R/V Yokosuka cruise at Tonga Trench
Oct. 6-21, 2013

Horizon Deep: 10,866m
The second deepest ocean in the world

Osamu Ishizuka (Geological Survey of Japan)
Boomerang Leg 8 aboard R/V Melville (1996)

Depth 4136m ~ 9371m

Special thank to Dr. Teruaki Ishii
FAB: Forearc Basalt (MORB-like tholeiitic basalt) the oldest (~52Ma) volcanic rocks in IBM

FAB has been firstly reported by Reagan et al. (2010, G3).

Ishizuka et al. (2011, EPSL)

Ishizuka et al. (2006, EPSL)

Michibayashi  MIS31-12: Tonga Trench Peridotites  Shizuoka University
YK13-10 cruise at Tonga Trench
Oct. 6-21, 2013

PI: Katsuyoshi Michibayashi (Shizuoka University)

• 4 dives given, but only 2 dives done.

• Dive 1369 near Horizon Deep observed sediments.

• Dive 1371 north of the Deep found igneous section.
6KDive1371: 6465-5917 m

Lower section

- basaltic pillow lava
- hyaloclastite
- dolerite
- one andesite
6KDive1371: 6465-5917 m

**Upper section**
- harzburgite
- dunite
- pyroxenite

But none of them are from outcrop.....
Tonga Trench reveals the subduction evolution.

The earliest stage of the subduction zone.

Water + Melt interaction

Mature arc system

Immature arc system

The earliest stage of the subduction zone.

Water

Melt interaction

4.4 Ma

11.4 Ma

31.8 Ma

47.7 Ma

49.9 Ma

51.5 Ma

52.9 Ma
Trigger to start melting in mantle

Melt reaction

Water reaction

Melt interaction

Water

Magma + (water)

The North

The South

Incompatible element

TiO₂ in spinel (wt%)