

Cascade Volcanoes



Belnap Crater, McKenzie Pass

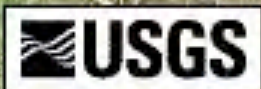
Belnap Crater Shield Volcano



AA lava flow



Larch Mountain: Shield Volcano

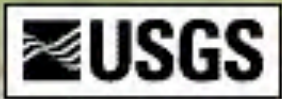


USGS Photo by Lyn Topinka, July 3, 2003, Larch Mountain, Or., as seen from Washougal, Wa.



Cinder cone, Sisters Wilderness Area

Rocky Butte: monogenetic volcano in the Boring Volcano Field



USGS Photo by Lyn Topinka, May 23, 2003, Rocky Butte from Interstate-205, Portland, Oregon



Beacon Rock, Columbia River Gorge



Lone Butte, Washington Cascades



Lone Butte-bedded hyaloclastic debris



Lone Butte-lava tube



Lone Butte-lava and bedded hyaloclastic debris: sub-glacial?



South Face, Mt Rainier



Mt St Helens October 1980. NB mud flows (X), Ape Cave Bst (A)



Basalt flow Mt St Helens-log cast



Basalt flow south flank Mt St Helens



Mt St Helens 2003-Southeast side-Shoestring glacier



Shoestring glacier mudflow



Shoestring glacier mudflow



West Side Mt Hood: Sandy River Glacier and valley



Sandy River Glacier Volcano, buried by Mt Hood



Andesite flow, Illumination rock, Mt Hood



Andesite flow, Timberline Road, Mt Hood



Mt Hood
South Side
White River Canyon

NB tree stumps



Mudflow

Pyroclastic flow

White River Canyon, Mt Hood



Old Maid Flat, south flank, Mt Hood



Sandy River Delta-? Distant portion of Mt Hood?

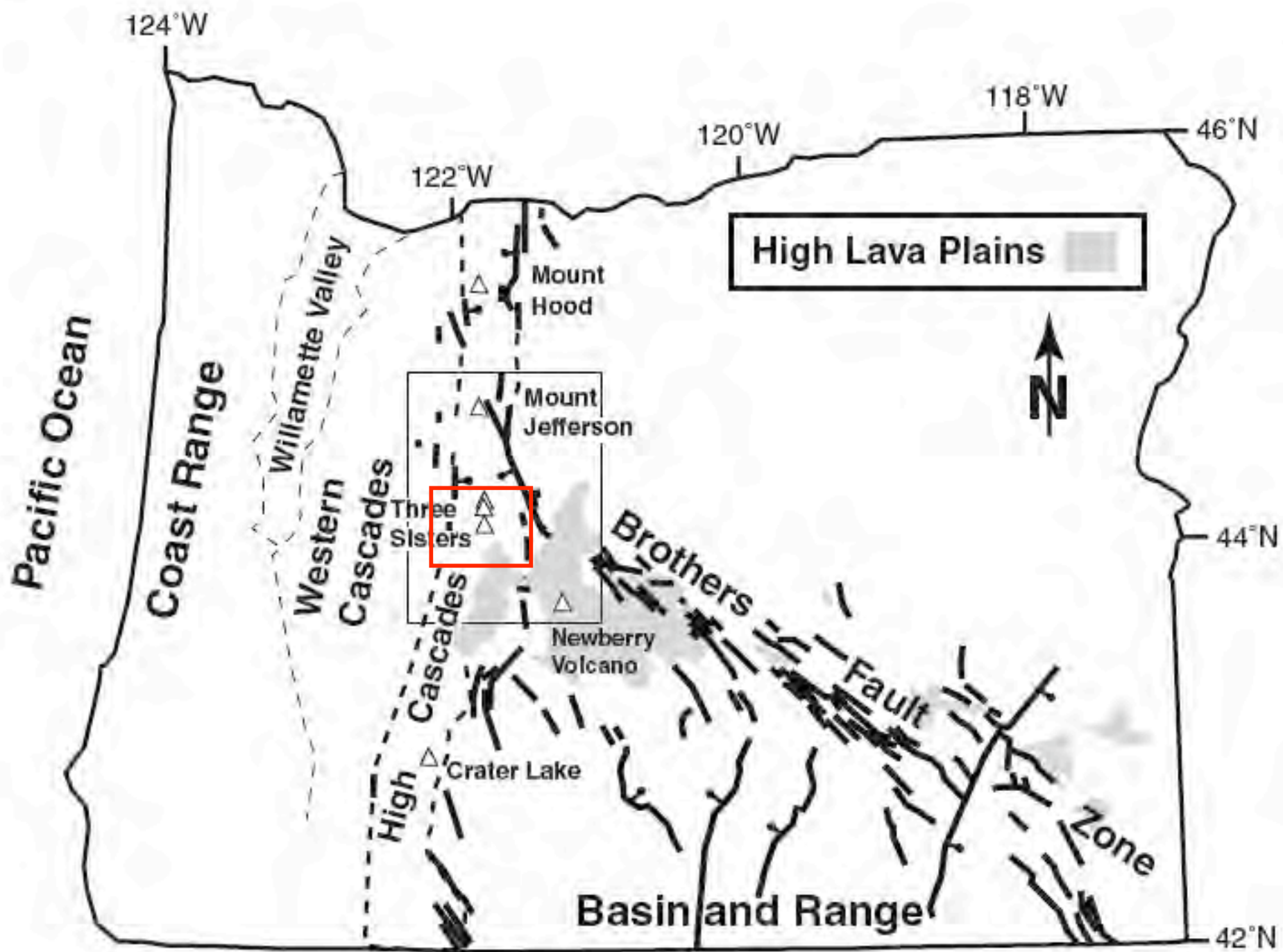


Hood River Valley

Lava flow
?Boring Volcano
?Mt Hood Volcano



Tom Dick Mountain-view from above Timberline Lodge





South Sister, southwest face



Rock Mesa dacite flow, South Sister, west side



Devil's Lake obsidian flow, above Sparks Lake, Sisters Wilderness



Broken Top, Sisters Wilderness



Broken Top summit area



South Sister, Middle Sister, North Sister from north side Broken Top

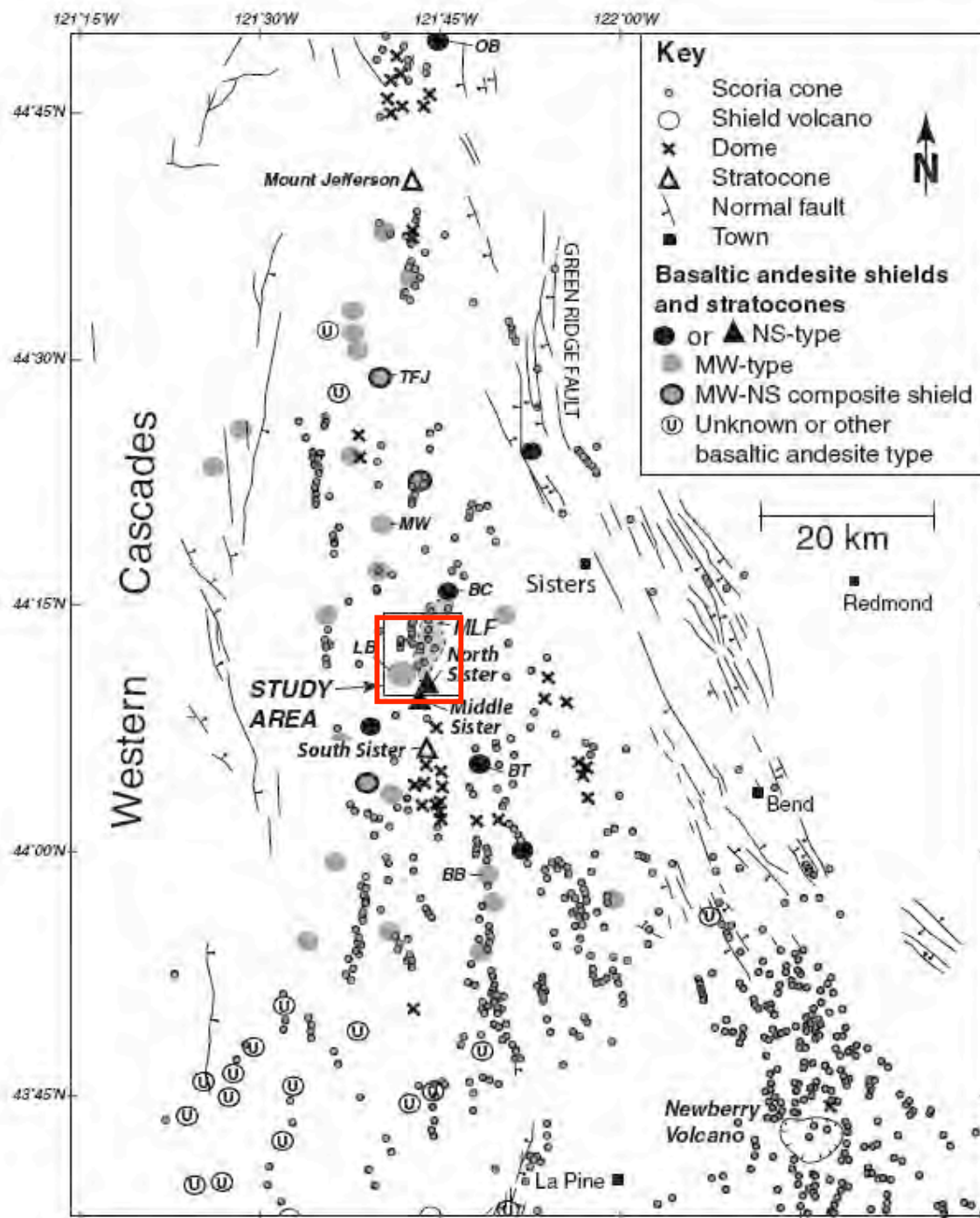
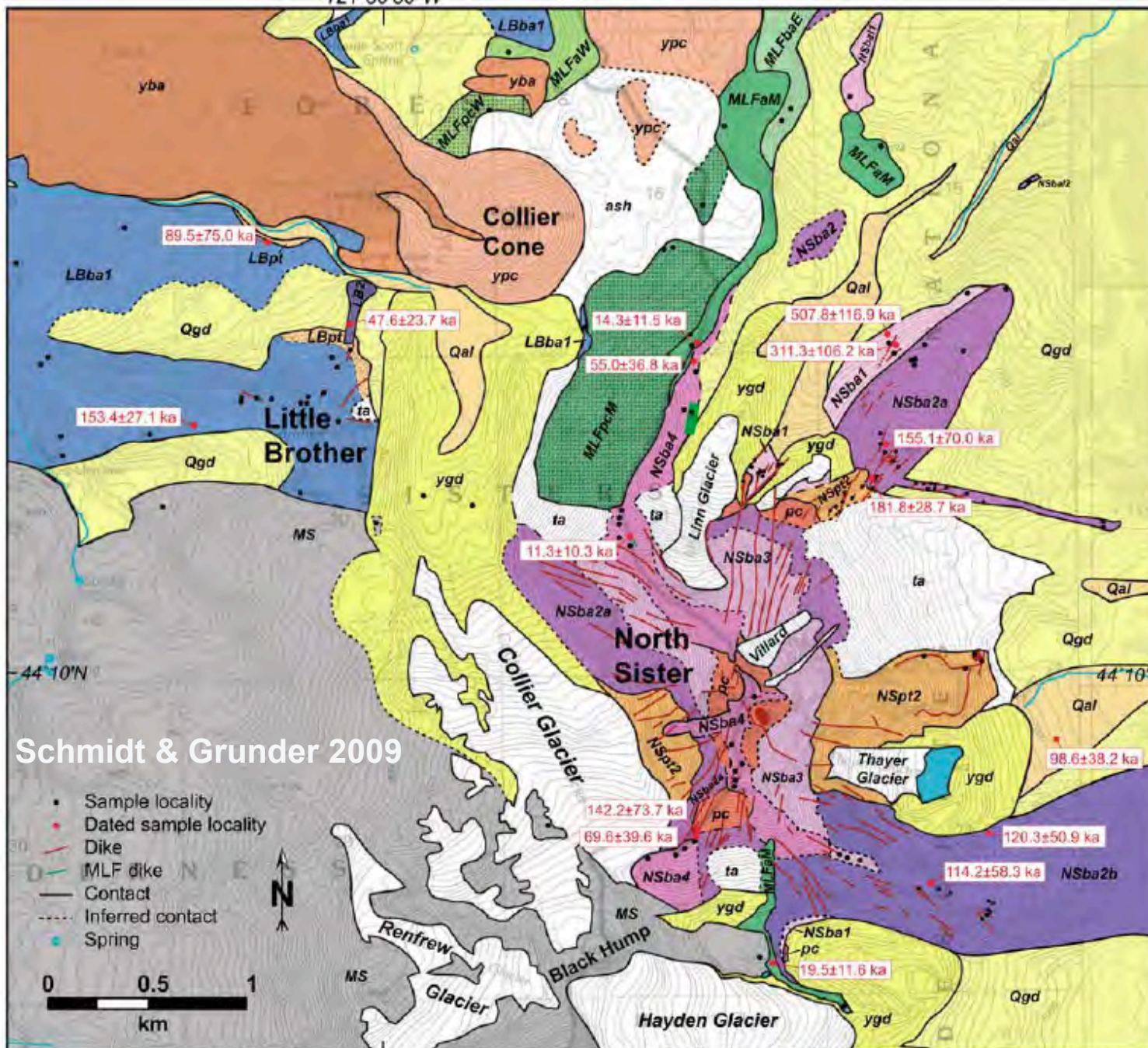


Figure 2. The distribution of volcanic vents, faults, and basaltic andesite types in the central Oregon Cascade Range. Monogenic mafic vents tend to be found along lineaments that mimic exposed faults both in length and in orientation. The distribution of the two main types of basaltic andesite—North Sister (NS)-type and Mount Washington (MW)-type—at shield and stratocone volcanoes is shown (Conrey et al., 2004). Abbreviations: OB—Ollalie Butte; TJJ—Three-Fingered Jack; MW—Mount Washington; LB—Little Brother; MLF—Matthieu Lakes Fissure; BC—Black Crater; BT—Broken Top; BB—Bachelor Butte. Map was compiled from Sherrod et al. (2004) and Conrey et al. (2004).

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2009



Rock Units

Unconsolidated and Holocene

- Qal** Quaternary alluvium
- ta** Talus, steep, unstable slopes
- ygd** Quaternary young glacial deposits, unconsolidated moraine of the Little Ice Age
- Qgd** Quaternary glacial deposits, moraine and glacial outwash, Last Glacial Maximum to Little Ice Age
- ash** Ash deposits, unknown origin
- ypc** Holocene pyroclastic deposits, scoria and bombs of scoria cones and fields
- yba** Holocene basaltic andesite lava, unglaciated and sparsely vegetated to unvegetated

Matthieu Lakes Fissure

- MLFaW** MLF andesite lava of west splay
- MLFpcW** MLF pyroclastic deposit of west splay
- MLFaM** MLF andesite lava of main splay
- MLFpcM** MLF pyroclastic deposit of main splay
- MLFbaE** MLF basaltic andesite lava of east splay
- MLFpcE** MLF pyroclastic deposit of east splay
- MLFa** MLF andesite lava of unknown timing
- MLFpc** MLF pyroclastic deposit of unknown timing
- lfpc** Island Fissure pyroclastic deposit, glaciated andesite vents that parallel MLF
- lfpt** Island Fissure palagonitic tuff cone

North Sister Volcano

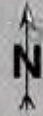
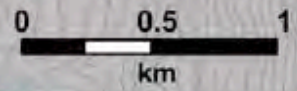
- pc** North Sister basaltic andesite scoria deposit
- NSba4** North Sister basaltic andesite Stratotoone Stage lavas intercalated with scoria
- NSba3** North Sister basaltic andesite Upper Shield Stage lavas with minor scoria and palagonitic tuff
- NSpt2** North Sister basaltic andesite palagonitized tuff and interlayered scoria of Glacial Stage
- NSba2b** North Sister basaltic andesite Glacial Stage lavas of compositional group 2b
- NSba2a** North Sister basaltic andesite Glacial Stage lavas of compositional group 2a
- NSba1** North Sister basaltic andesite lava and minor scoria of Lower Shield

Other volcanic centers

- LB2** Late Little Brother basaltic andesite dike and related flow
- LBba1** Little Brother basaltic andesite lava
- LBpt** Little Brother palagonitic tuff
- MS** Middle Sister, undifferentiated
- psba** Pleistocene glomeroclastic basaltic andesite lava, unknown source

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- Sample locality
- Dated sample locality
- Dike
- MLF dike
- Contact
- Inferred contact
- Spring



121°30'30"W

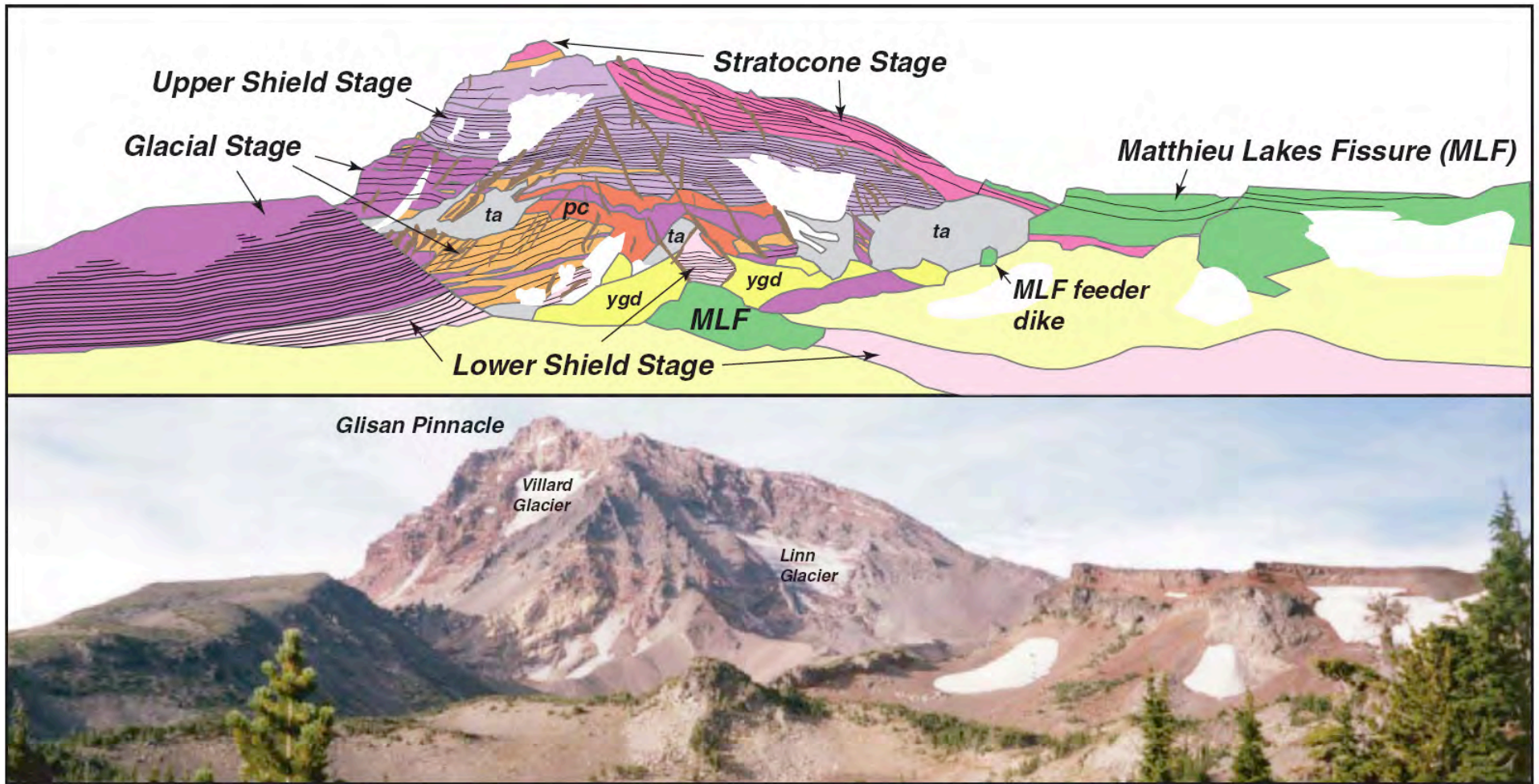


Figure 6. (A) Perspective view of North Sister Volcano with eruptive stages based on (B) photo of North Sister from the north. Note interfingering of Glacial Stage lavas and palagonitic tuffs on lower northeast flank (left) of North Sister.

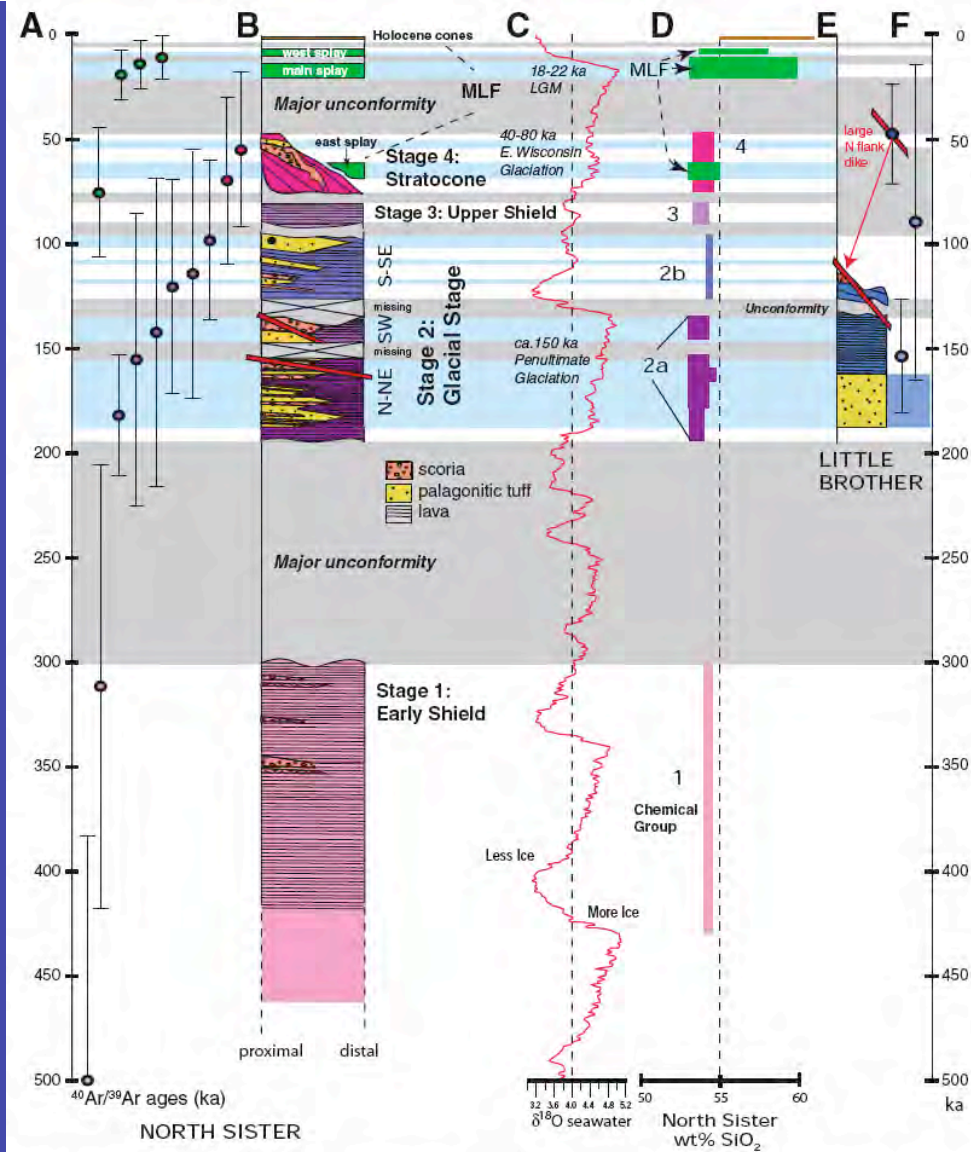


Figure 7. Summary of field and chemical data presented in this paper as a schematic stratigraphic section for North Sister and Little Brother. (A) $^{40}\text{Ar}/^{39}\text{Ar}$ dates with 2σ error for North Sister Volcano. Colors as in Figures 3 and 4. (B) Stratigraphic section for North Sister eruptive stages: the Lower Shield Stage, the Glacial Stage, the Upper Shield Stage, the Stratocone Stage, and Matthieu Lakes Fissure (MLF). Subglacial eruptive sequences of palagonitic central volcano and thick Matthieu Lakes Fissure lavas are indicated in light blue. Unconformities are shown in light gray to (C) the global $\delta^{18}\text{O}$ of seawater record (Lisiecki and Raymo, 2005). Higher $\delta^{18}\text{O}$ values indicate times of more ice, and lower $\delta^{18}\text{O}$ values indicate less ice worldwide. Major glaciations of the Oregon Cascades, defined by Scott (1977), correlate with subglacial eruptions and unconformities. (D) SiO_2 concentrations through time. Variations within the 2a group are based on stratigraphy within the N-NE ridge. See Figure 8 and text for further description of compositional groups. (E) Schematic stratigraphic section of Little Brother. (F) Little Brother $^{40}\text{Ar}/^{39}\text{Ar}$ dates with 2σ error. An arrow connects a young date with a large, N10°E-trending Little Brother dike found on its north flank.