# Magnetostratigraphy of the Eocene Jianchuan Basin in southeast Tibet: Preliminary result

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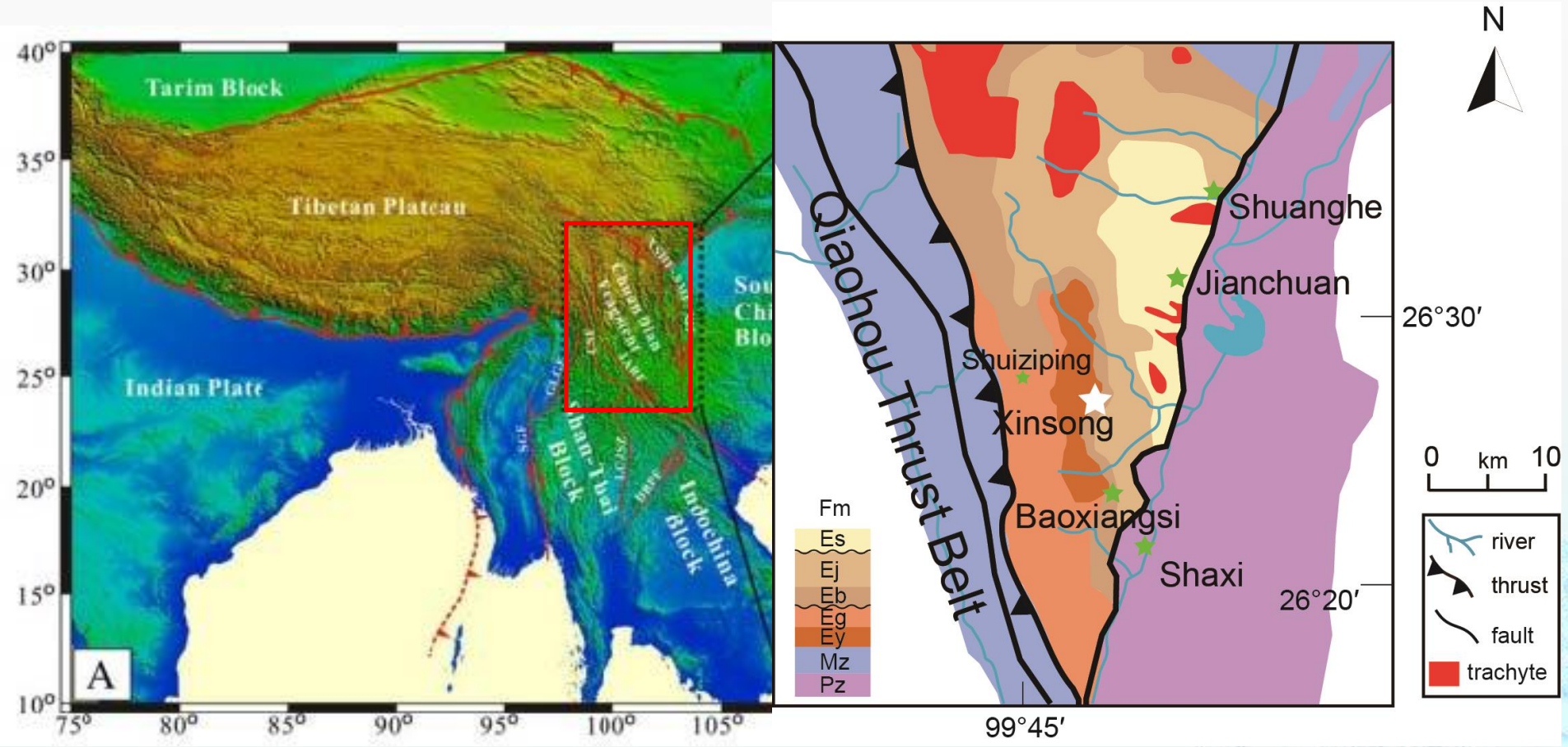
# Introduction

Early Cenozoic terrestrial sediments in southeastern Tibet provide important archives for gaining insight into the early stages of the growth of the Tibetan plateau.

Jianchuan Basin is one of the largest Cenozoic sedimentary basins in southeastern Tibet.



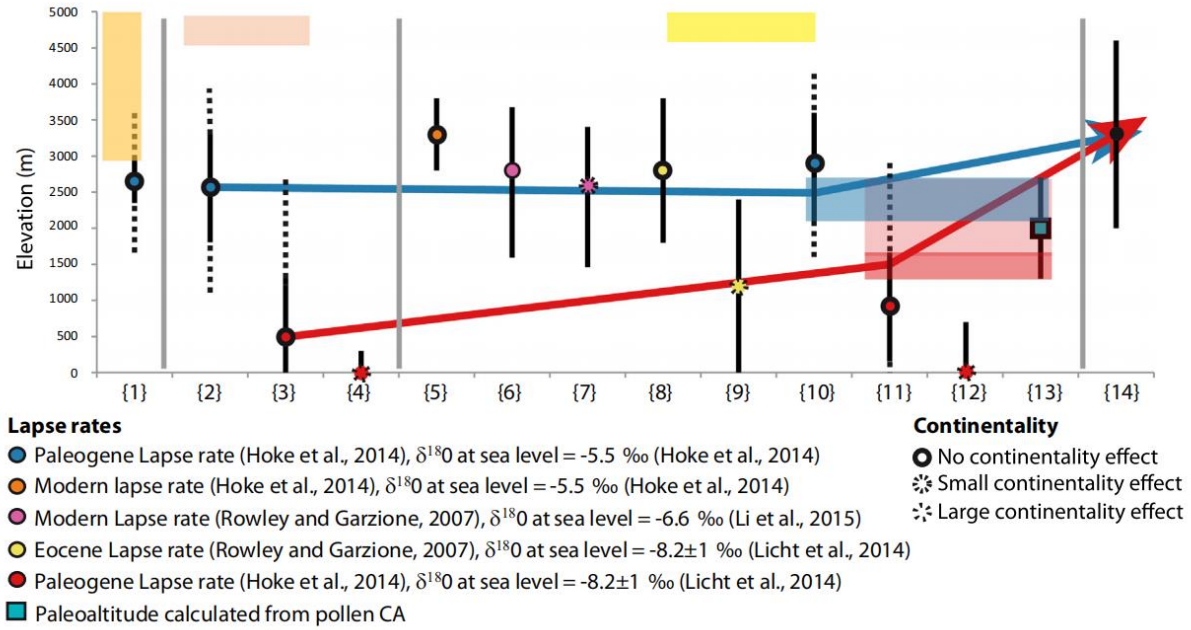

(Tong et al.,2015)

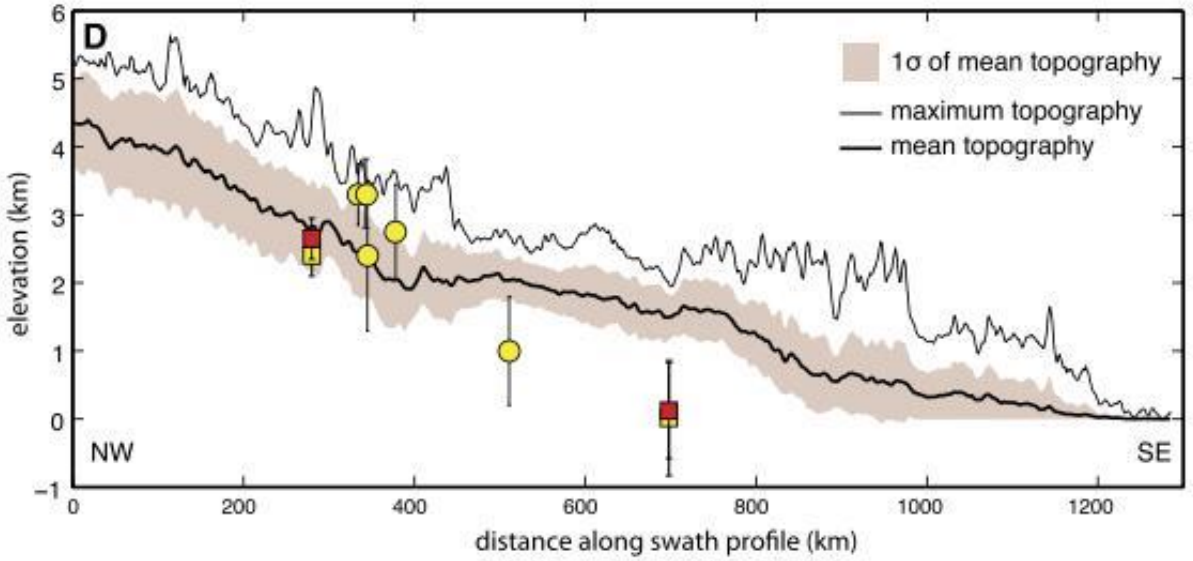
This study

# The Jianchuan Cenozoic Basin has been the focus of several studies.

- Paleoelevation

The SE margin of Tibet reached its present elevation as early as the late Eocene.(Hoke et al.,2014;Wu et al.,2018)

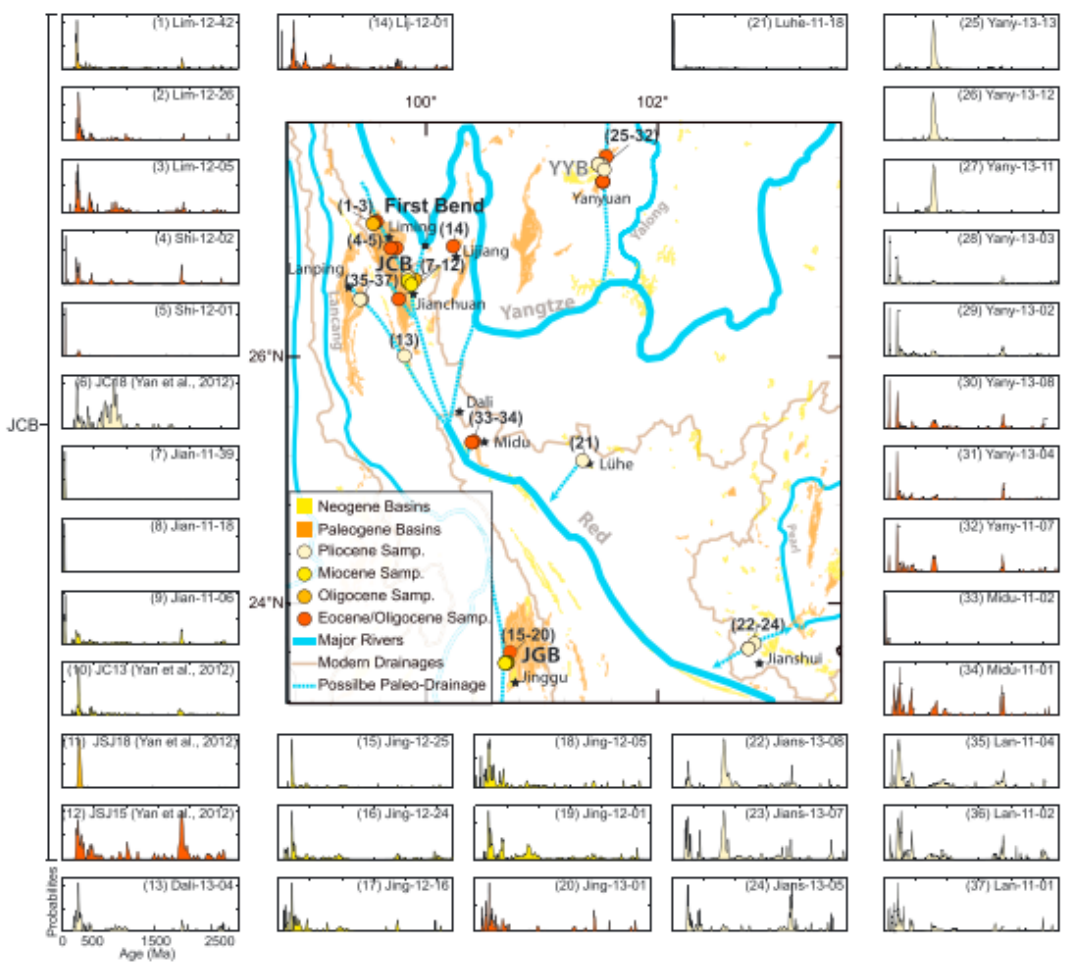


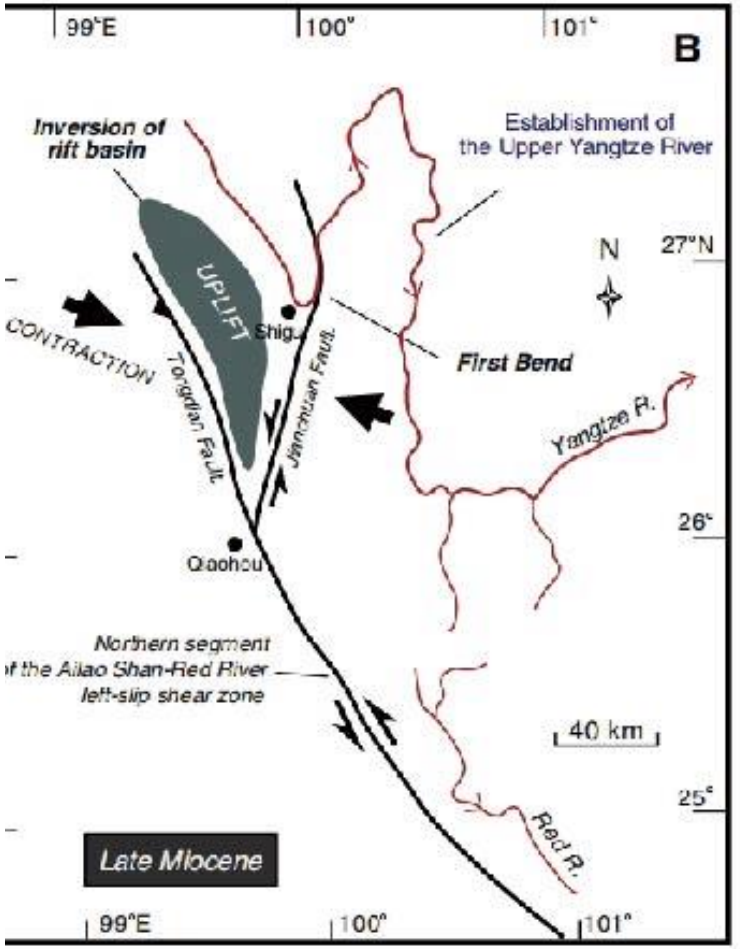

(Wu et al.,2018)

(Hoke et al.,2014)

# Paleodrainage evolution



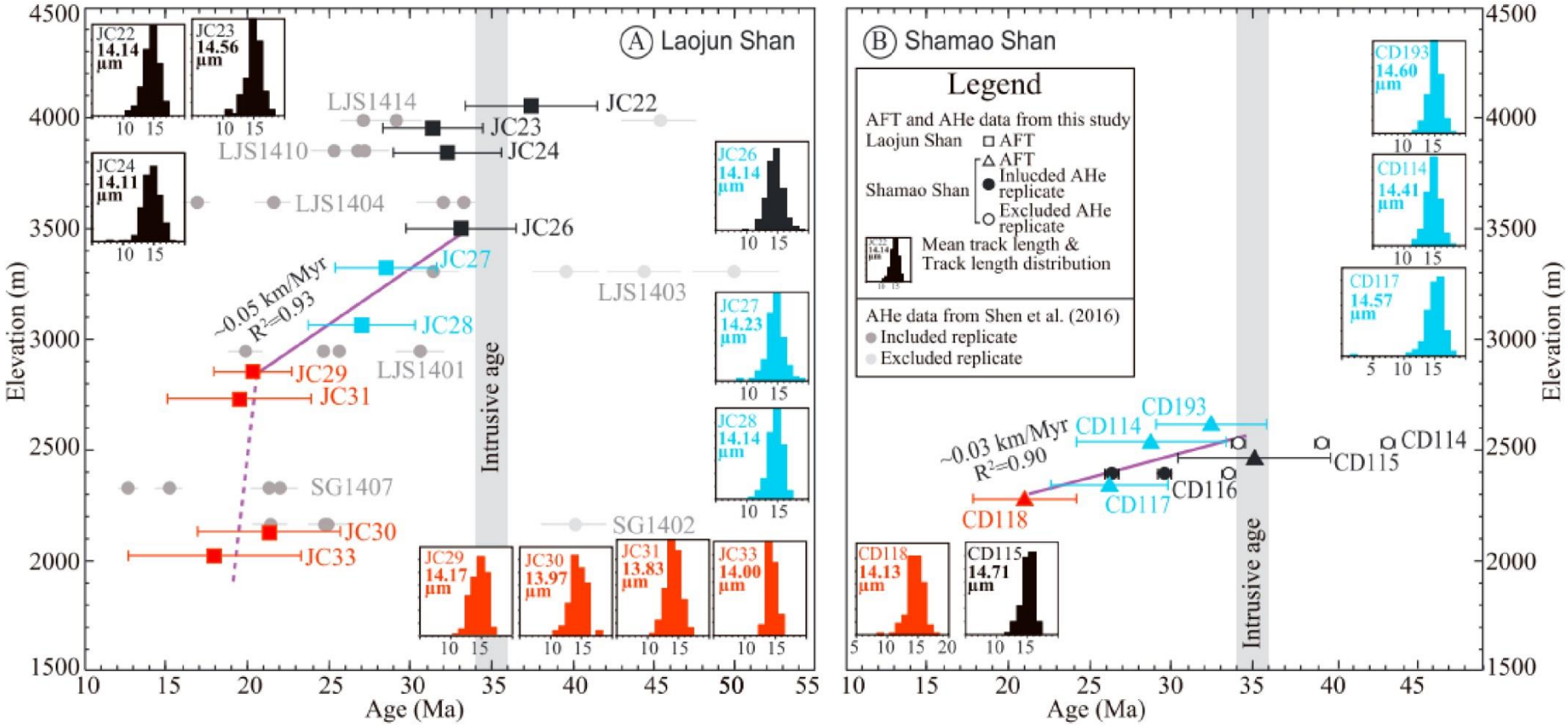

Wissink et al.,2016




Wei et al.,2016

- No evidence for a connection between the Paleo-Yangtze and Paleo-Red Rivers.(Wissink et al.,2016)
- No sedimentary records indicating the Upper Yangtze River once flowed southward.(Wei et al.,2016)

# Geomorphology

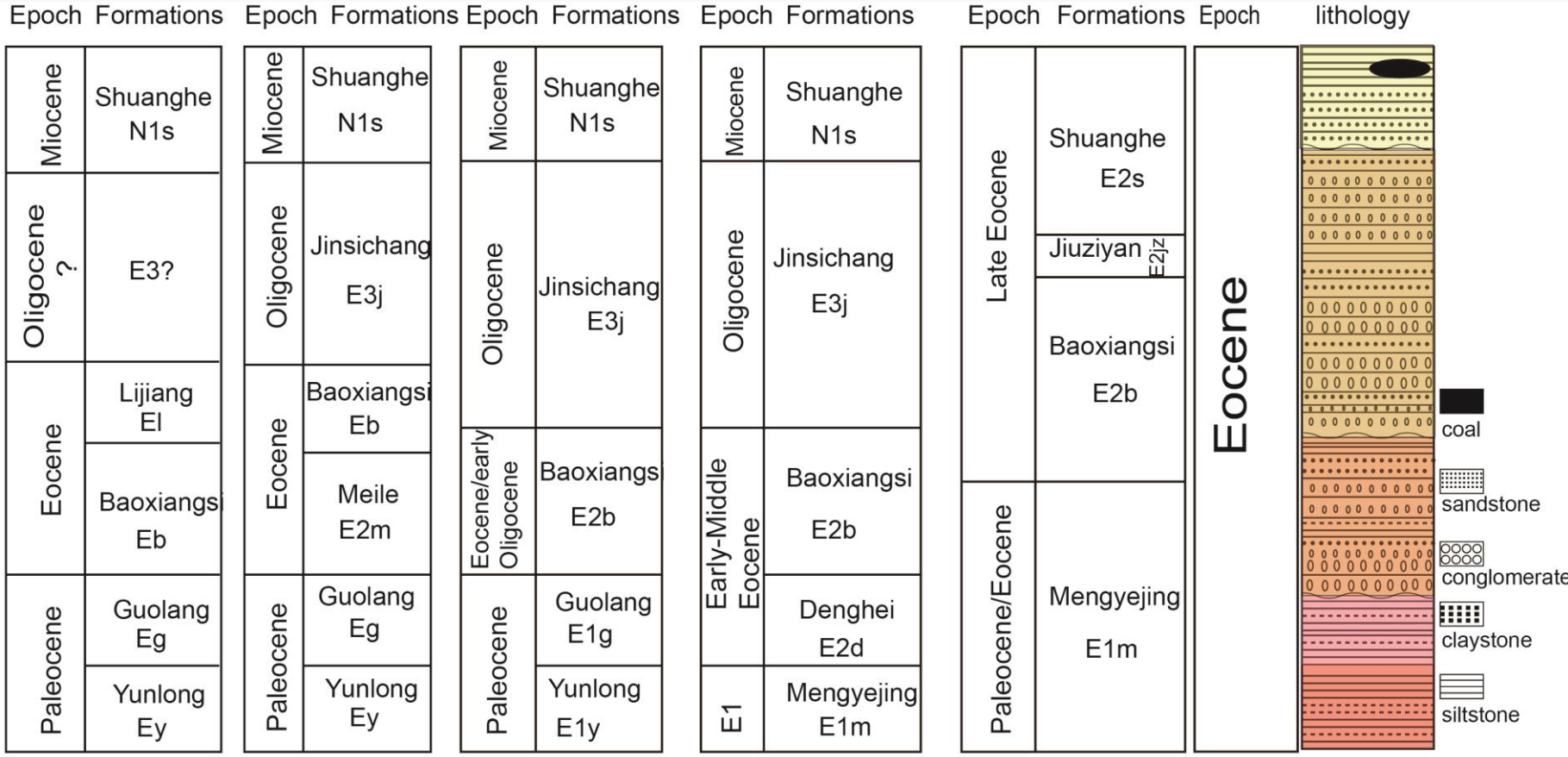



(Cao et al.,2019)

2.3–3.2 km of rapid exhumation is consistent with the present day topographic relief of 1.8–2.4 km across the Yulong and Chenghai thrust belt. (Cao et al.,2019)

# Motivations

- There were few constraints on the chronology of these Cenozoic sediments, impeding further studies of the tectonic, topographic and environmental evolution in southeast Tibet.
- The Jianchuan Basin was mapped from the Paleocene up to the Pliocene but recently reassigned to the Paleocene/Eocene as a whole.



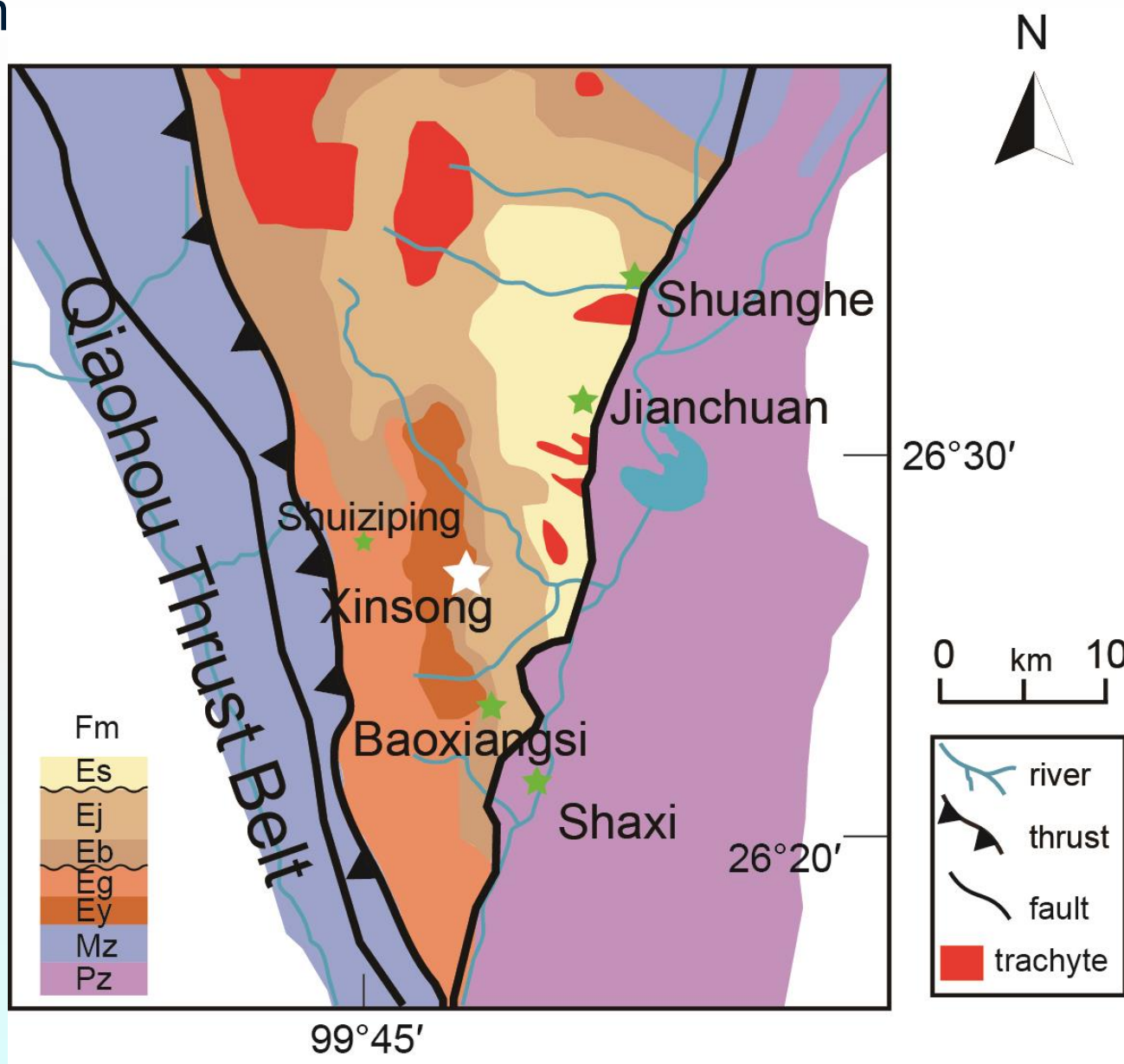

Yunnan Geological Survy,1974 | 1984 | Yan ,2012 | BGMRYP, 1996 | Gourbet ,2017 | This study

# Stratigraphic Section

This study focuses on the Xinsong section (26.4552° N, 99.7853° E) located in lower parts of Jianchuan Basin in Southwestern Yunnan , China.

Based on geological maps, three formations are defined in Xinsong section .

From bottom to top are Yunlong ,Guolang and part of Baoxiangsi Formations.



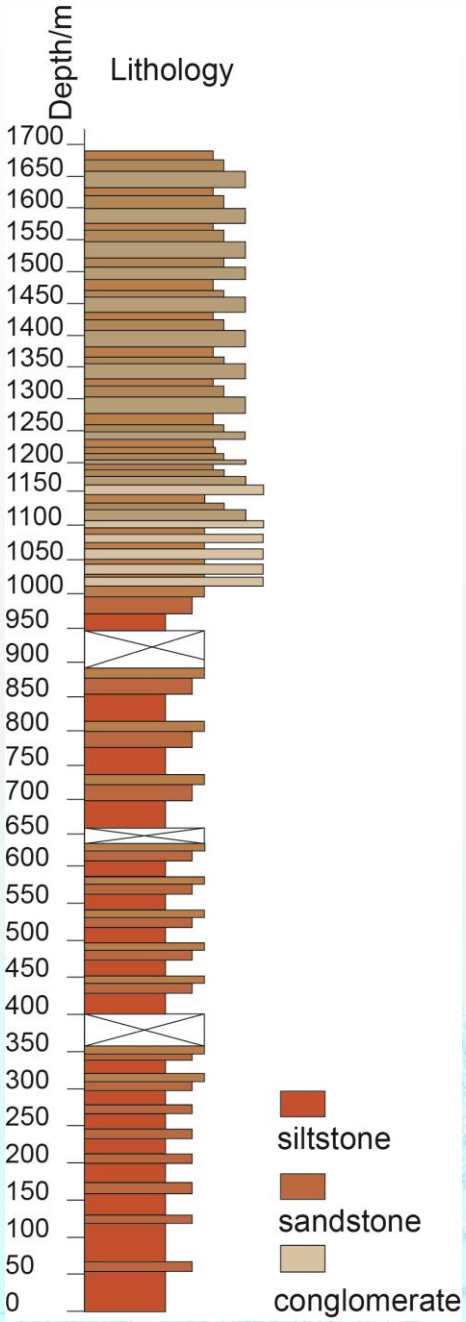

Simplified geological map of the Jianchuan area based on existing maps.

# Stratigraphic Section

Thickness of the section : 1687 m

Depositional facies:

- lower part :thick red-colored, massive siltstone with fine sandstone interlayers
- upper part :basal-scoured, upward-fining and stacked sandstone



# Sampling


924 samples were collected using a portable drill with a water-cooled diamond bit .

# Methodologies

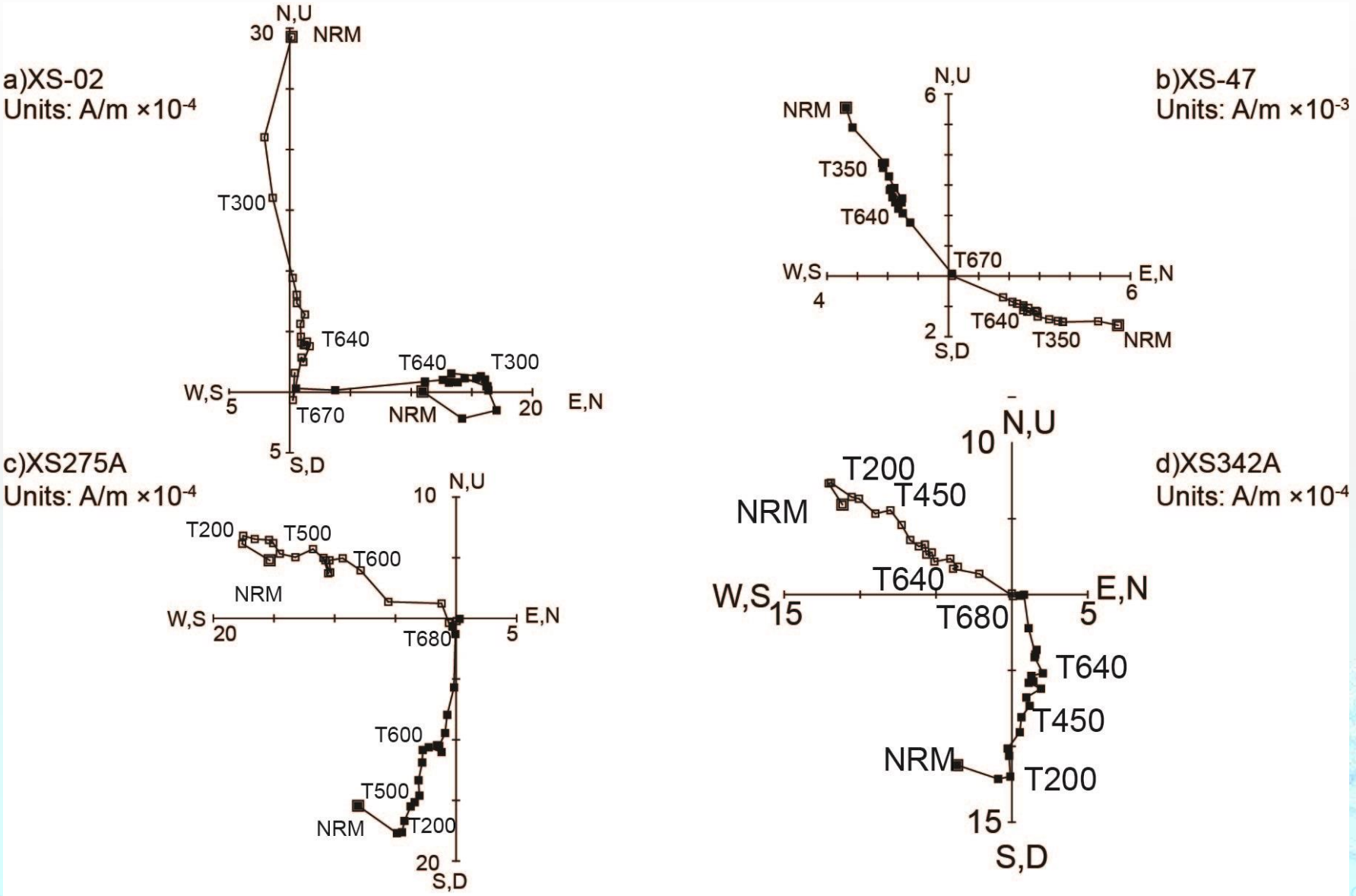
- Stepwise thermal demagnetization

- School of Earth Science and Engineering, Nanjing University, China.

➢ Instrument:
- an ASC TD48 thermal demagnetizer.
- a three-axis, 2G Enterprise Inc. 755 rock magnetometer.

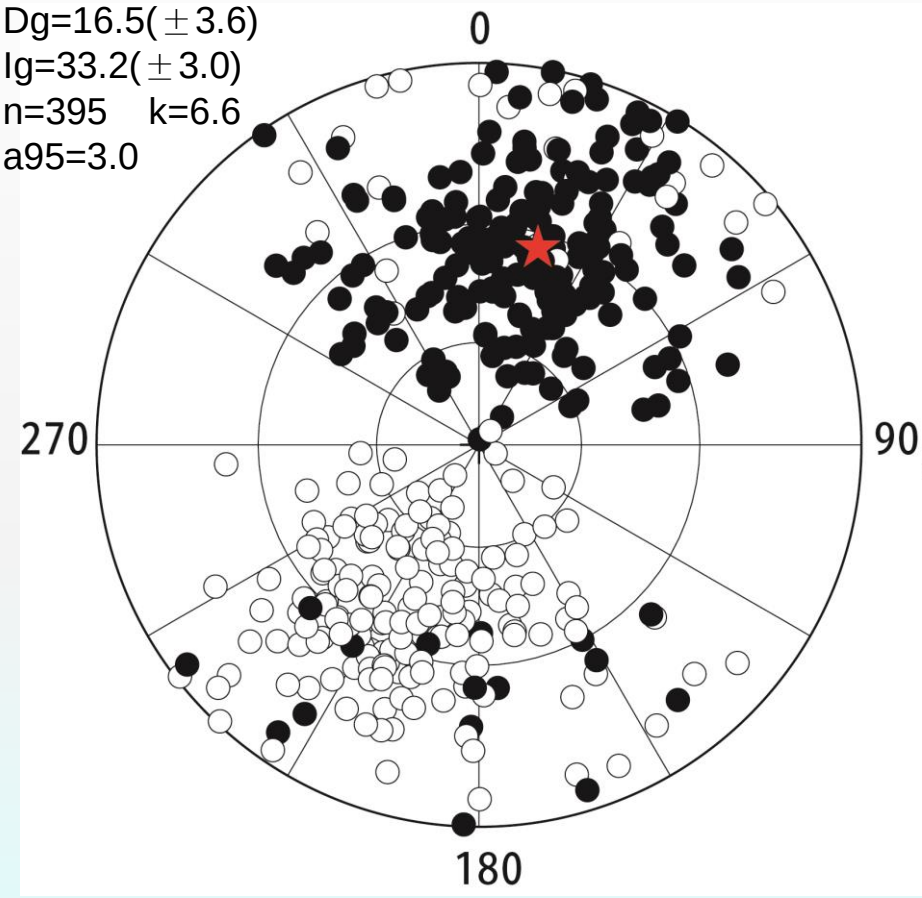
➢ Software packages :
- PaleoMac(by Jean-Pascal Cogné)
- PMAG (by Randolph J. Enkin)

# Representative demagnetization data



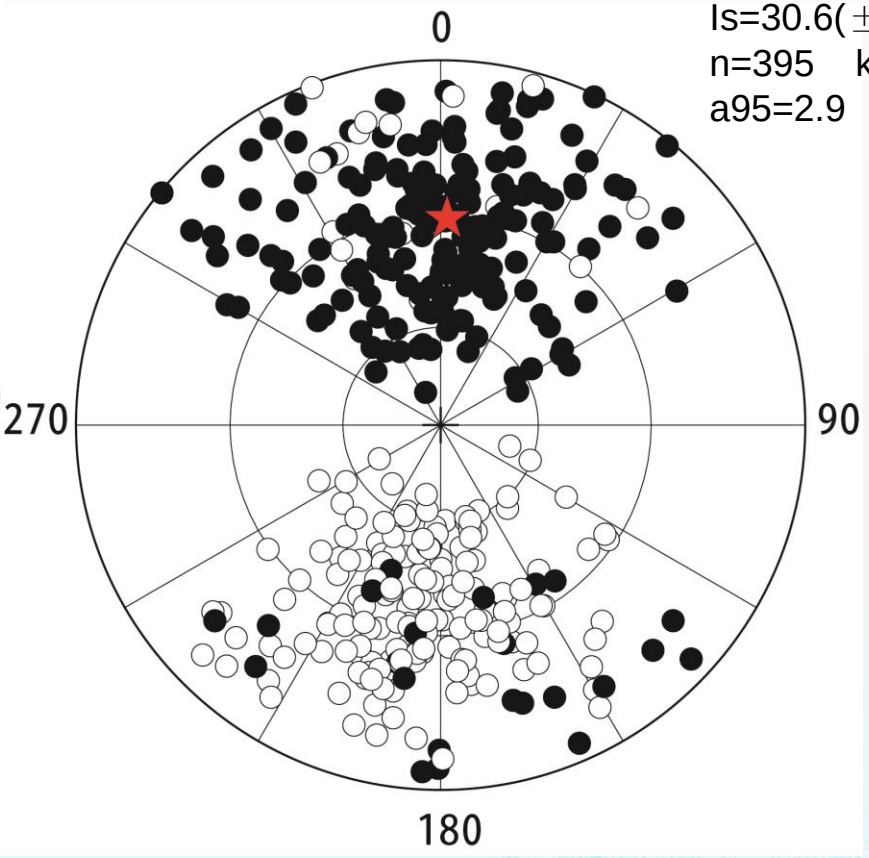
# Stereoprojection for high-temperature components

Dg=16.5(±3.6)
Ig=33.2(±3.0)
n=395 k=6.6
a95=3.0




geographic coordinate

Ds=1.8(±3.4)
Is=30.6(±2.9)
n=395 k=6.9
a95=2.9

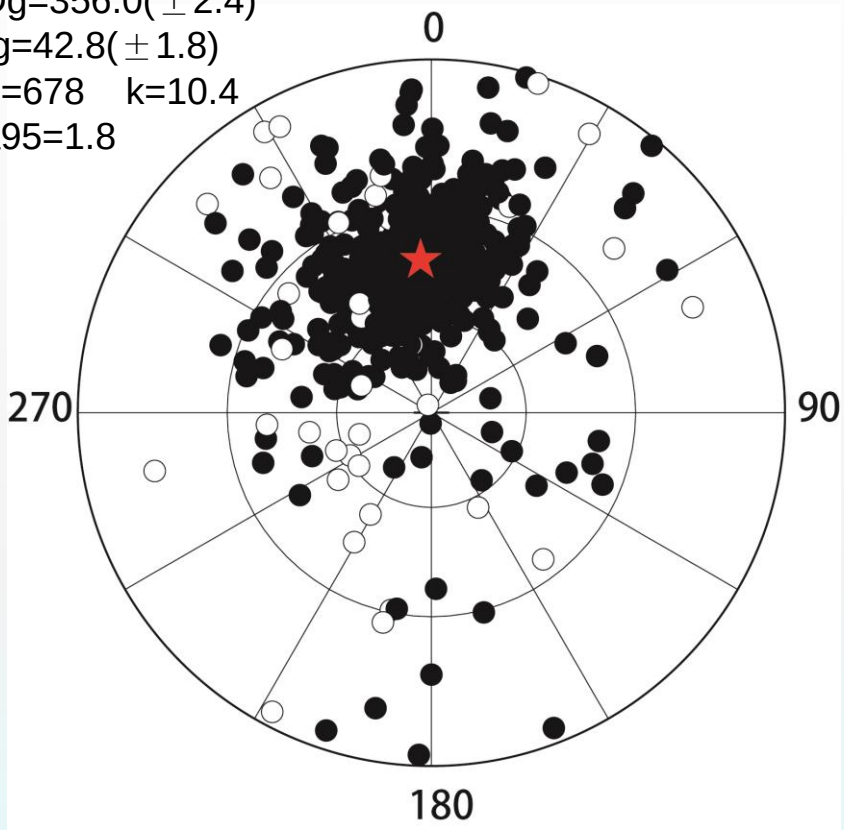



stratigraphic coordinate

- High-Temperature Component (HTC): unblocked at ~640-680℃
- Major magnetic mineral phase: **hematite**

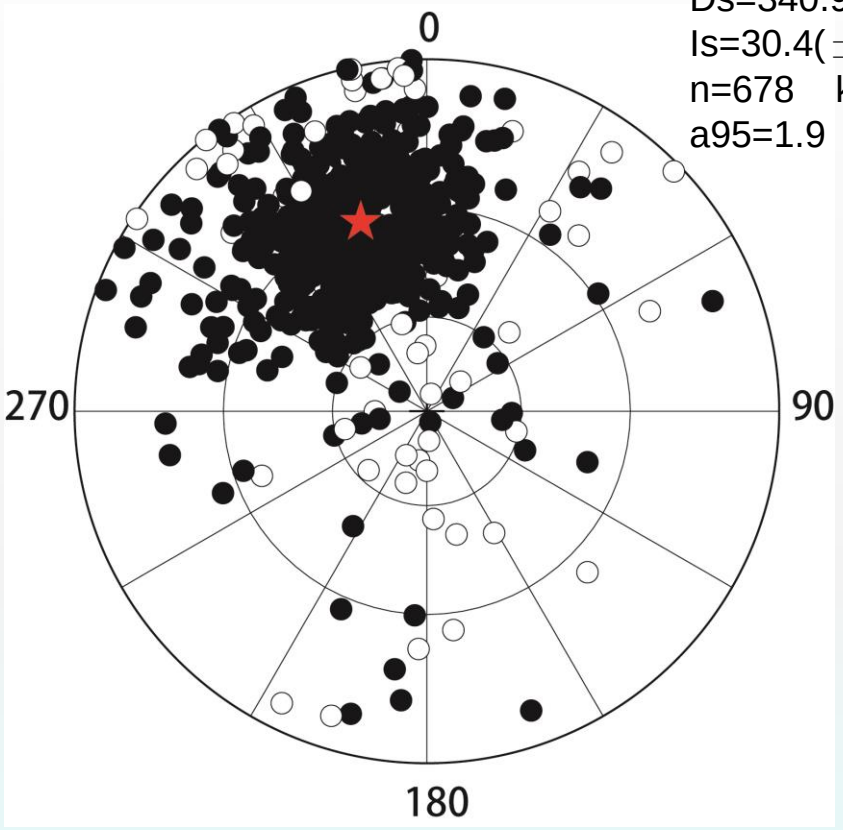
# Stereoprojection for Low-temperature components

Dg=356.0(±2.4)
Ig=42.8(±1.8)
n=678 k=10.4
a95=1.8




geographic coordinate

Ds=340.9(±2.2)
Is=30.4(±1.9)
n=678 k=9.2
a95=1.9



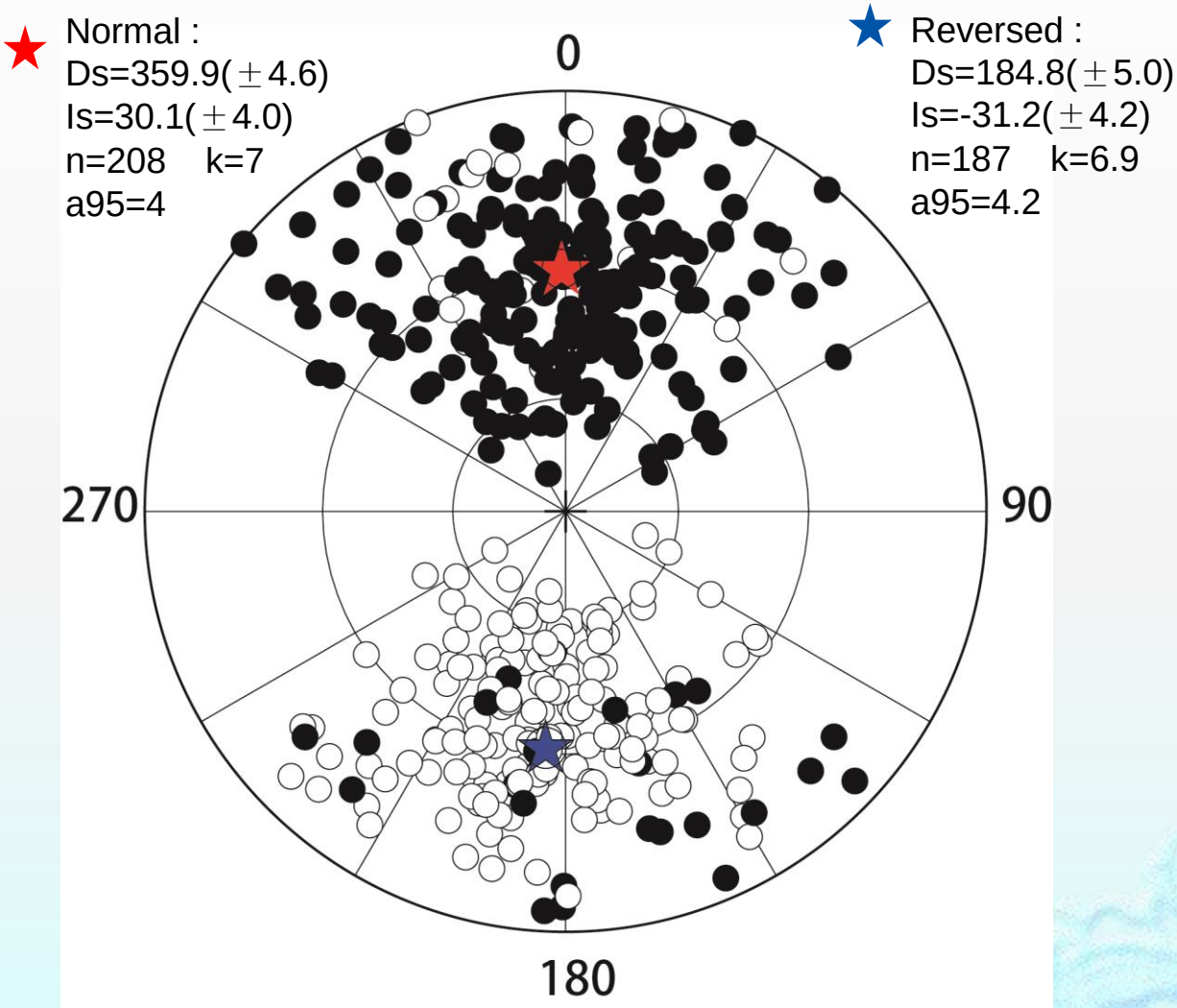

stratigraphic coordinate

- Earth's magnetic field of the studied area: Dec=1.3° ,Inc = 46°
  (Dec : Declination Inc :Inclination)

- Low-Temperature Component (LTC) :Viscous Remanent Magnetism(**VRM**)

# Reversal test

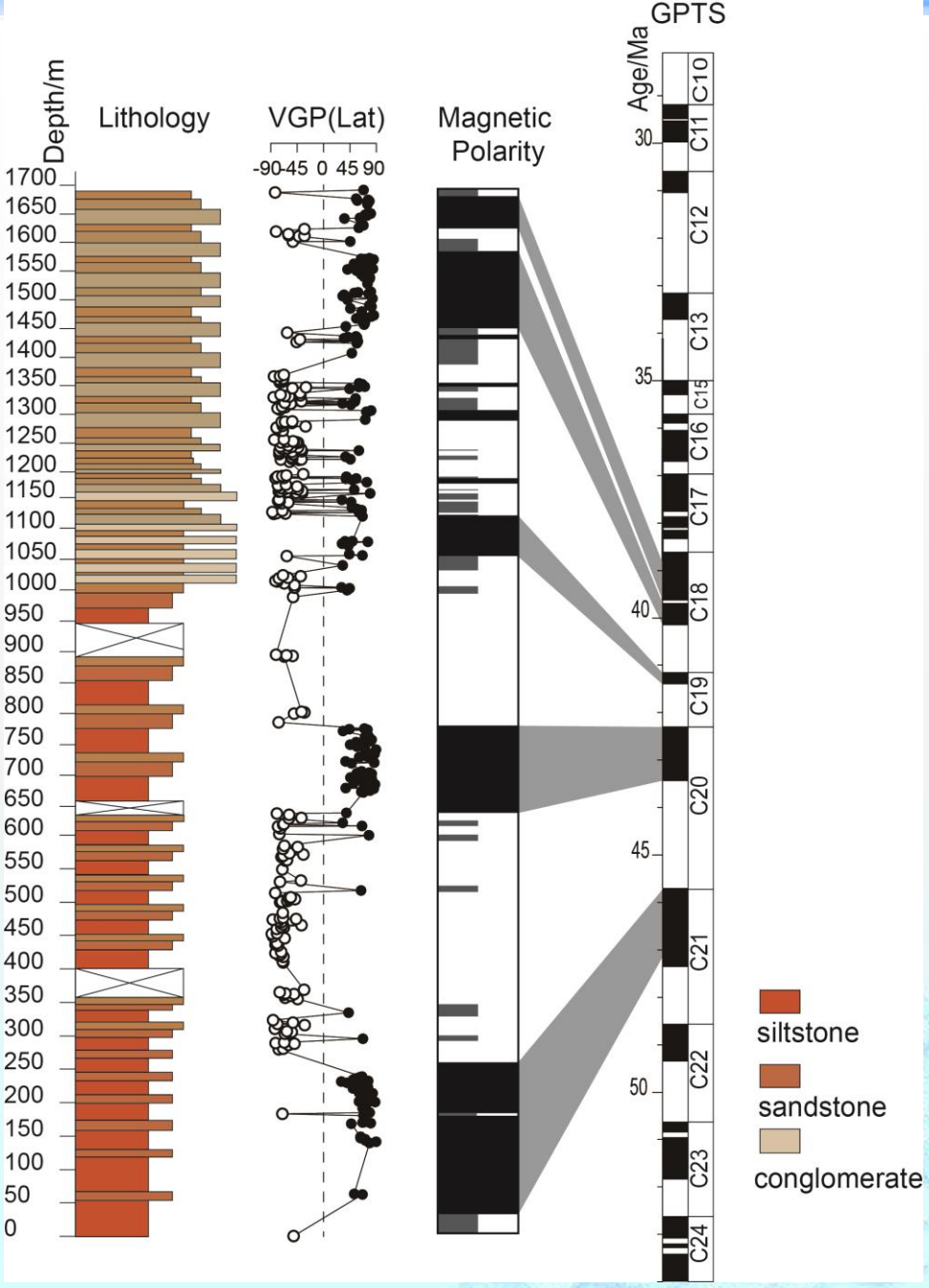
- Positive at 95 % confidence level (class “B”; McFadden and McElhinny, 1990).
- Characteristic Remanent Magnetization(CHRM) is a primary Natural Remanent Magnetization(NRM).




Stereoprojection for reversal test in stratigraphic coordinates

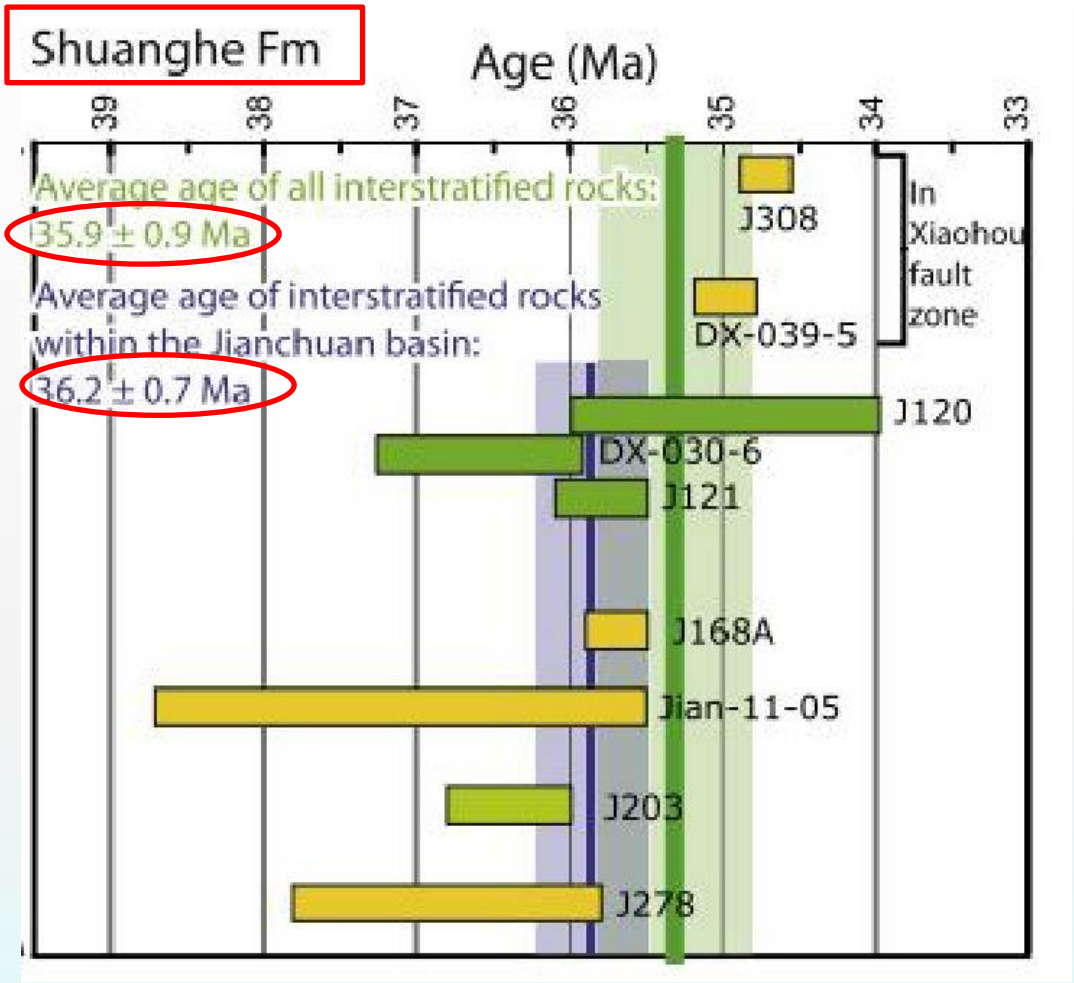
# Magnetostratigraphic correlation

- Changes in VGP latitudes were used to define four reversed polarity zones and five normal polarity zones.
- The age of Shuanghe formation was reassigned to the Eocene,~36Ma, which gives the minimun age for the underlying formations.
- The preliminary result is that the age of the investigated section is **Eocene** between Ca. 48Ma and Ca.38 Ma.

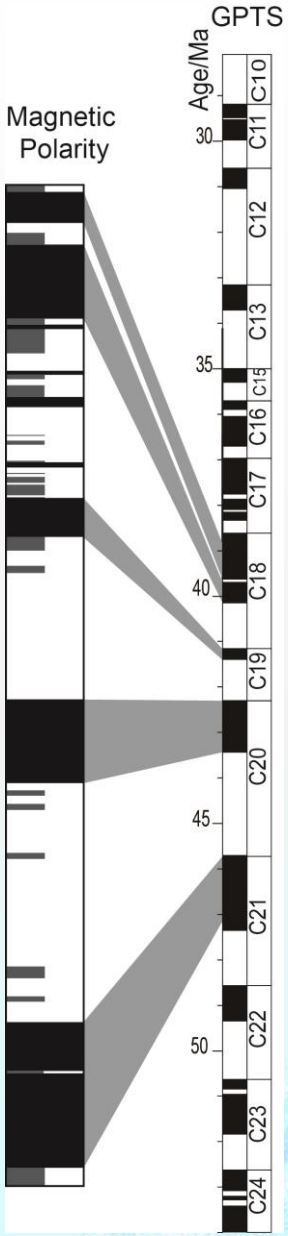



The correlation with GPTS

# Discussion




(Gourbet et al.,2017)

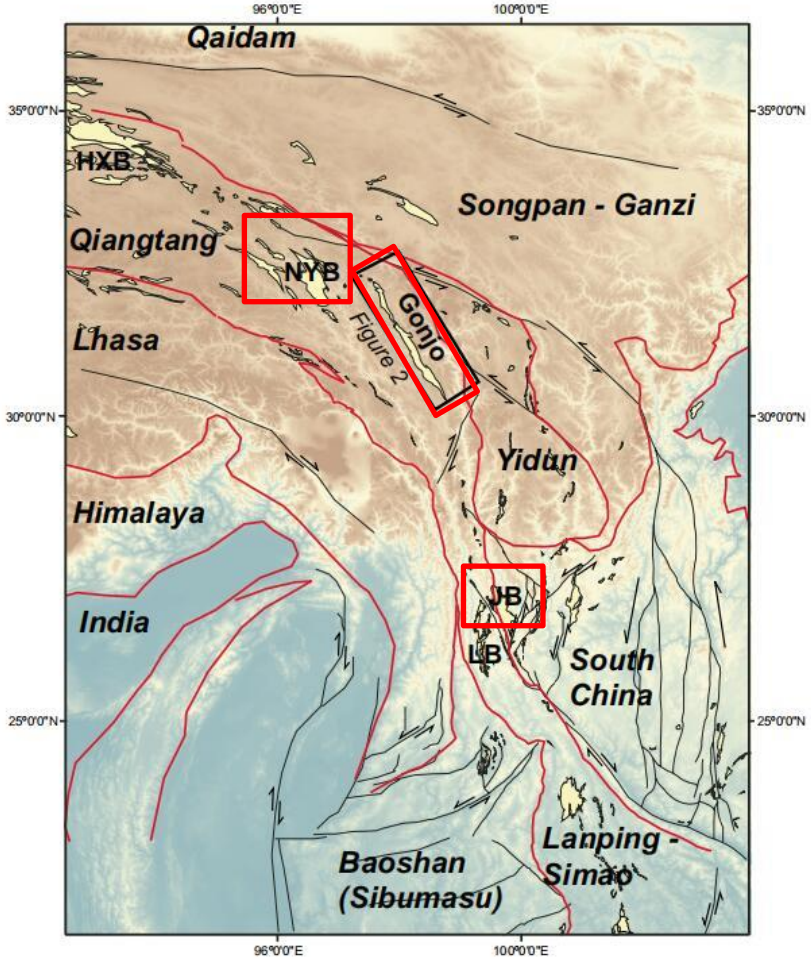



This study

**~48 - ~38Ma**

The upper stratigraphy ,Shuanghe formation, has been reassigned to Eocene, thus this study infers that the age of Jianchuan Basin is Eocene as a whole.

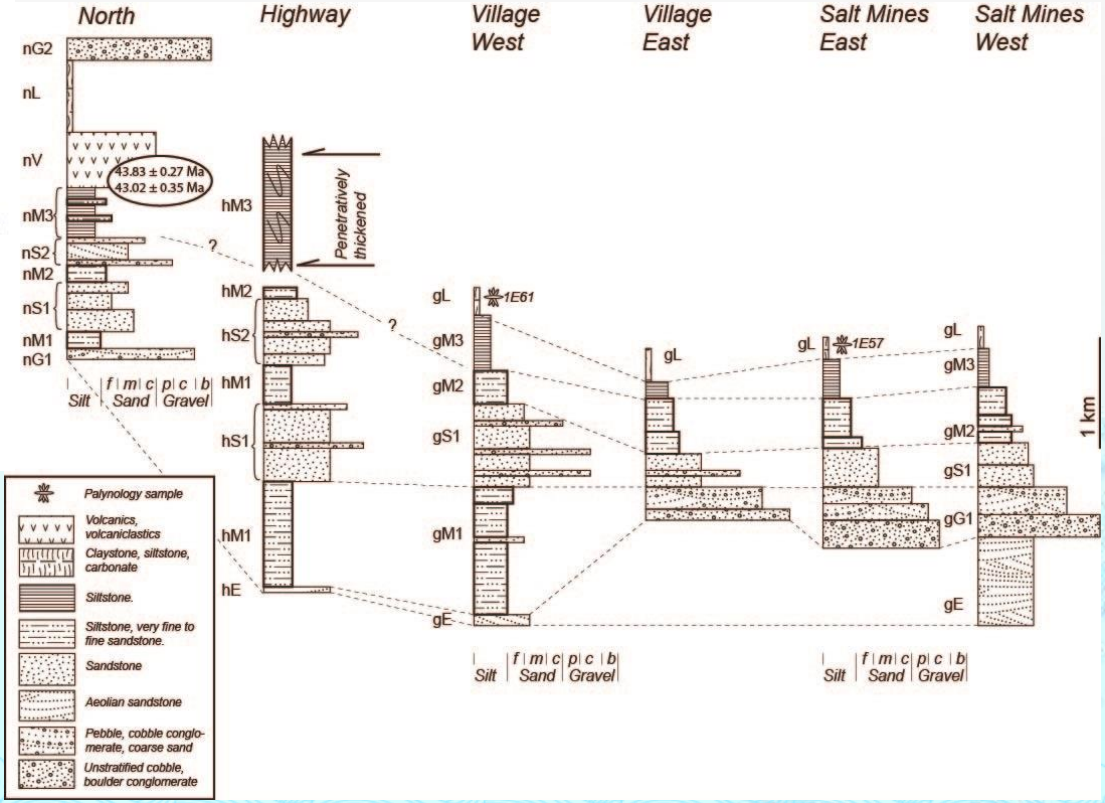
# Discussion



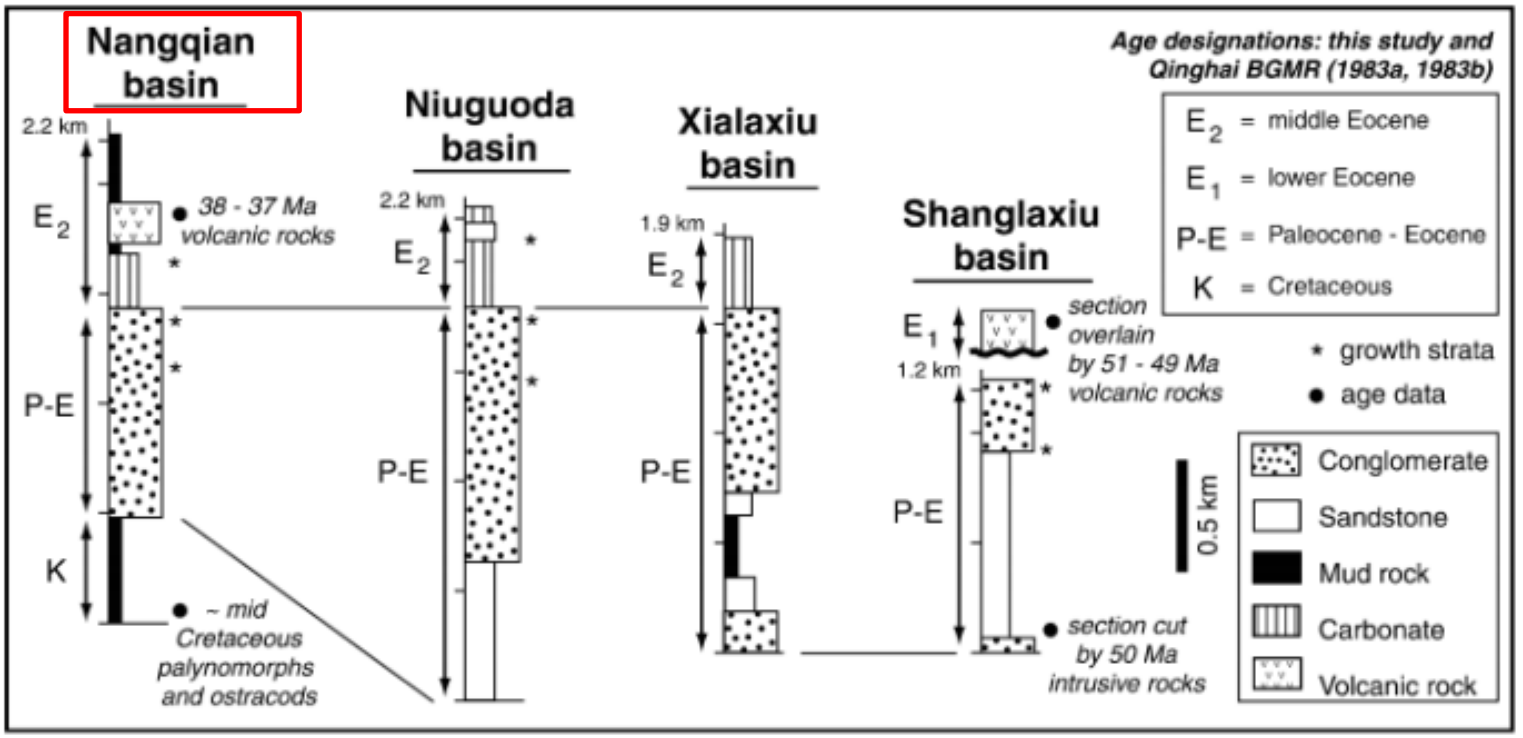

(Studnicki-Gizbert et al.,2008)

The continental sequences are generally found in an arcuate belt that extends from the central plateau into the western Yunnan province (e.g. Nangqian-yushu Basin, Gongjo Basin and Jianchuan Basin).

They were considered to have been deposited in similar tectonic compressional settings.(Horton et al.,2002; Studnicki-Gizbert et al.,2008; Cao et al., 2020)



# Discussion




(Horton et al.,2002)

Recent magnetostratigraphy suggested a Cretaceous-Paleogene age for the Gonjo Basin (Li et al.2020). However, our new results indicate an Eocene age for Jianchuan Basin , which is consistent with previous published age constraints (Horton et al.,2002; Studnicki-Gizbert et al.,2008).

## Conclusions

- The age of the Xinsong section is Eocene between Ca. 48 and Ca.38 Ma.
- The study implies that the age of Jianchuan Basin is Eocene as a whole.
- The results may be of great significance for understanding the kinematics and dynamic models of the deformation and evolution of the Tibetan plateau.

# Thank you