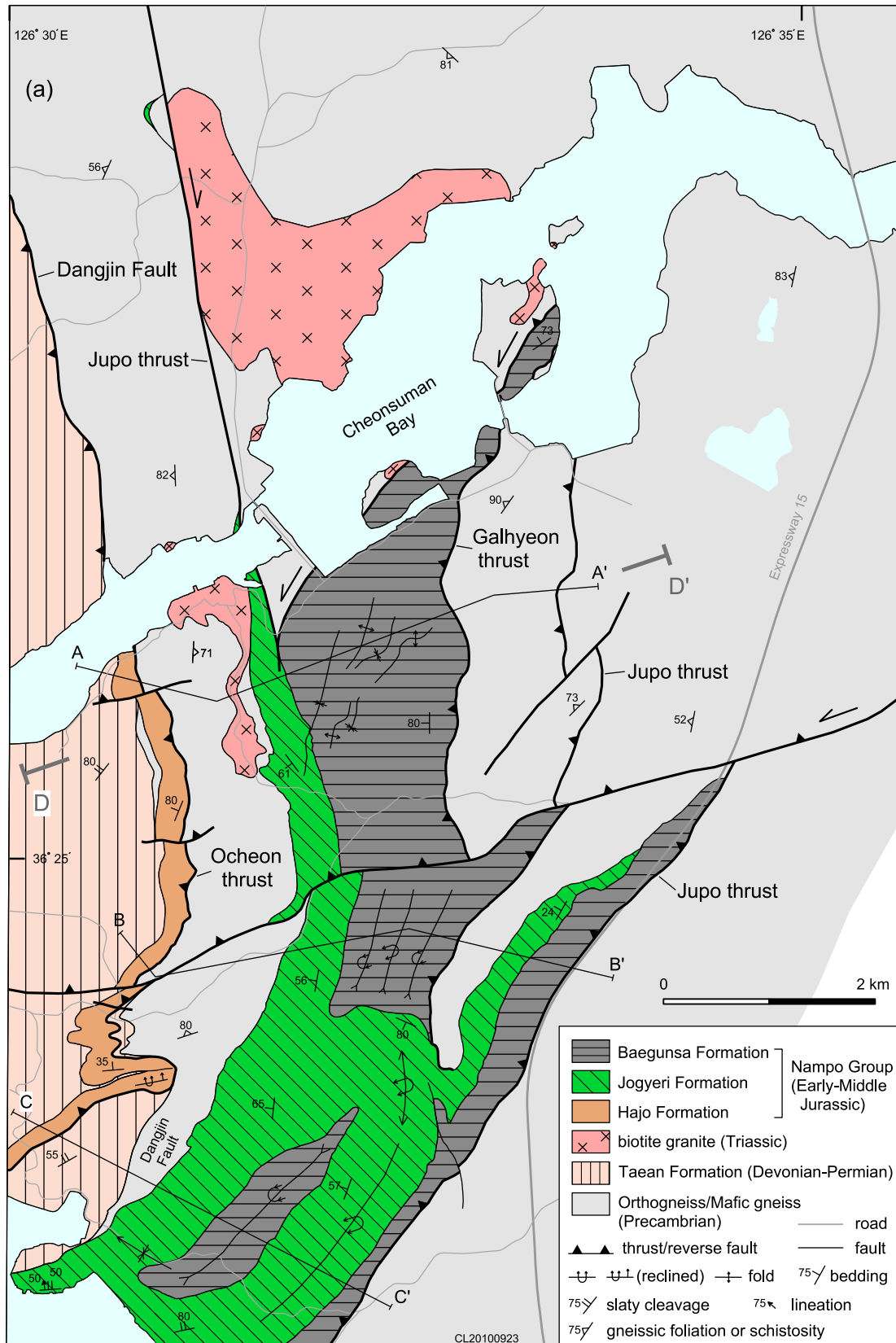
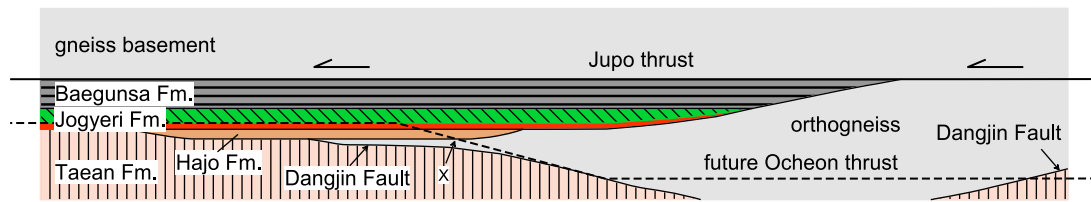
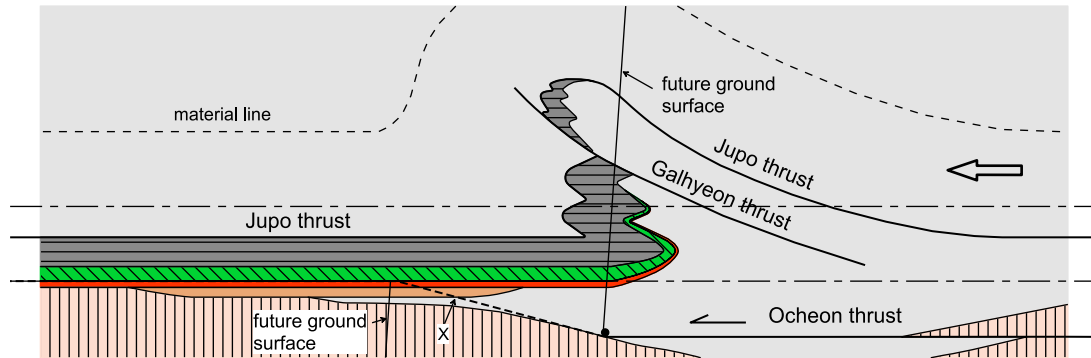


Figure 2. (a) Geologic map of the Ocheon area. Fault symbols are based on final movement sense. (b) Cross sections along the lines shown in the map. Arrows indicate final sense of motion. The complexity of vergence is fully discussed in section 4.2.2.

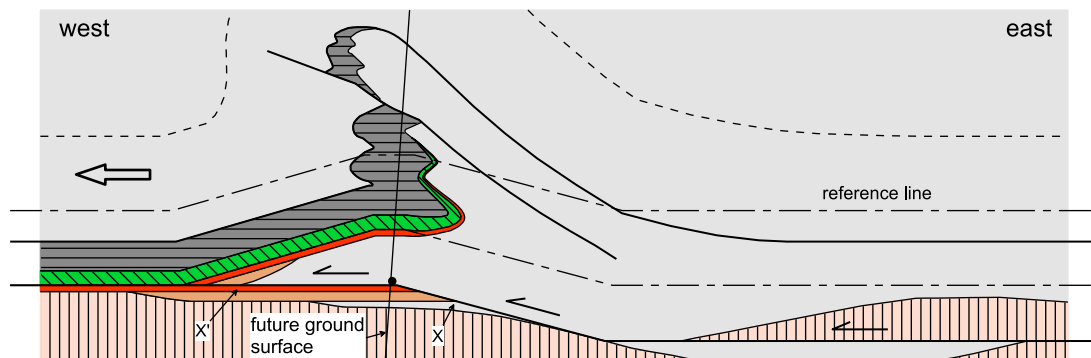
(a) before development of the Ocheon thrust



(b) after folding, before climbing the ramp



(c) after least displacement to climb the ramp



(d) present

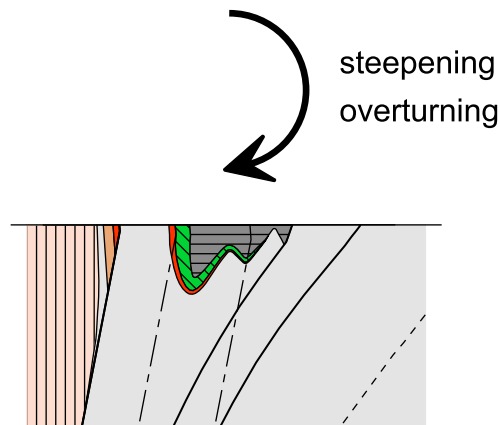


Figure 6

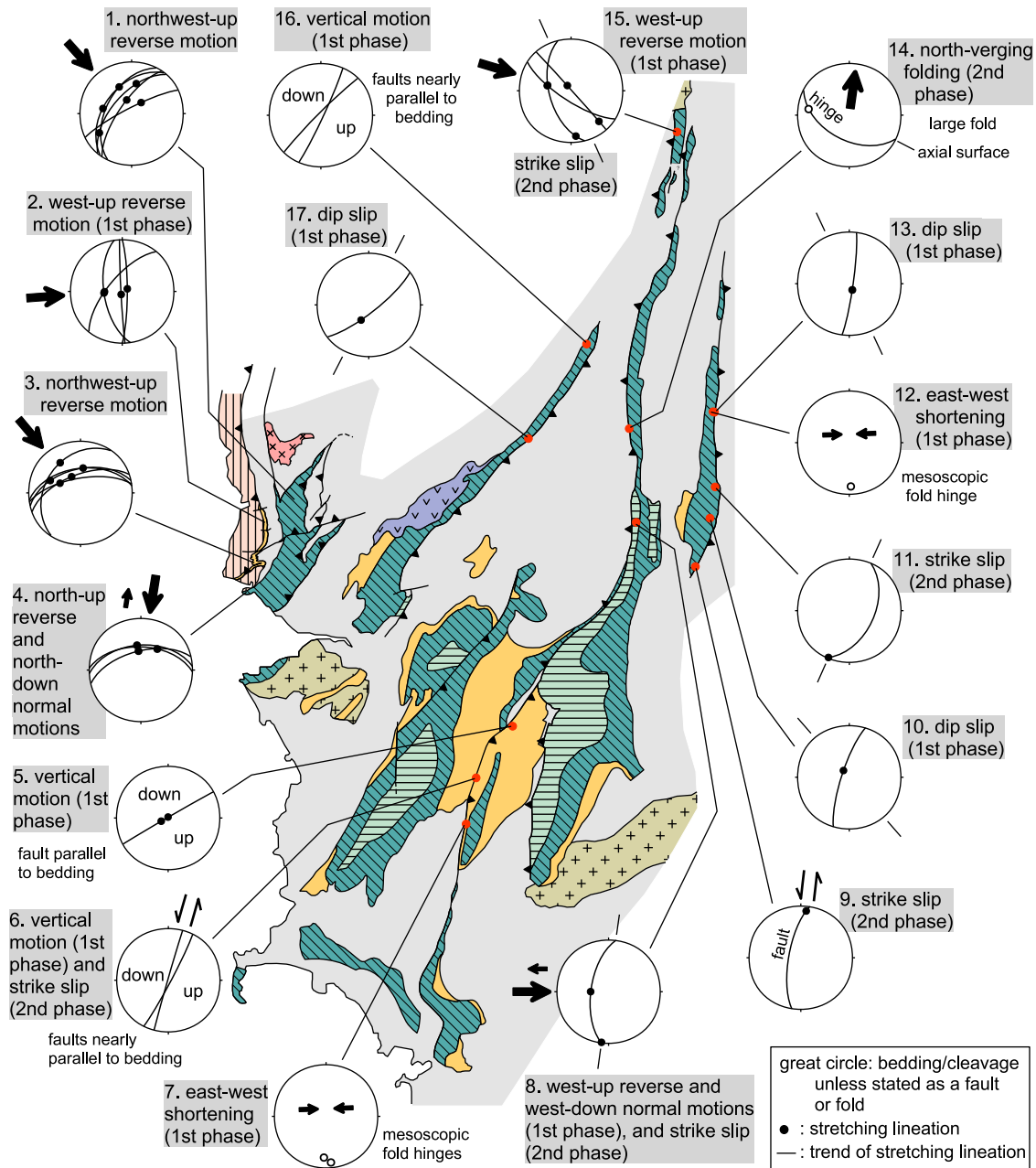


Figure 9. (a) Orientation of mesoscopic structures observed in the Chungnam Basin, and shear sense (arrows) determined from them. In some places, downdip lineations would trend E-W to NW-SE when associated foliations are rotated back to horizontal position, suggesting that they resulted from the first-phase shortening (1, 2, 8, 10, and 13; see section 4.2.1). By contrast, the shortening direction is not easily determined in cases where rotation about a vertical axis occurred presumably during the second phase (3, 4, 5, 15, and 17; see section 4.3.1). Kinematic indicators are, rotated pebbles (1, 2, 3, 4, and 8), oblique foliations (1, 5, 6, and 9), folds (7, 12, 14, and 16), and shear bands (15). Lower hemisphere, equal area projection. (b) Orientations of stretching lineations measured along major faults in the Chungnam Basin. Orientations of associated cleavages and faults are also shown. Gray crosses are mean vector of stretching lineation. Lower hemisphere, equal area projection. (c) Dome-and-basin structures developed in the Chungnam Basin, consistent with the two phases of shortening.

[39] Alternatively, an eastward transport accompanying kinematic inversion may explain the majority of the observed shear senses (Figure 11b). However, this scenario is inconsistent with the down-to-west motions. Moreover,

the eastward transport would have brought the Taean Formation onto the top of Nampo Group, which is not the case (see Figure 6). It is therefore concluded that, in the Chungnam Basin, the Nampo Group and basement rocks were principally transported westward during the first-phase