台灣陸海域地質與活動構造

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Angelier et al. (2008)

- Luzon arc-South China margin collision.
- Later influenced by the westward advancing Ryukyu arctrench system.
 - Taiwan links two oppositedipping subduction systems



Ryukyu



Geological Map of Taiwan







Coastal Plain



Foothills Quaternary-Miocene Sequence



Hsuehshan Range Paleogene Slate



Backbone Range Miocene-Paleogene Slate



Coastal Range Neogene Island Arc System



2 A

Unit I

Coasta1

Plain

Pre-Tertiary Metamorphic Complex

Unit II

Western

Foothills



Arc-continent collision is oblique!





2. Initial arccontinent collision

1. Oceanic subduction



2. Initial arccontinent collision



Lin et al. (2009) Tectonophysics





Manila Subduction Interface - Geometry Setting



A section across initial arc-continent collision zone



Tectonic features in the incipient orogenic wedge

Upper Slope: Mud diapirism

Lower slope: Folds-and-thrusts



Lin et al. (2008)

Progressive closure of the North Luzon Trough, a forearc basin









Abundant shallow earthquakes in the full collision zone



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Geo-provinces in the Taiwan orogen



4. Post-collisional collapse





Westward advancing of the Ryukyu arc-trench system



The fault-bounded Taipei basin formed on top of a fold-and-thrust belt



The Ilan basin formed on top of metamorphic terranes



²⁵

NE coast of Taiwan

The **DEMISE** of a very young (c. 6 Myr) mountain belt

Eocene-Oligocene Sandstones

The foundered orogen off NE Taiwan is block faulted





SOT: Southern Okinawa Trough

Okinawa Trough is known as the backarc basin of the Ryukyu trench-arc system. According to preliminary investigation, We found vigorous volcanic activities and abundance west-east trending normal faults which may indicate the north-south regional stretching mechanism.





南沖繩海槽的斷層構造





Erosion and uplift rates in Taiwan across multiple timescales



a, Calculated from fluvial suspended sediment observations. Black arrows indicate mean annual coastal suspended sediment flux from rivers draining areas greater than 400 km². b, Bedrock strath incision rates (all in mmyr⁻¹). Values for each locality represent mean incision rate for all terraces measured at that locality. c, Exhumation rates (all in mmyr⁻¹) calculated from apatite fission-track ages: red, reset; orange, partially reset; blue, unreset.

Dadson et al. (2003)³²

Trends in rock uplift rate along the length of the **Taiwan island**



Tectonic Development and Sedimentation



Cenozoic tectonic evolution





Lin et al. (2003)



Lin & Watts (2002) 3

Simplified stratigraphy in Taiwan



Lin & Watts (2002)



Cenozoic Tectonic Development in the Taiwan Region



Teng and Lin (2004)

Taiwan arc-continent collision since ~ 6 Ma



Sediment isopach map for the Taiwan foreland 24 basin



Lin & Watts (2002) 22

East to west stratigraphic correlation of the foreland sediments





Conclusions (1)

The Taiwan arc-continent collision zone is the result of oblique collision between the Luzon arc and the south China margin.

In the northern end of this zone, reversal of subduction polarity accompanied by the westward-advancing Ryukyu arc-trench system results in post-collisonal collapse.

Conclusions (2)

> The tectonic setting progresses northward from oceanic subduction and initial arccontinent collision in the south, through full collision in the middle, into post-collisional collapse in the far north.

The Taiwan foreland basin in the west and the Huatung basin in the east are the main mountain-derived sediment sinks.