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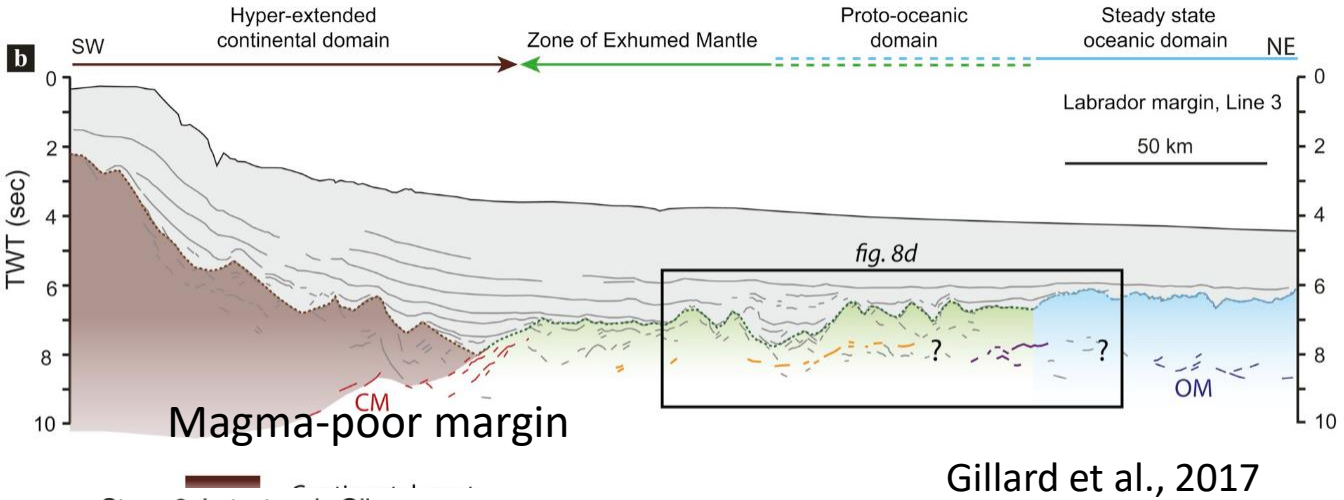
Magmatic evolution in a sedimented margin and implications for lithospheric breakup:

insights from high-resolution seismic data from the South China Sea

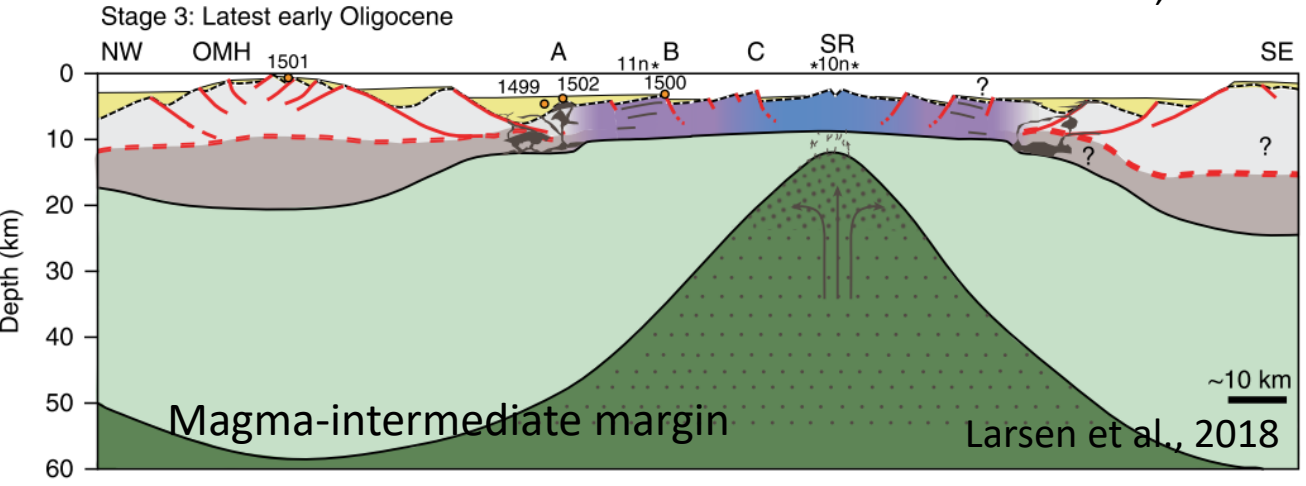
C. Zhang[1], Z. Sun[1], G. Manatschal[2], X. Pang[3], M. Su[4], J. Zheng[3], H. Li[3], Y. Gu[4], J. Zhang[5], Y. Zhao[6]

1) CAS Key Laboratory of Ocean and Marginal Sea Geology, South China Sea Institute of Oceanology, Guangzhou, 510301, China.
2) IPGS/CNRS, Université de Strasbourg, Strasbourg Cedex, 67084, France.
3) CNOOC Ltd.-Shenzhen, Shenzhen, 518054, China.
4) School of Marine Sciences, Sun Yat-sen University, Zhuhai, 519082, China.
5) The Chinese University of Hong Kong, Shenzhen, 518172, China.
6) Second Institute of Oceanography, Ministry of Natural Resources, Hangzhou, 310012, China. Hangzhou, 310012, China.



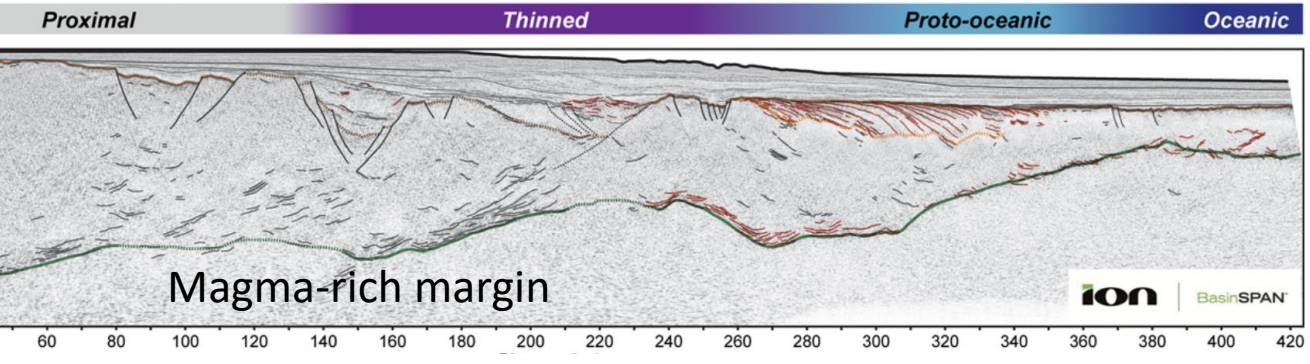
Magma-poor margin

Gillard et al., 2017



Magma-intermediate margin

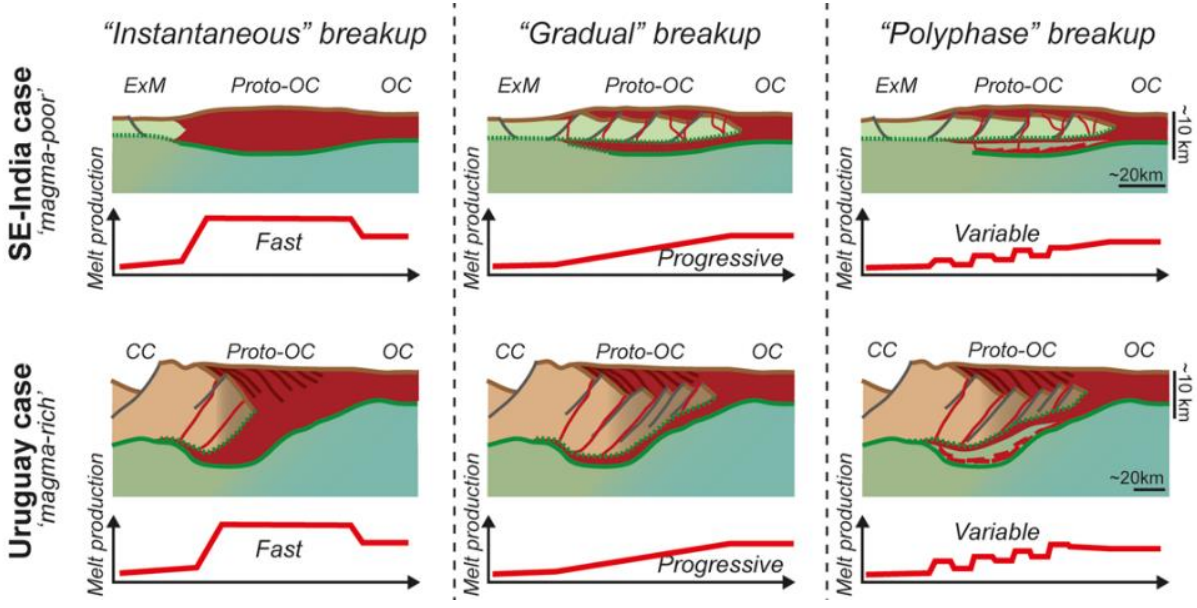
Larsen et al., 2018



Magma-rich margin

Questions:

When, where and how the magma came in during the development of the rifted margin?

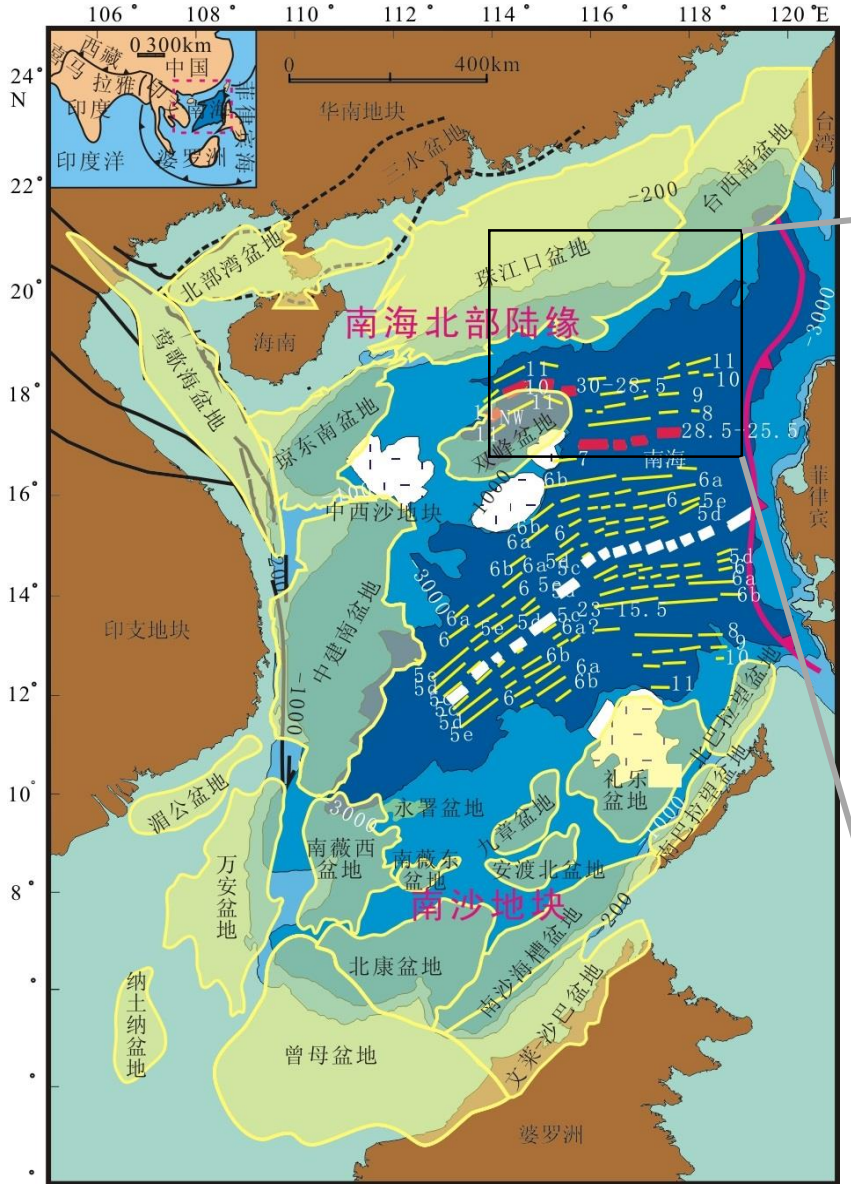


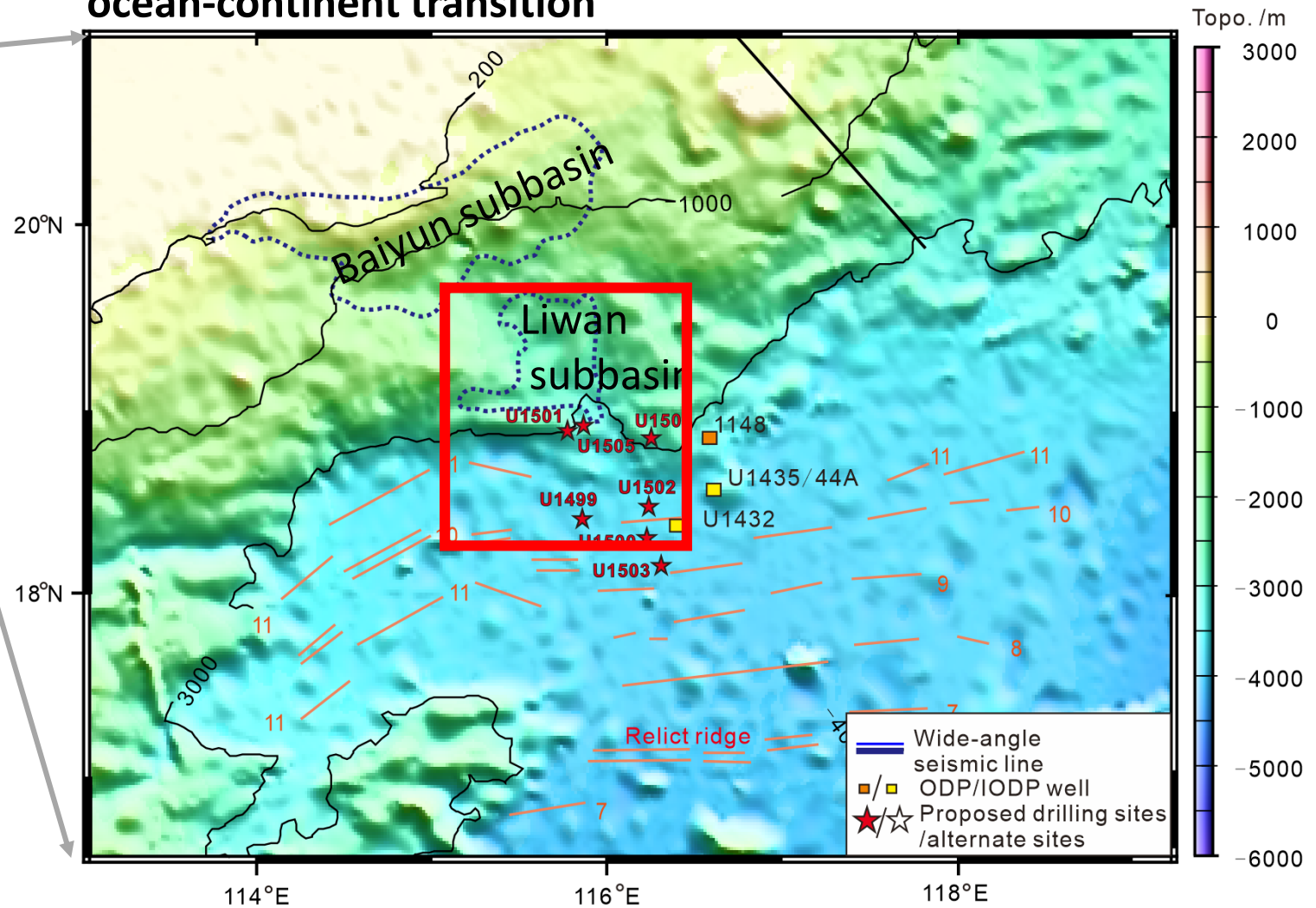
Tugend et al., 2018

1. Geological setting in the mid-northern SCS

SCS northern margin is rich in sediments.

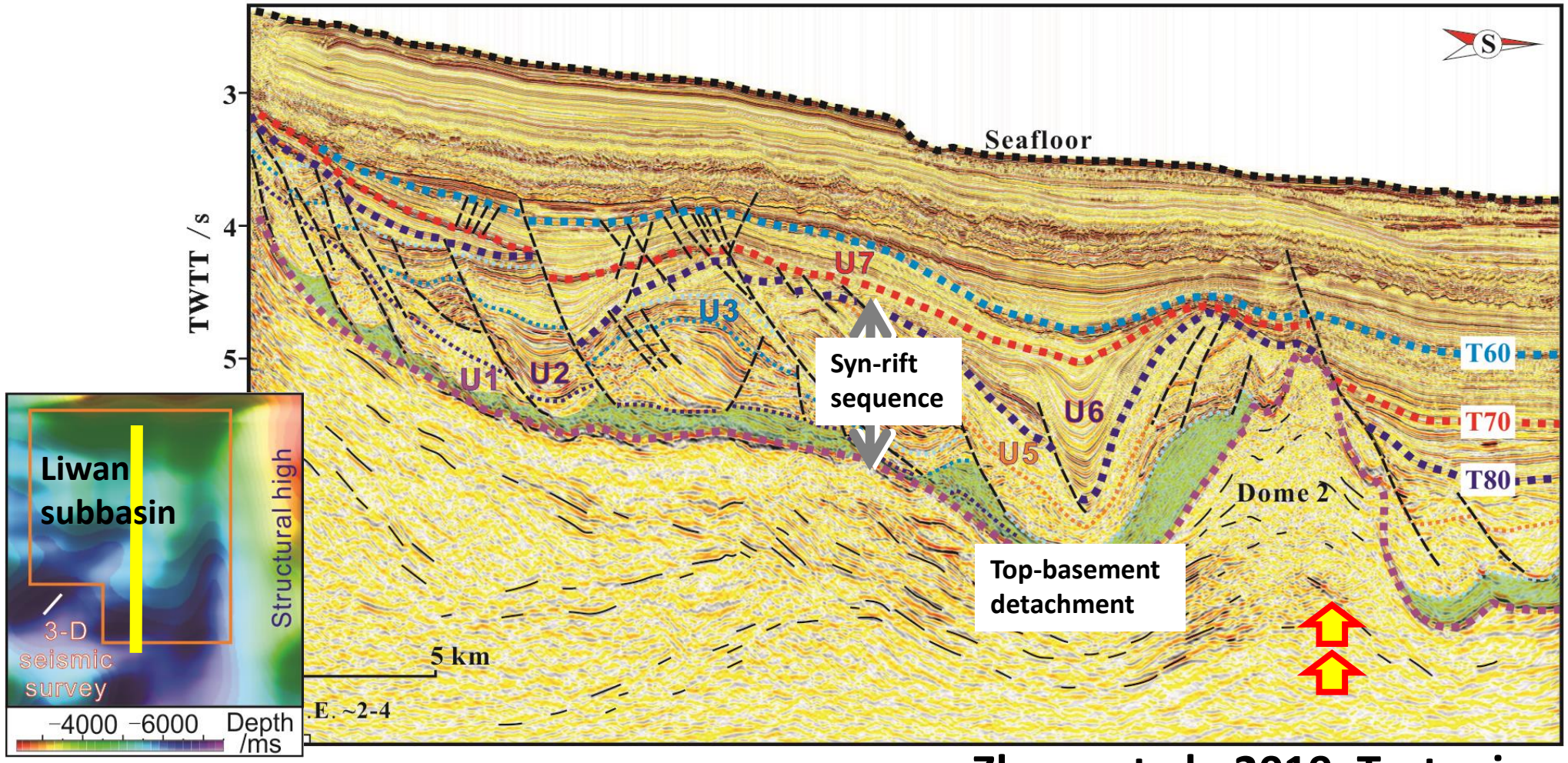
The study area covers from the hyperextened Liwan subbasin to ocean-continent transition





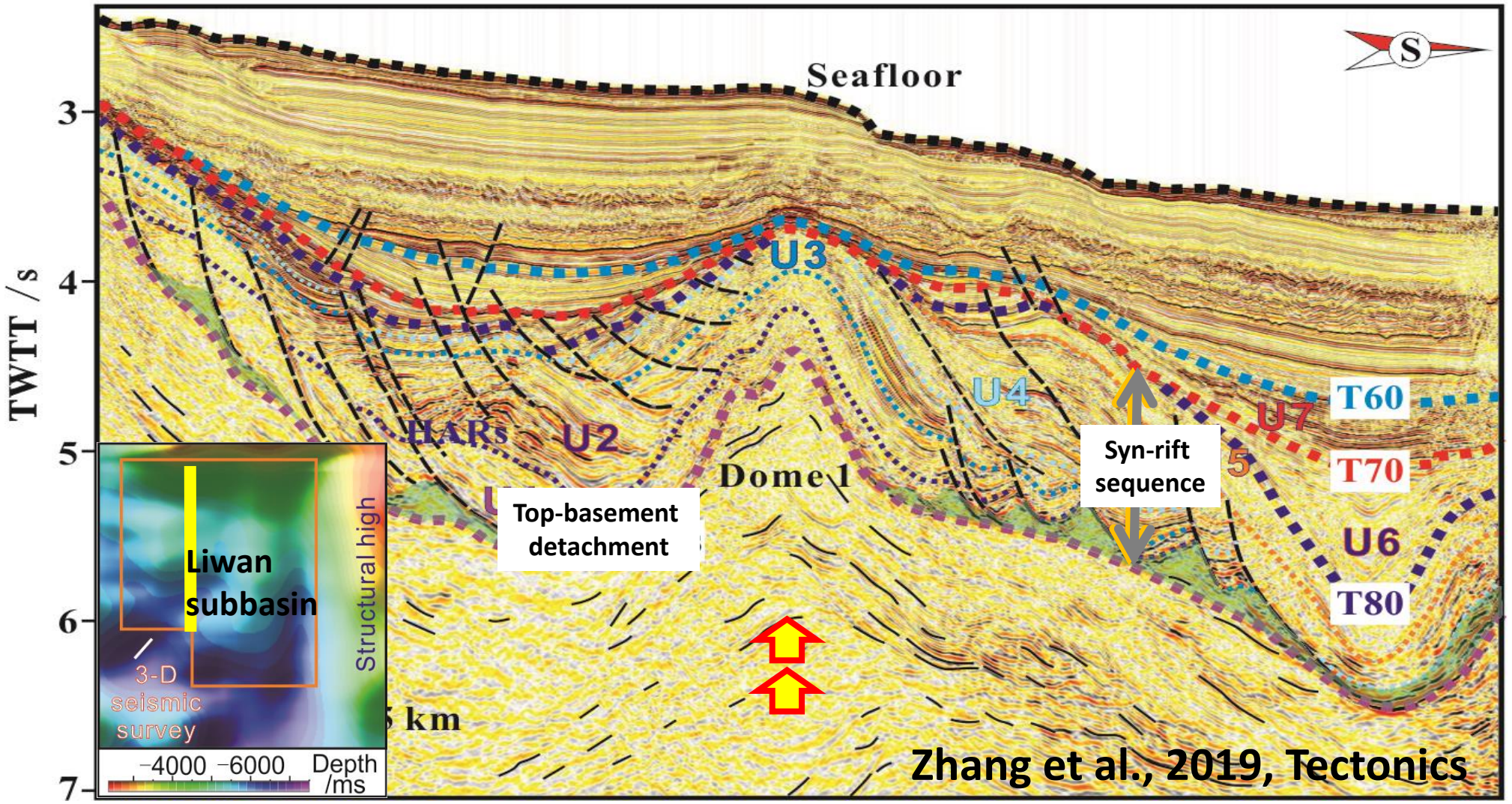
2. Structures reminiscent of magmatic additions

2.1 Dome shaped highs (DSHs)—mamatic intrusions

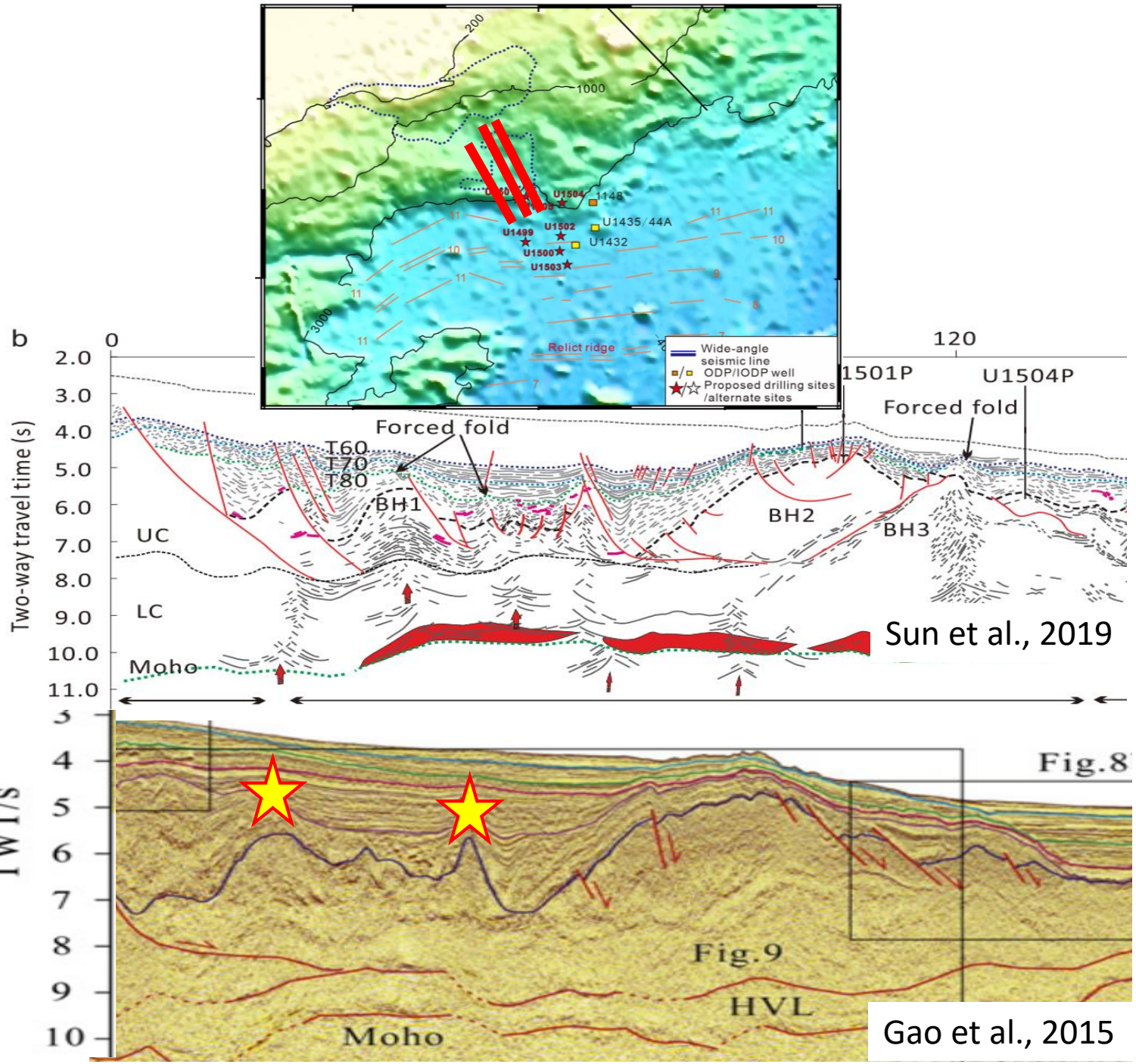


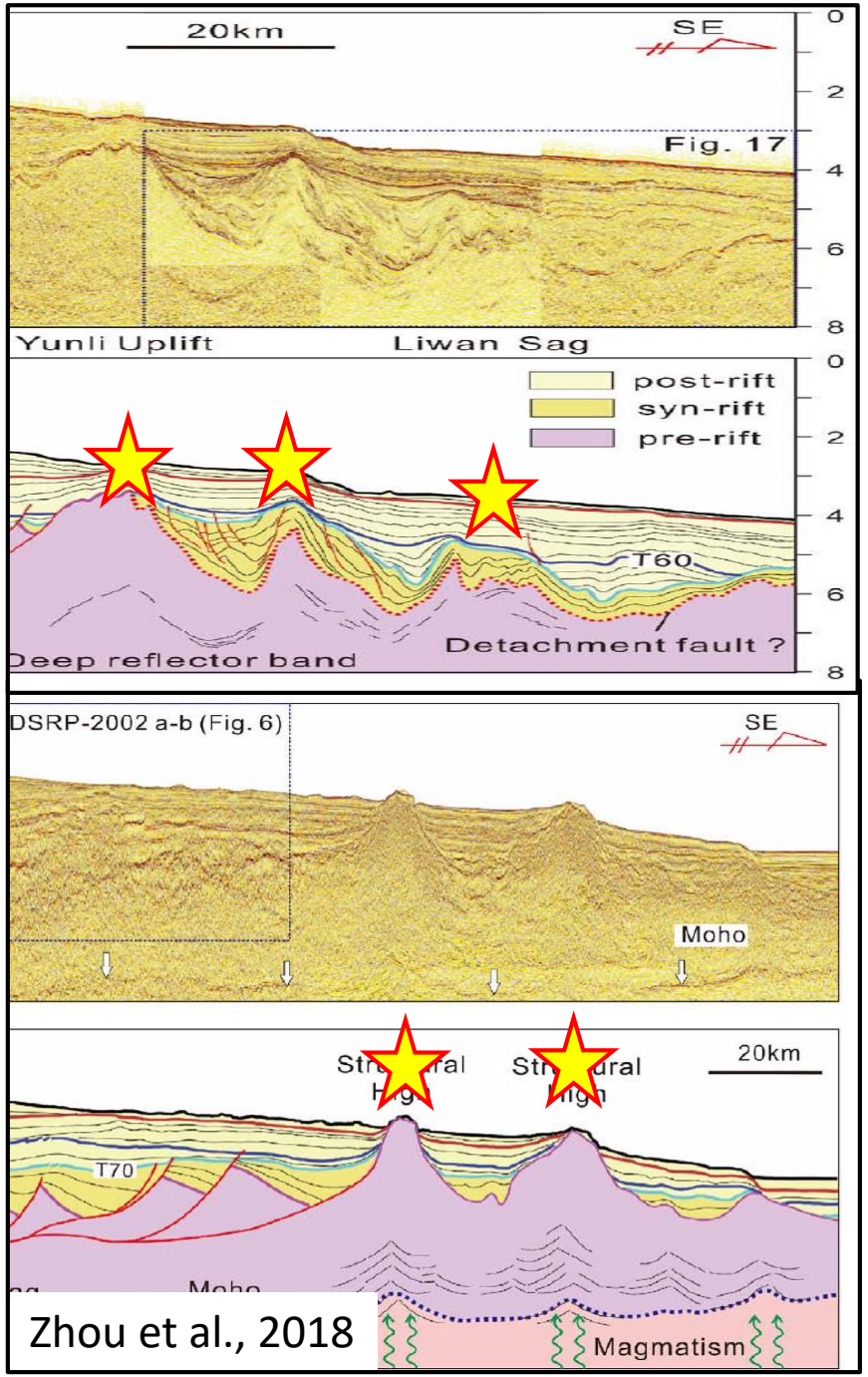
Zhang et al., 2019, Tectonics

Rare extensional faults offset the top-basement detachment; the seismic basement is decoupled with the syn-rift sequences and structures. The detachment surface was uplifted and formed DSHs.

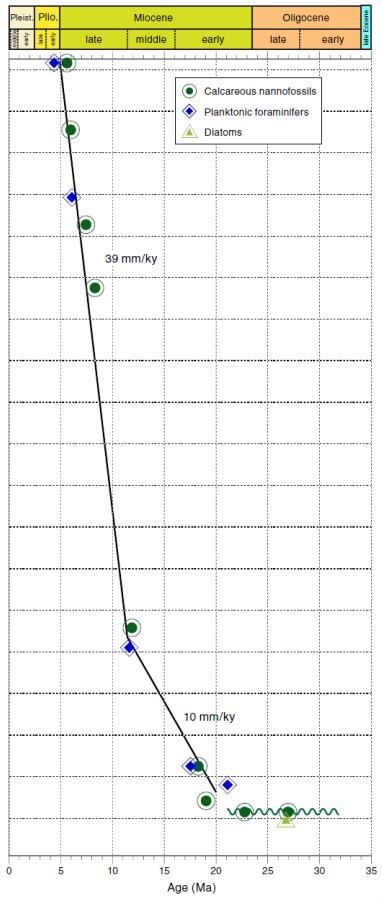


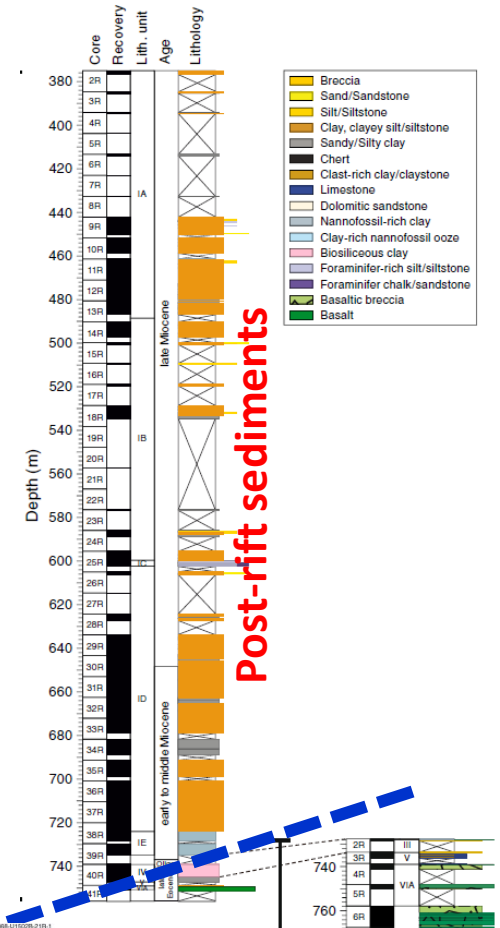
1. The detachment surface was uplifted and formed DSHs.
2. DSHs interacted with the syn-rift sediments, which enable to define the timing of DSHs.
3. DSHs are linked with syn-rift magmatic intrusions.


b
Two-way travel time (s)
Forced fold
T60
T70
T80
BH1
BH2
BH3
UC
LC
Moho
1501P
U1504P
Forced fold
Relict ridge
Wide-angle seismic line
ODP/IODP well
Proposed drilling sites /alternate sites
U1504
U1502
U1499
U1500
U1503
U1435/44A
U1432
1148
Sun et al., 2019
TWT/s
Fig.8
Fig.9
HVL
Moho
Gao et al., 2015

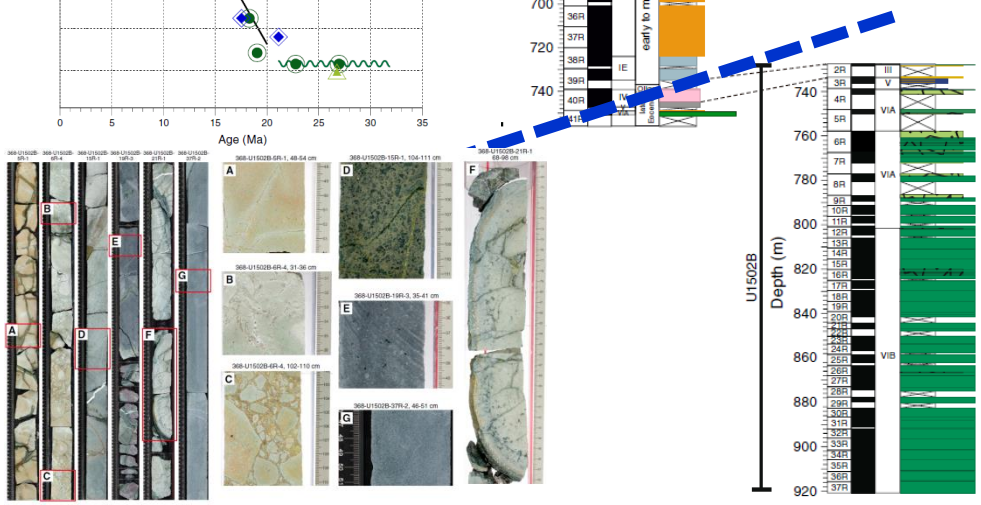

20km
SE
Fig. 17
Yunli Uplift
Liwan Sag
post-rift
syn-rift
pre-rift
T60
Deep reflector band
Detachment fault ?
DSRP-2002 a-b (Fig. 6)
SE
Moho
20km
T70
Magmatism
Zhou et al., 2018

2.2 Cone shaped high-volcano during final breakup





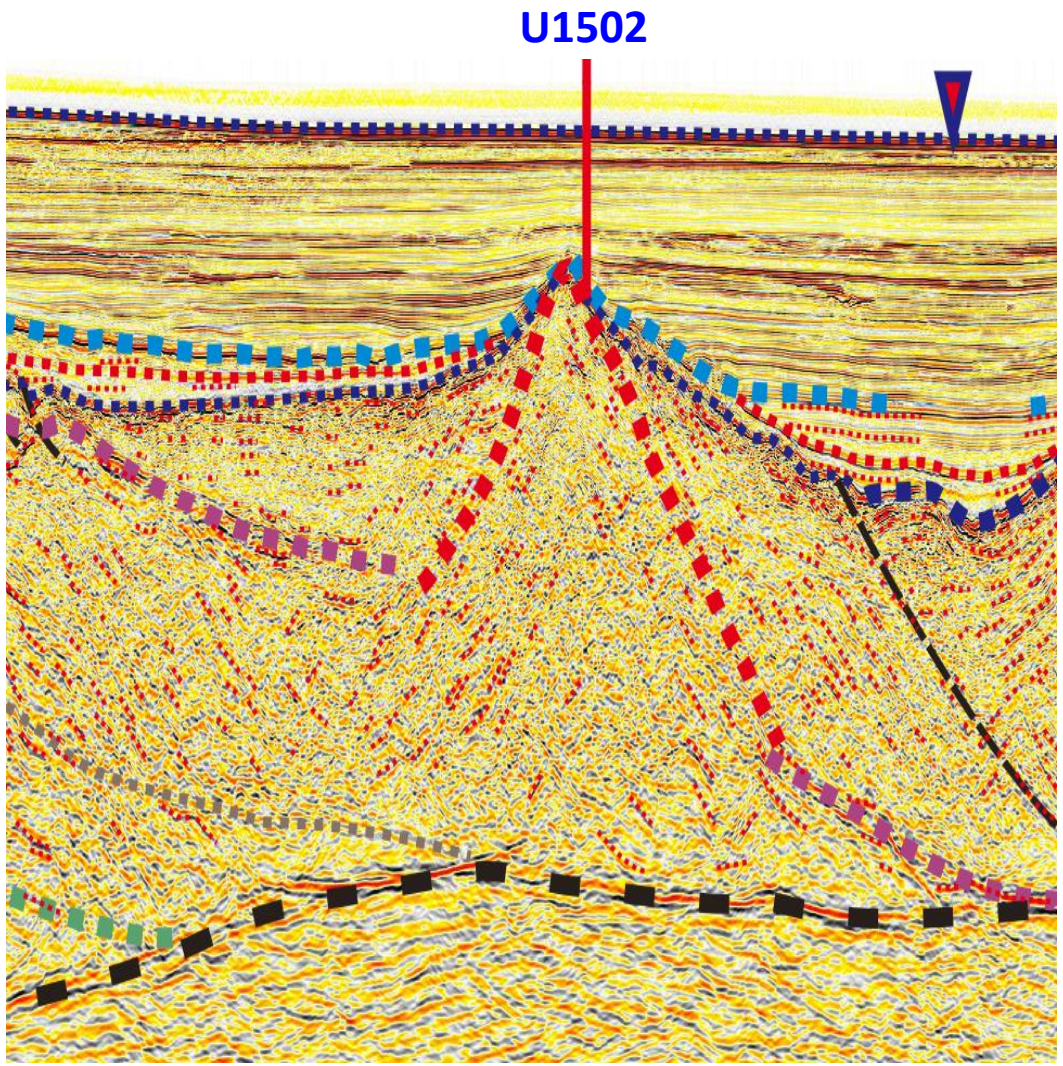
Post-rift sediments



Top of basement

Altered basalt

Larsen et al., 2018



Zhang et al. In review.

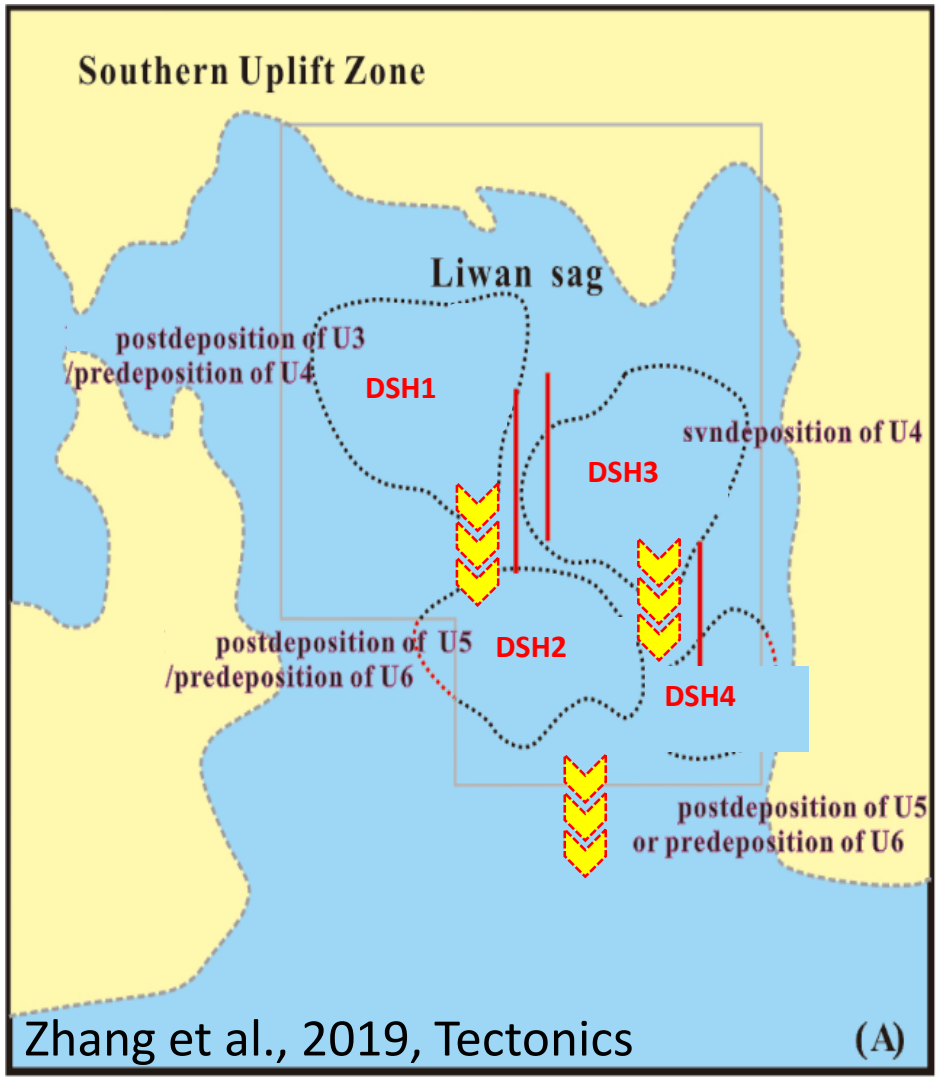
Based on the observations of magma-related structures, we focus on:

2. **Defining the forms and distribution of magmatic additions**

3. **Timing and migration of magmatism**

4. **Amount of magmatic additions and their evolution as a function of the development of northern margin**

Zhang et al. 2020, In review.



Thanks for your attention!