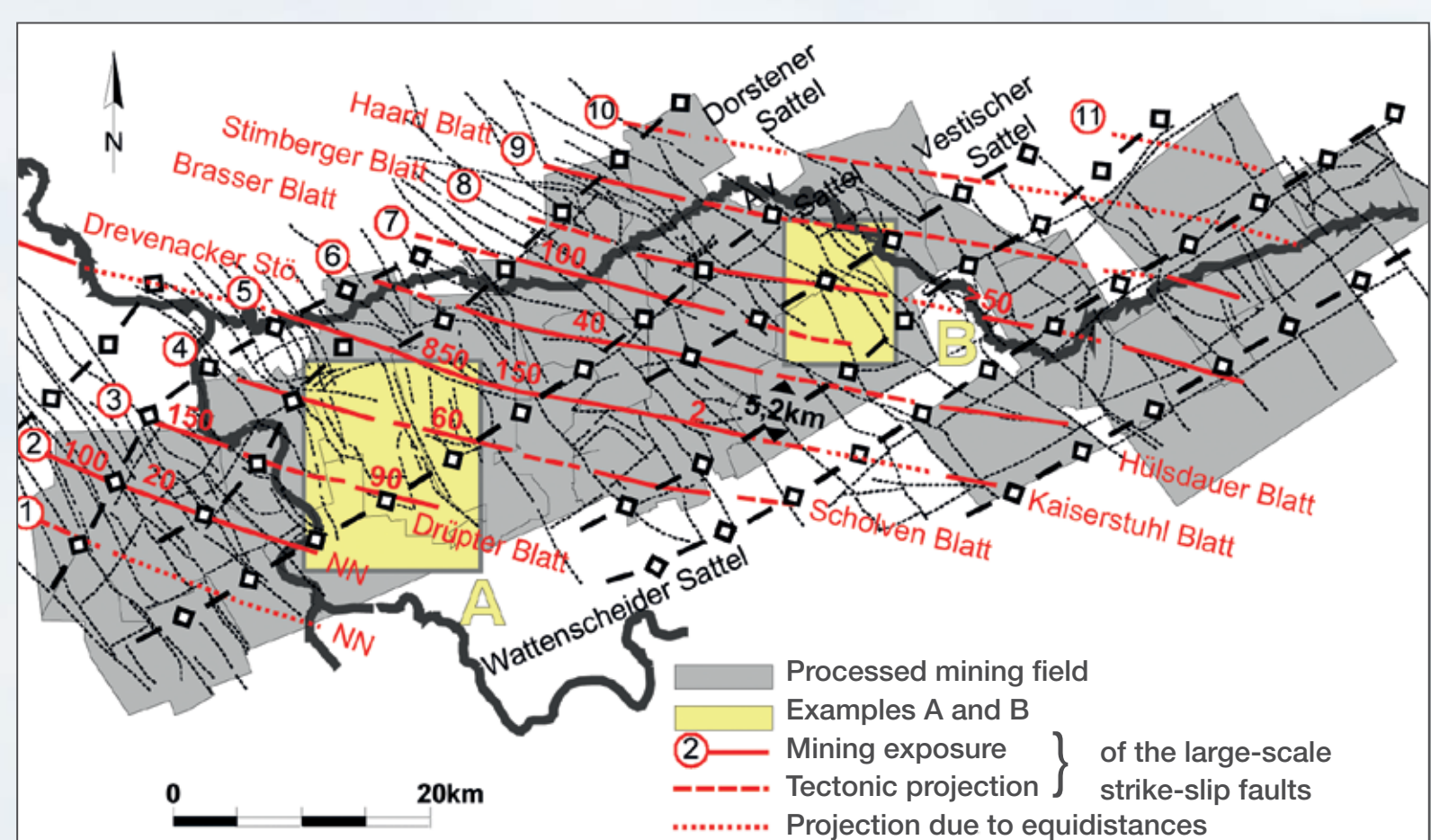
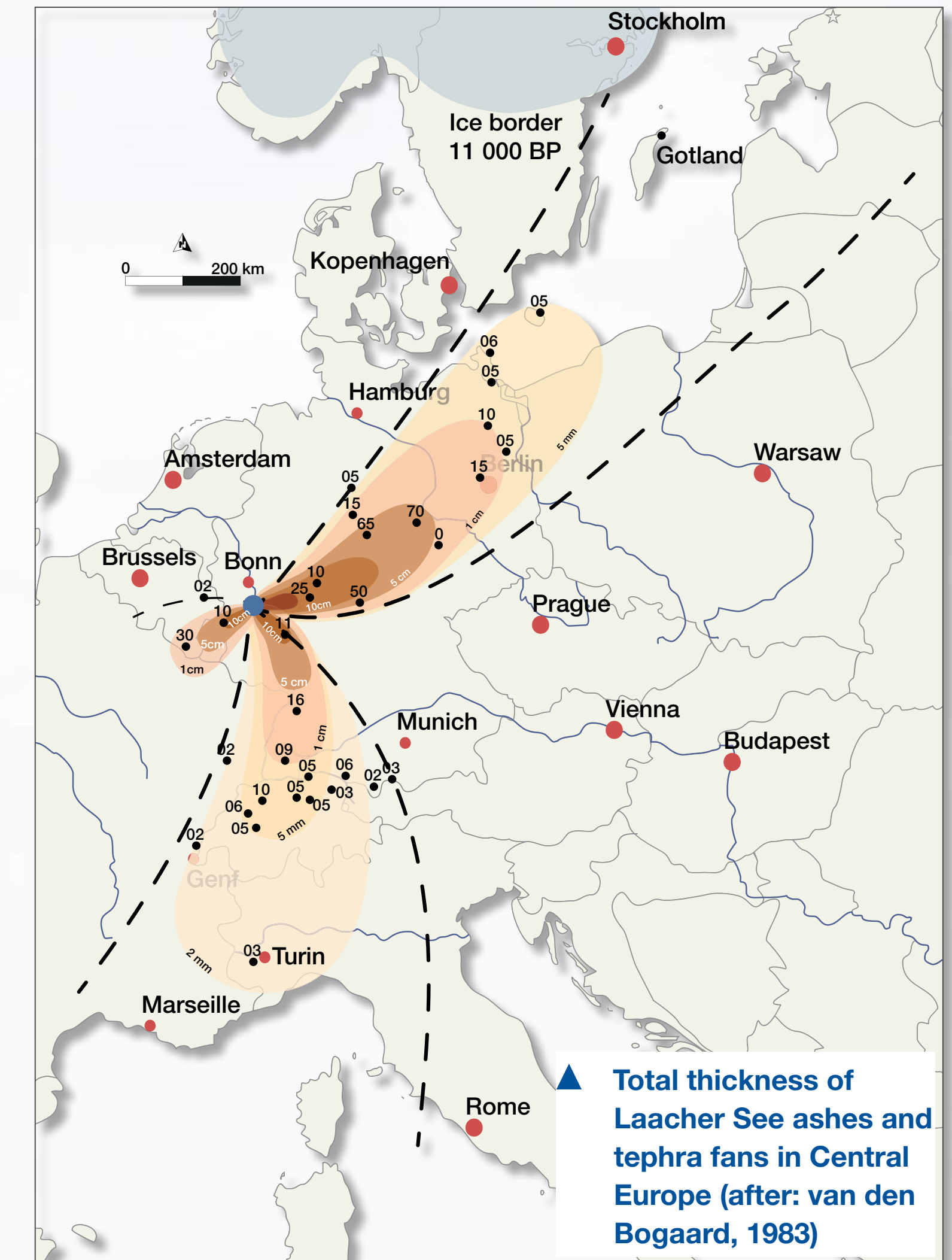
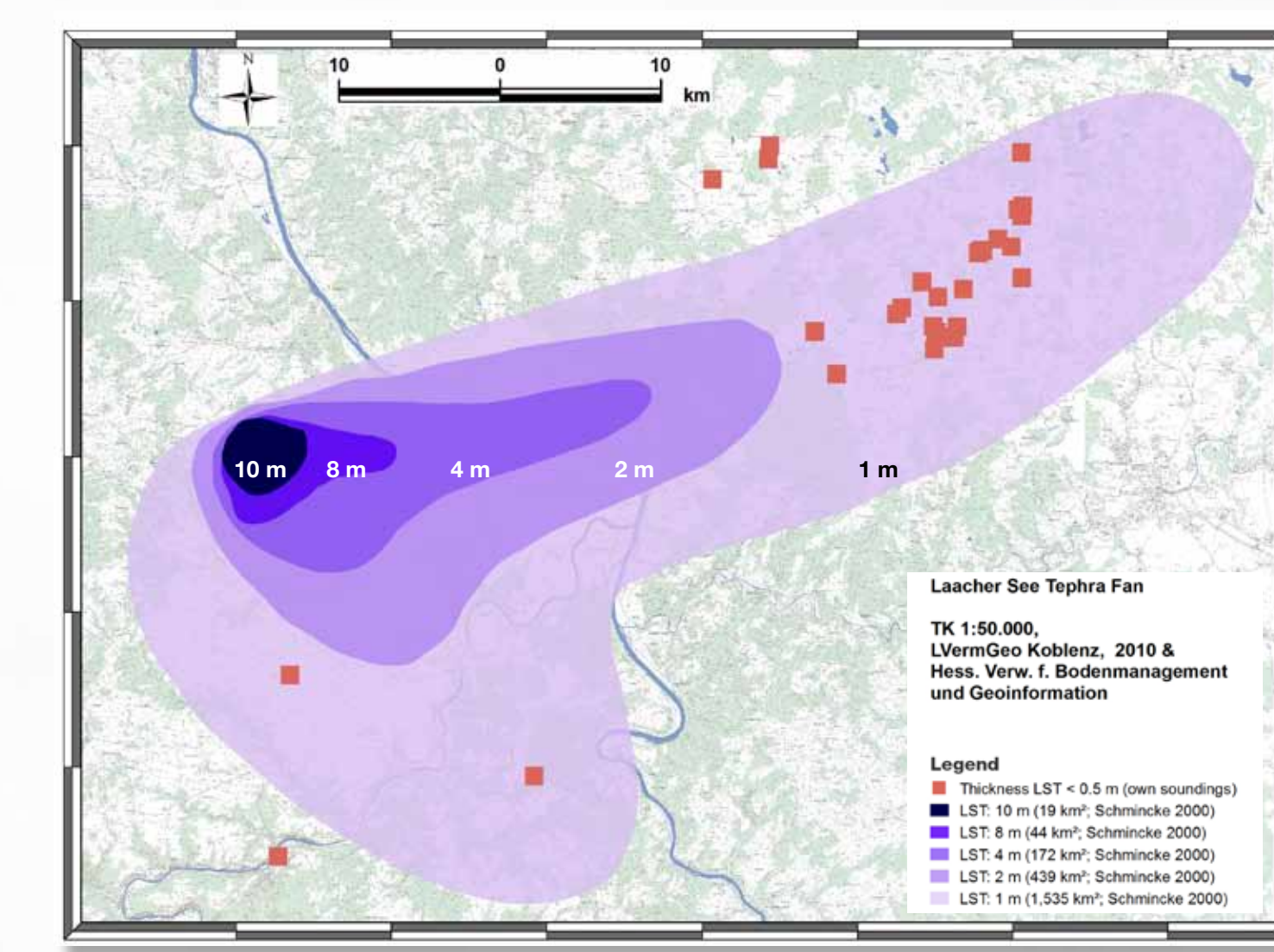
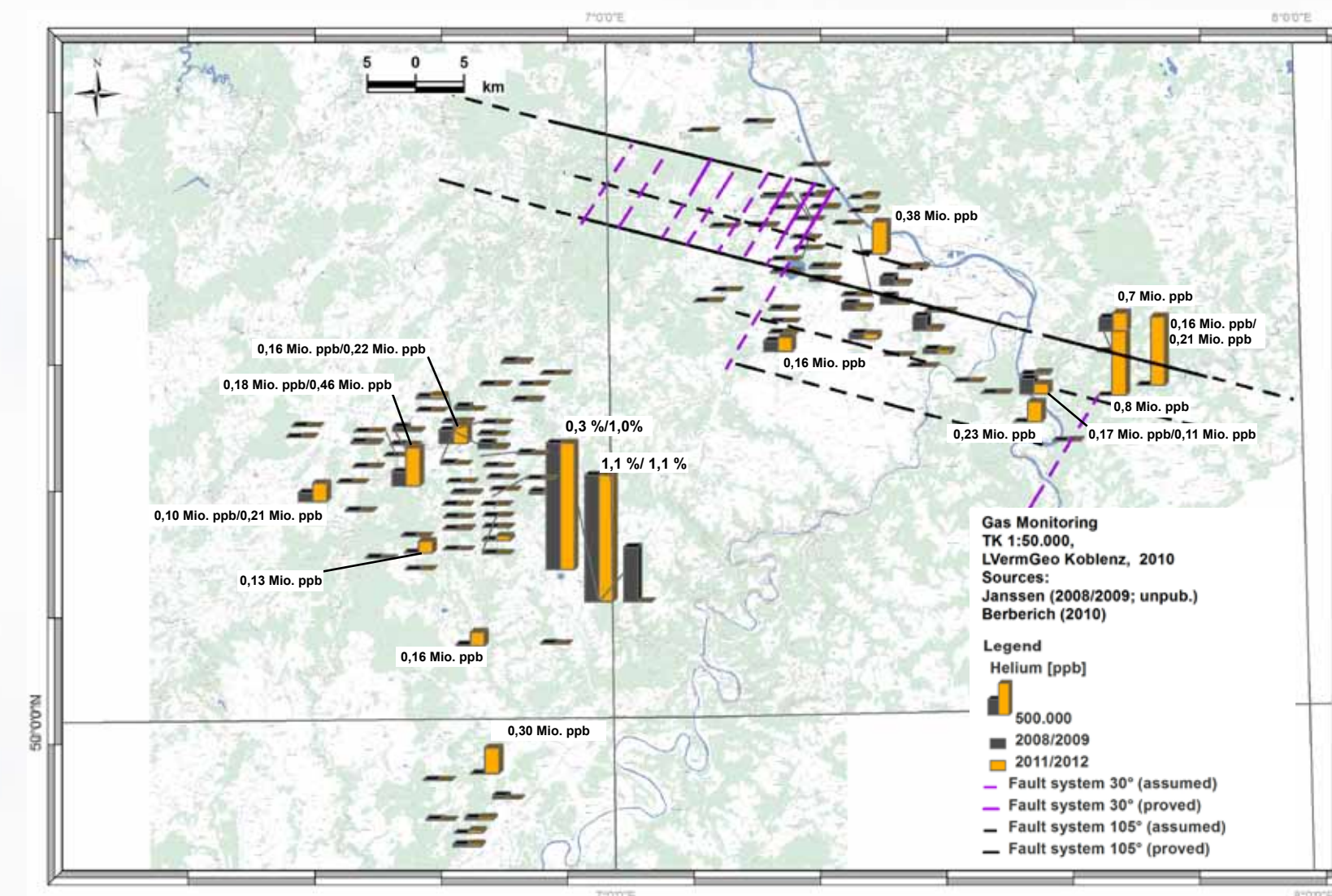
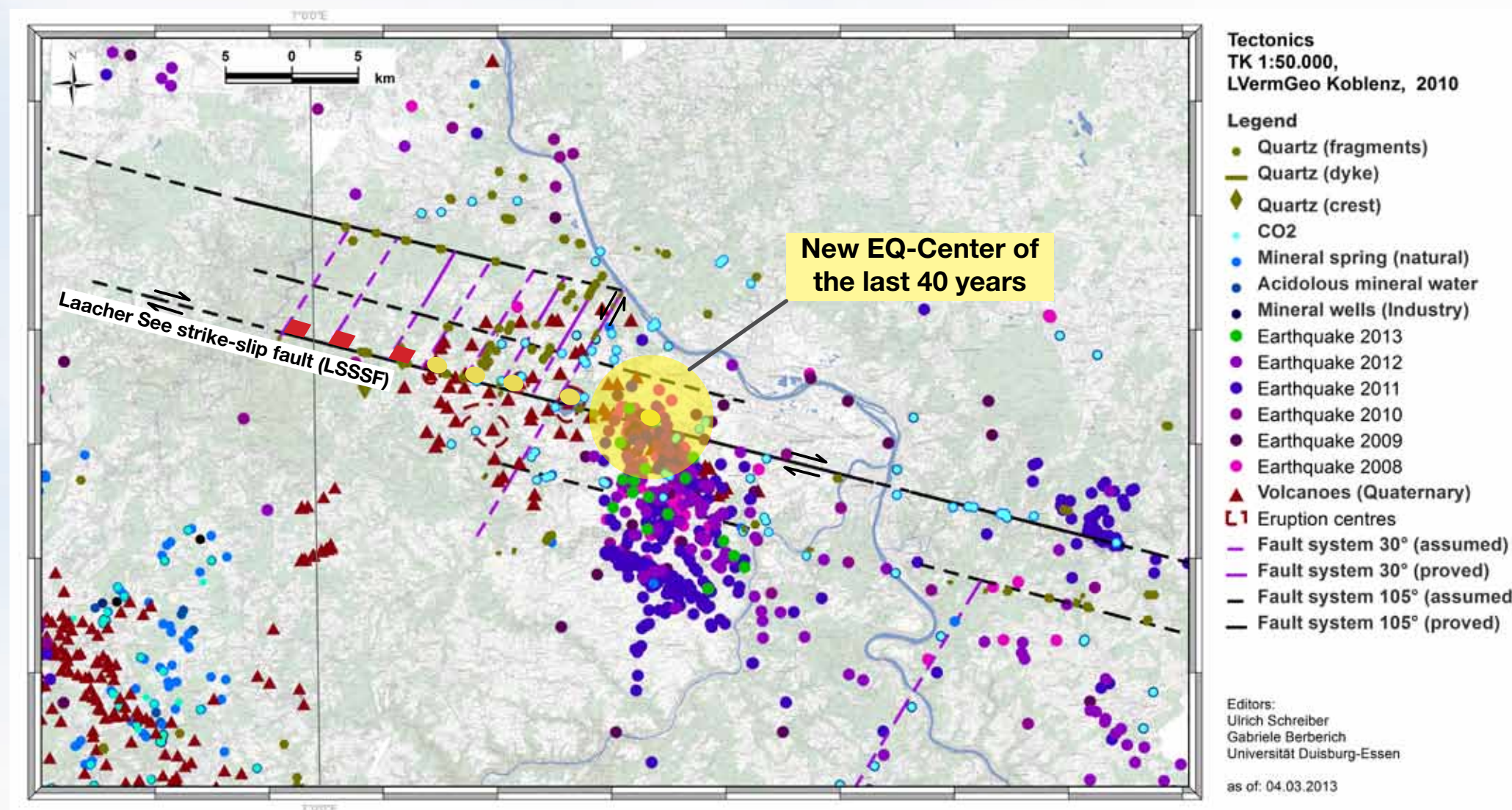
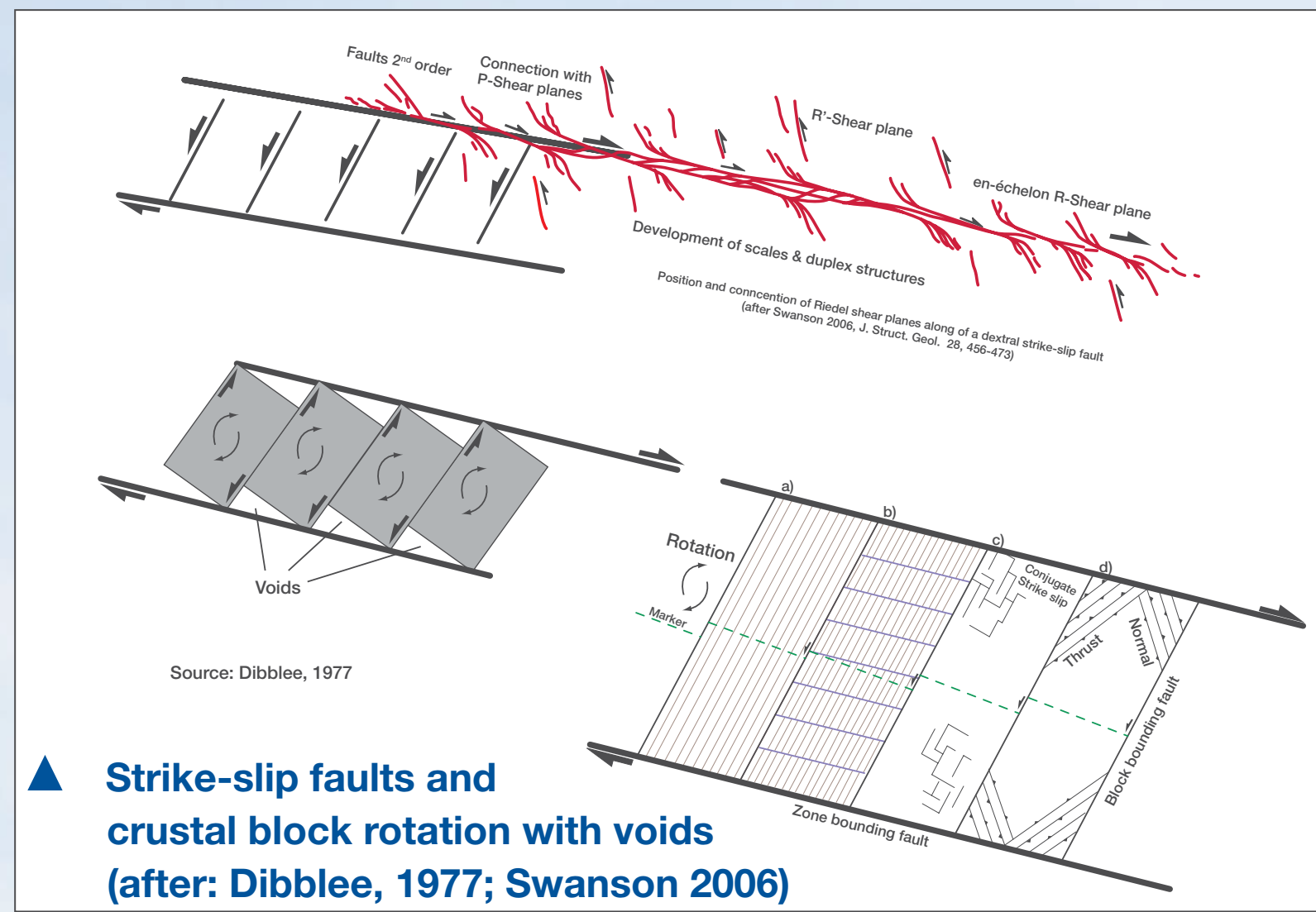


Why does the Size of the Laacher See Magma Chamber and its Caldera Size not go together? – New Findings

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New model concepts on the tectonic evolution of the young East Eifel lead to a contradiction in terms of size of the postulated magma chamber and the Laacher See Caldera

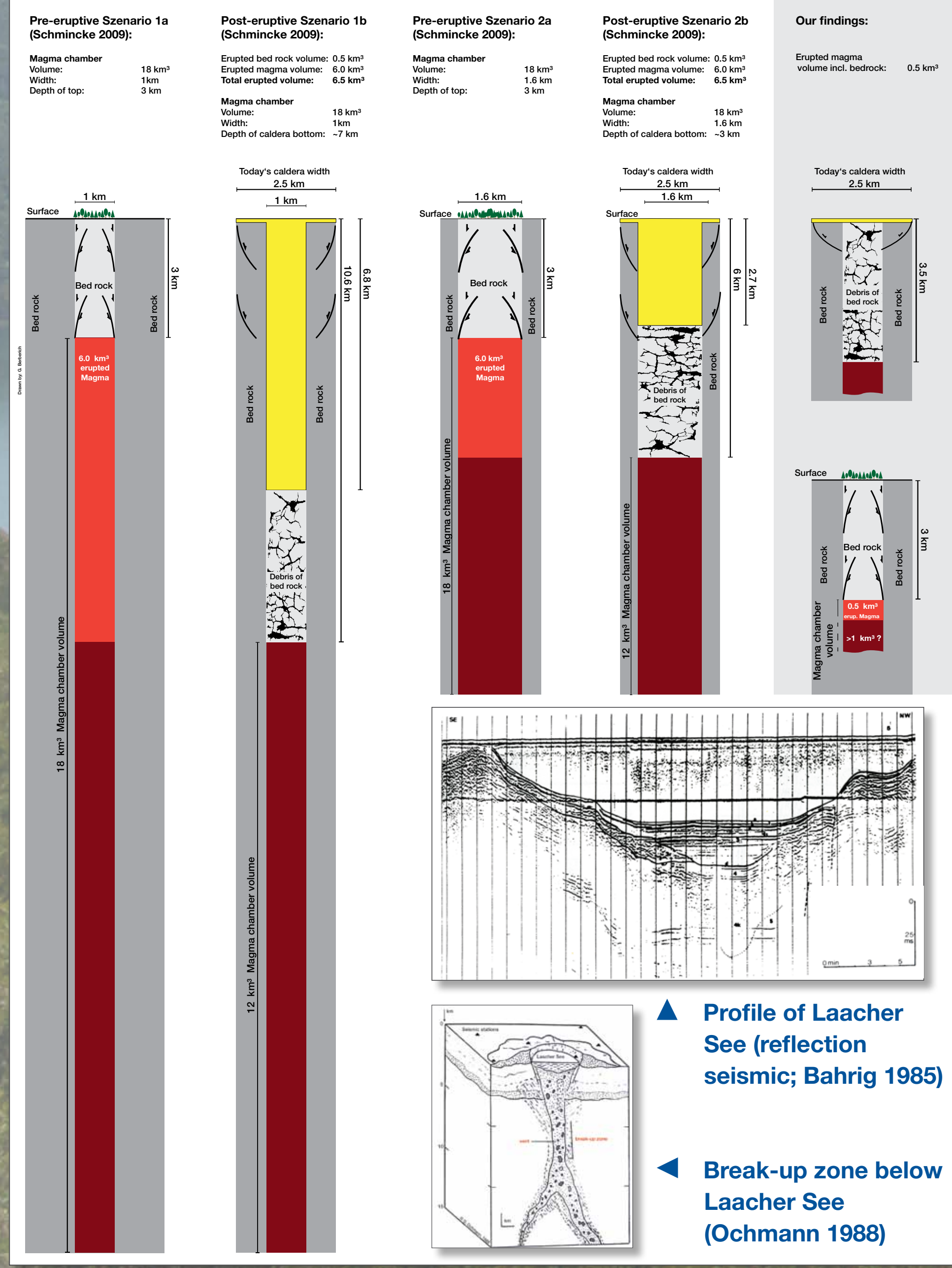
Due to the slow movement rates of active tectonic faults (mm per year), an estimated 18 km³ magma chamber beneath the Laacher See (v. d. Bogaard & Schmincke 1984) cannot be confirmed. Discrepancies are given by

- the volume of the Laacher See caldera of approx. 0.5 km³ with regard to the pre-eruptive surface (Viereck & v.d. Bogaard 1986) and the erupted volume of 6.3 km³ dry rock equivalent of lava and bed rock (v. d. Bogaard & Schmincke 1984) resp. 6.5 km³ magma (Schmincke 2009),
- a comparison of modeling of caldera evolution with the Laacher See Caldera formation (Holohan, de Wries & Troll 2008; Acocella, Funicello, Marotta, Orsi & de Vita 2004),
- no geophysical prove of such a large magma chamber,
- a volume compensation of approx. 6 km³ by ascending magma from the mantle which could have prevented a further subsidence of the magma chamber (over a period of several days of the estimated duration of eruption) appears unrealistic,
- performed sonar recordings of the post-eruptive Laacher See sediment layers (Bahrig 1985) that do not show any displacements that might indicate a doming caused by magma.

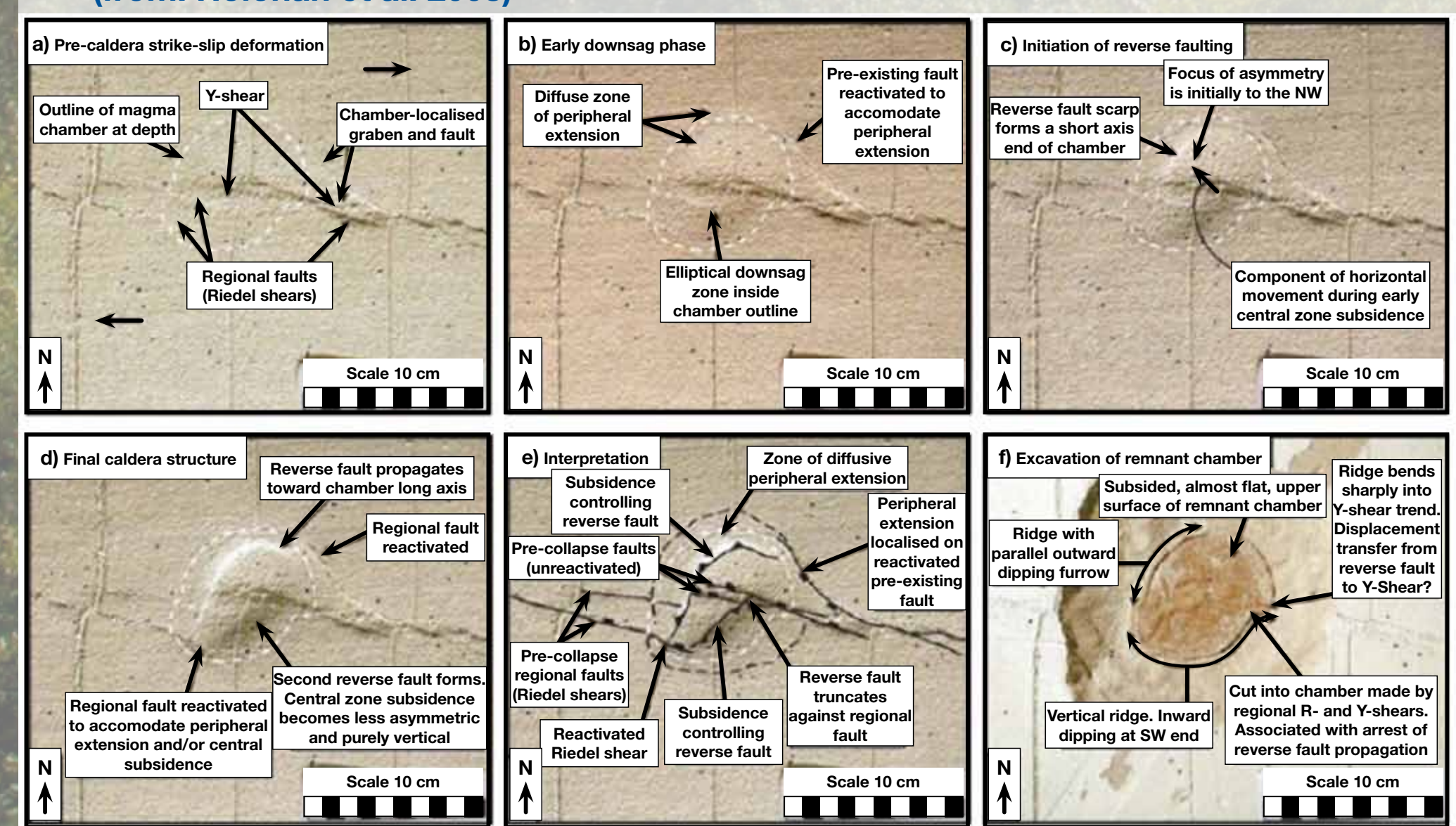
Our findings

- No statistical significant data set with regard to spatial distribution of the erupted tephra volume, e.g. only one sample point for North Italy (v.d. Bogaard 1983).
- Overestimation of the tephra thickness in published isopach maps of the Westerwald and other regions.
- More critical evaluation of interpretations of tephra samplings from old maps and literature is required.
- Inclusion of atmospheric effects (e.g. atmospheric turbulences, dune formation, dust storms long after the eruption, congestion of air masses at the alpine orogene) is required.
- **An order of magnitude smaller magma chamber stretched over a longer vertical crustal section can help to better match the given tectonic movement rates and the size of the caldera.**
- **All sampling locations would also be explained by an erupted volume of only 10% of the estimated one by Schmincke (2009).**

▼ Schematic models of Laacher See magma chamber sizes and erupted volumes



▼ Analogue Models of Caldera Collapse in Strike-Slip Tectonic Regimes (from: Holohan et al. 2008)



▼ Under pressure experiments of Roche et al. (2000)

