

# Comparison of the ages of groundwater around a saltwater-freshwater mixing zone

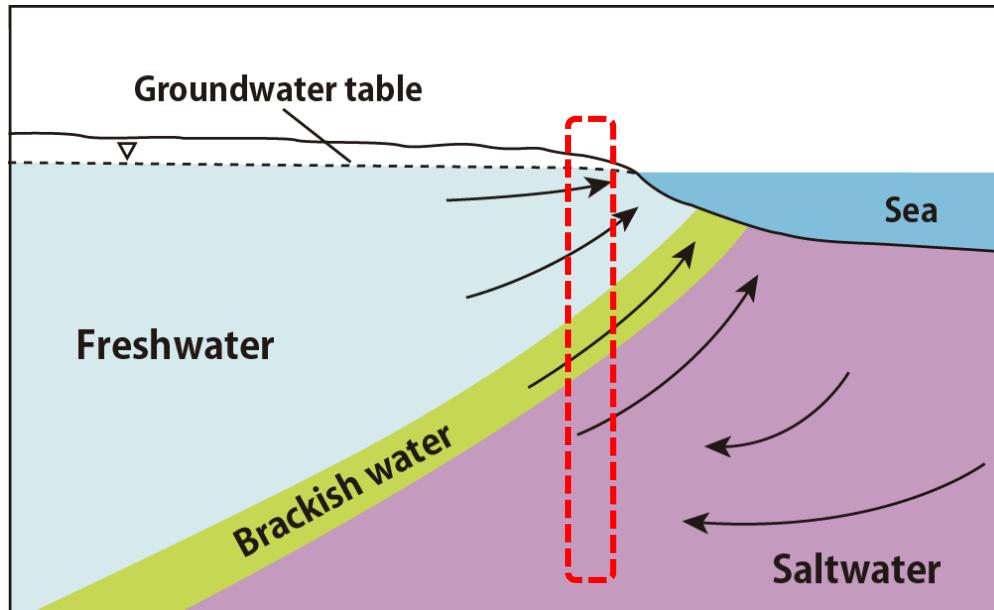


Fig. 1  
General illustration of the distribution and flow of groundwater in coastal areas

Isao Machida, Masahiko Ono, Masaru Koshigai and Atsunao Marui  
(Geological Survey of Japan, AIST)

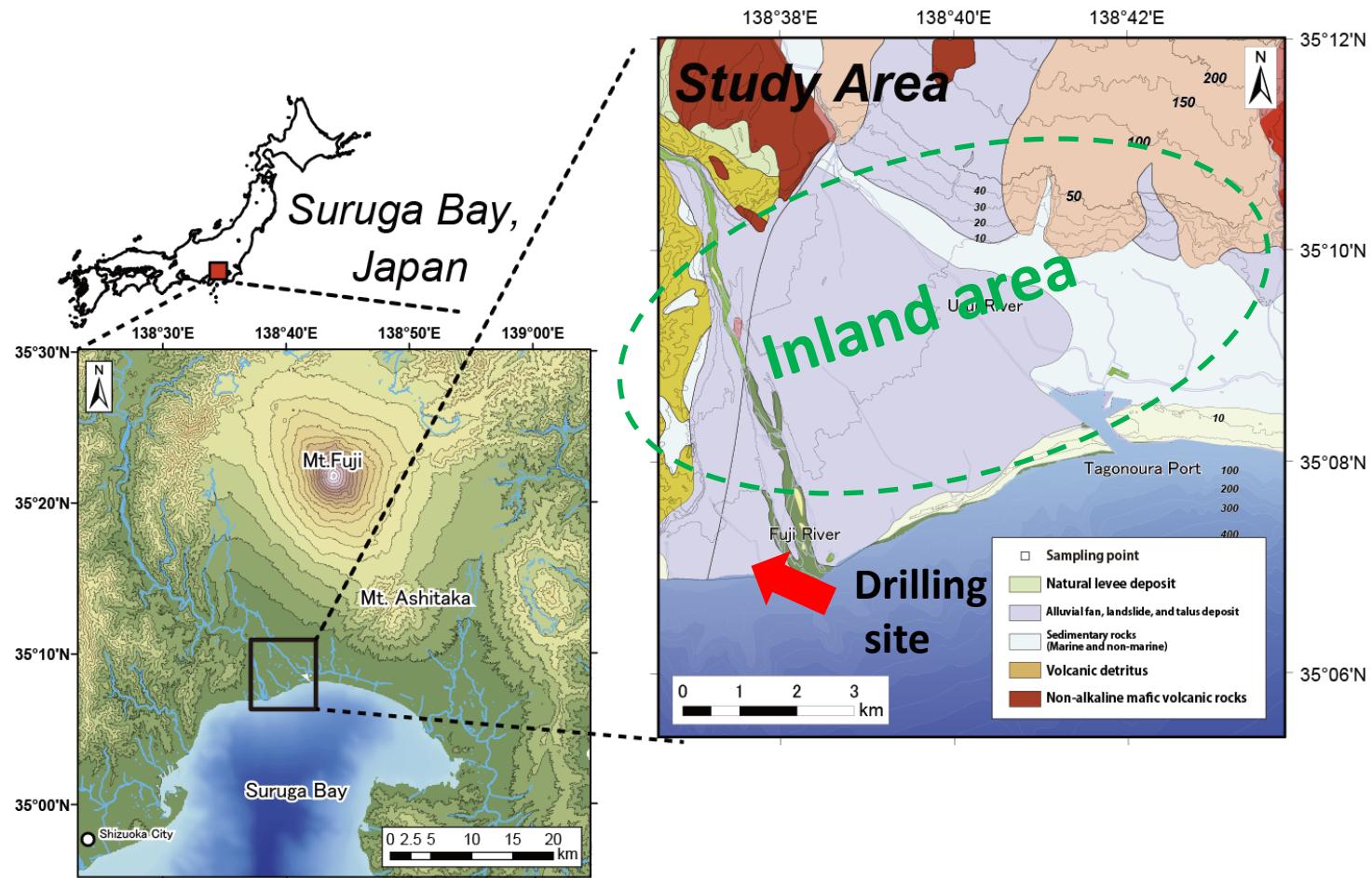
N°abstract



25-29<sup>th</sup>  
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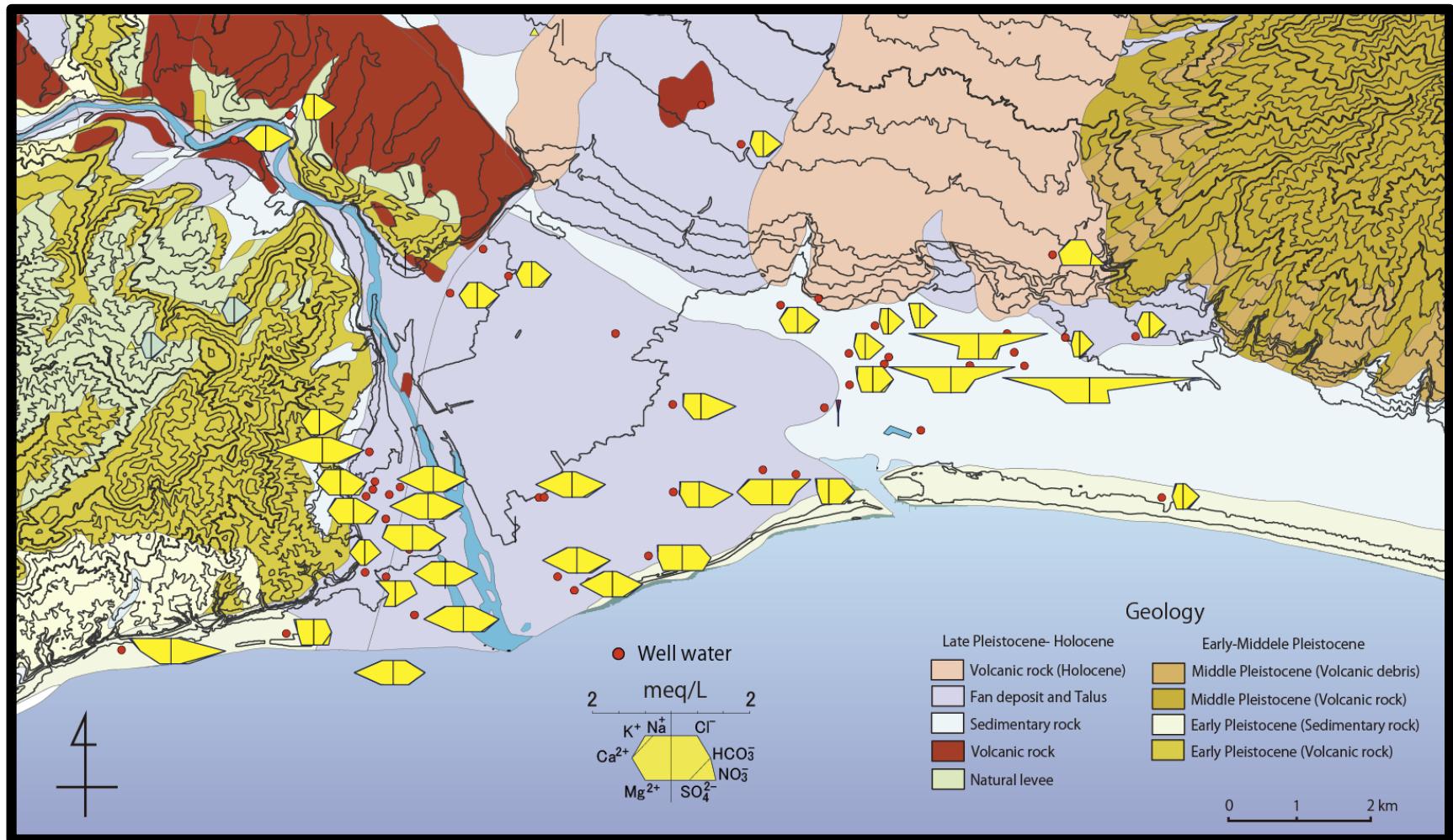




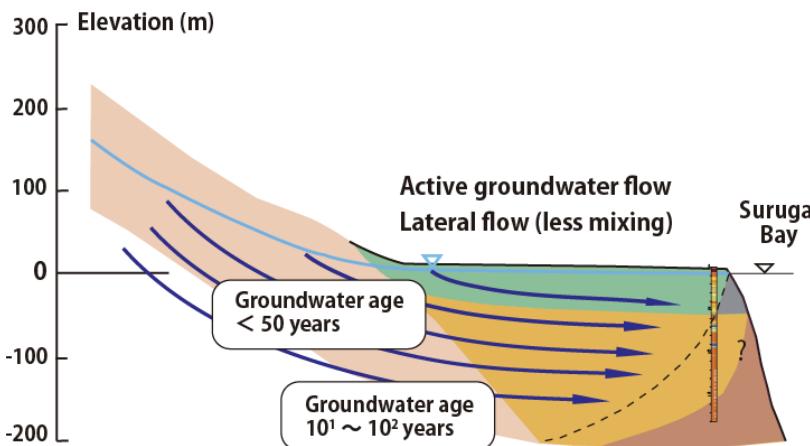
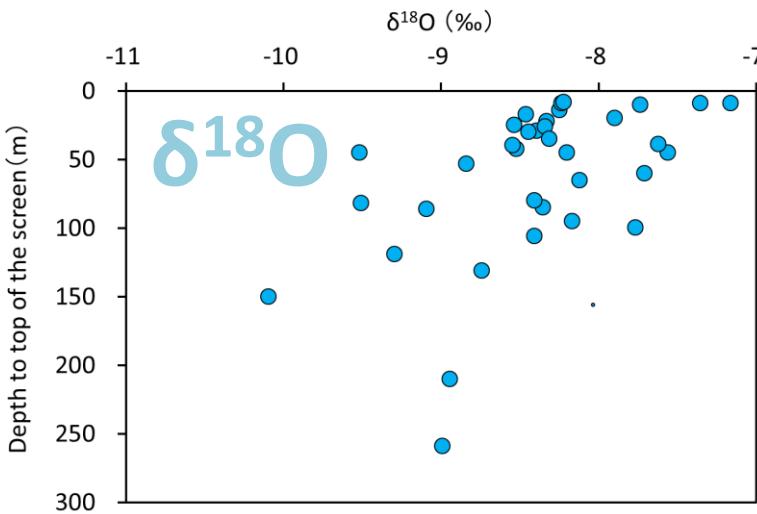
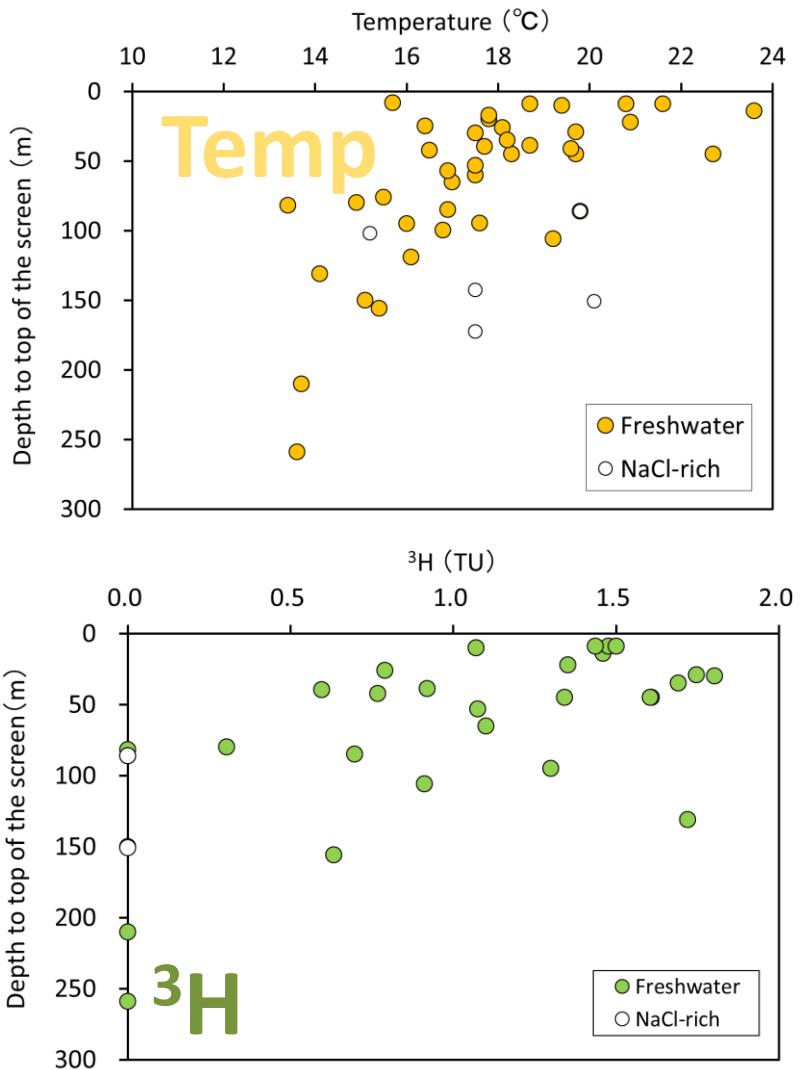
**Fig. 2 STUDY AREA**

**North: Foot of the mountain, recent volcanic deposits**

**South: Flat region with alluvial fan deposits from the river.**



**Fig. 3 Stiff diagrams showing the horizontal distribution of the groundwater quality in inland areas from 2013 to 2014**



**Fig. 4 Vertical distribution of groundwater quality in inland areas**

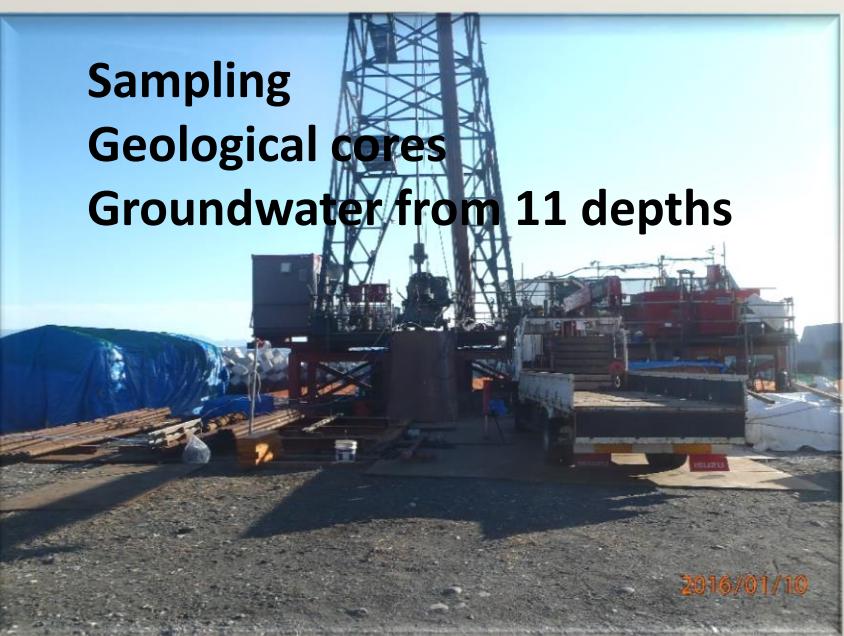
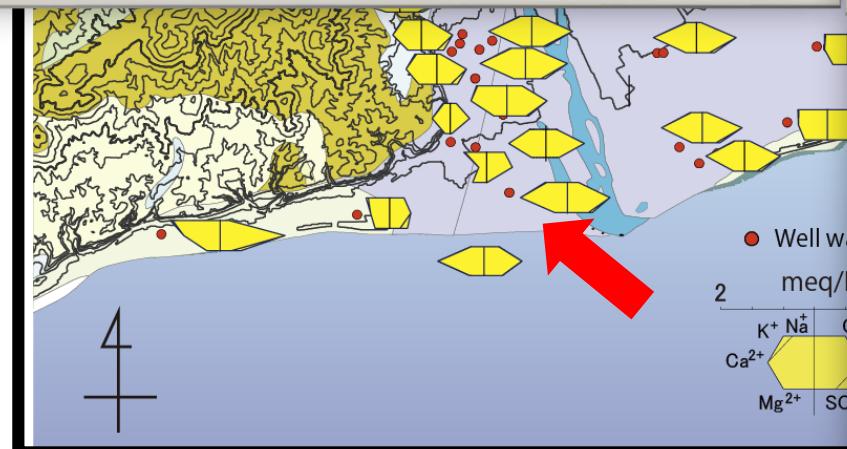
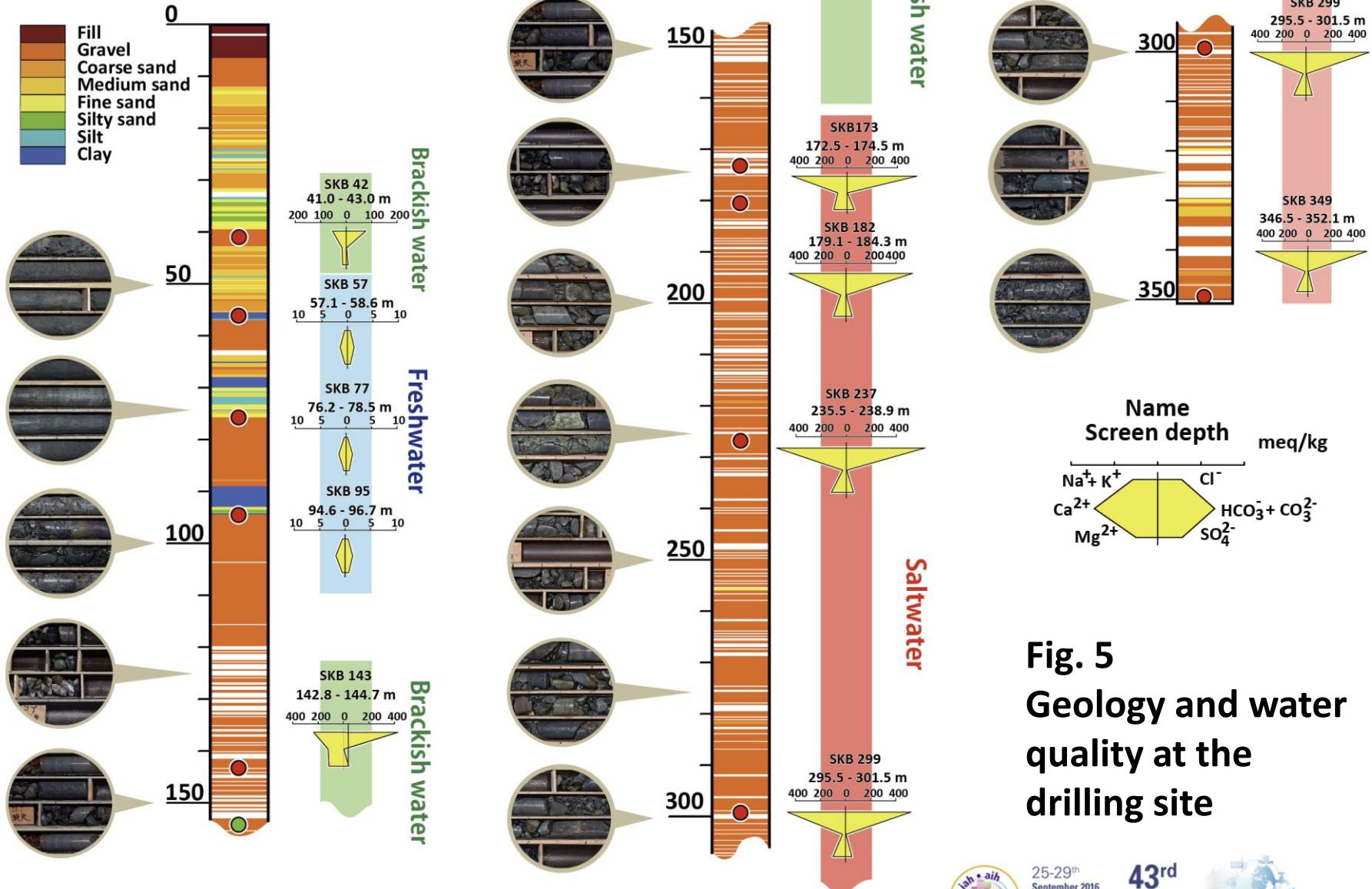
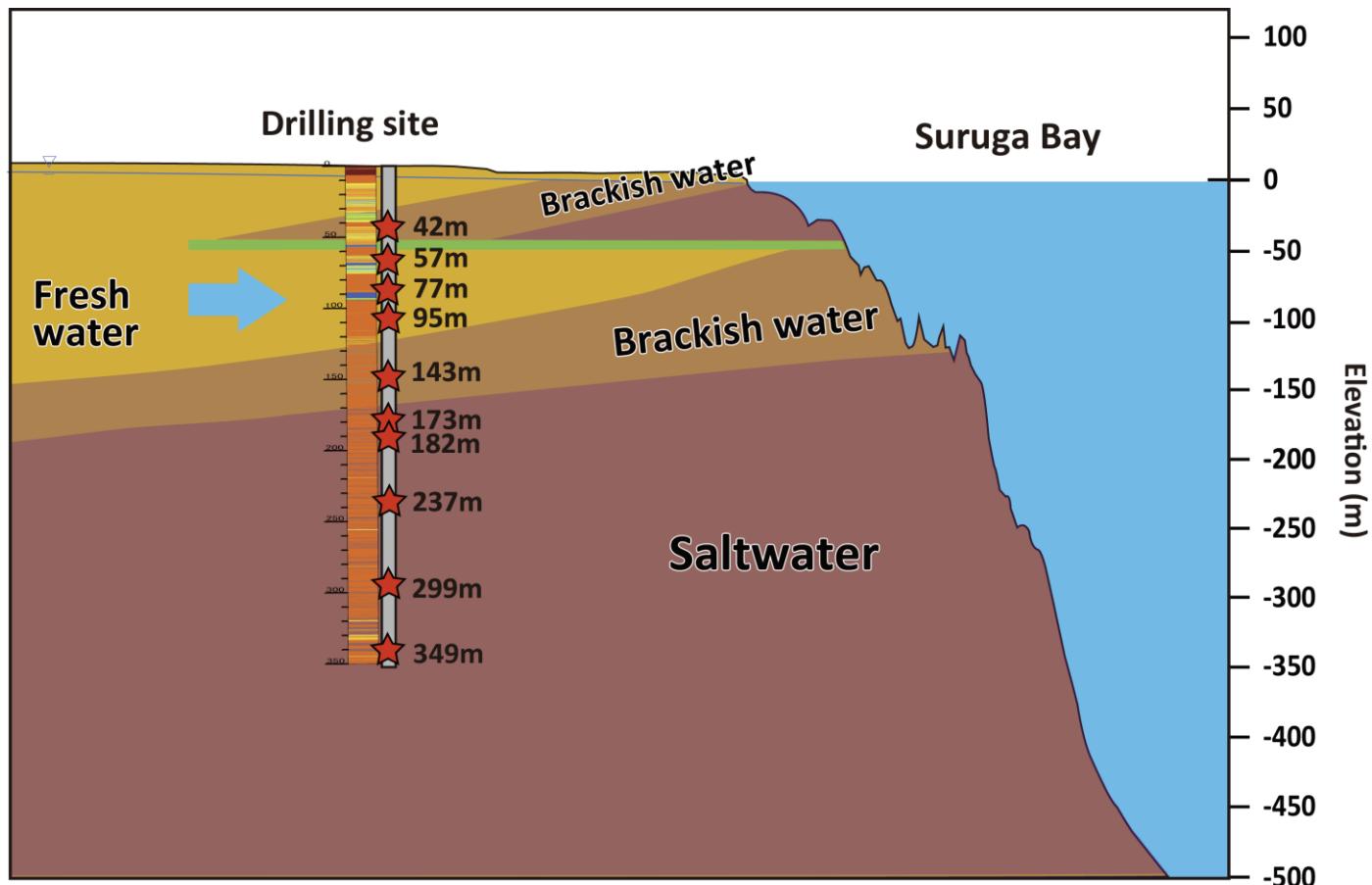


Fig.3 Horizontal distribution of groundwater quality  
Stiff diagrams in inland area (2013)

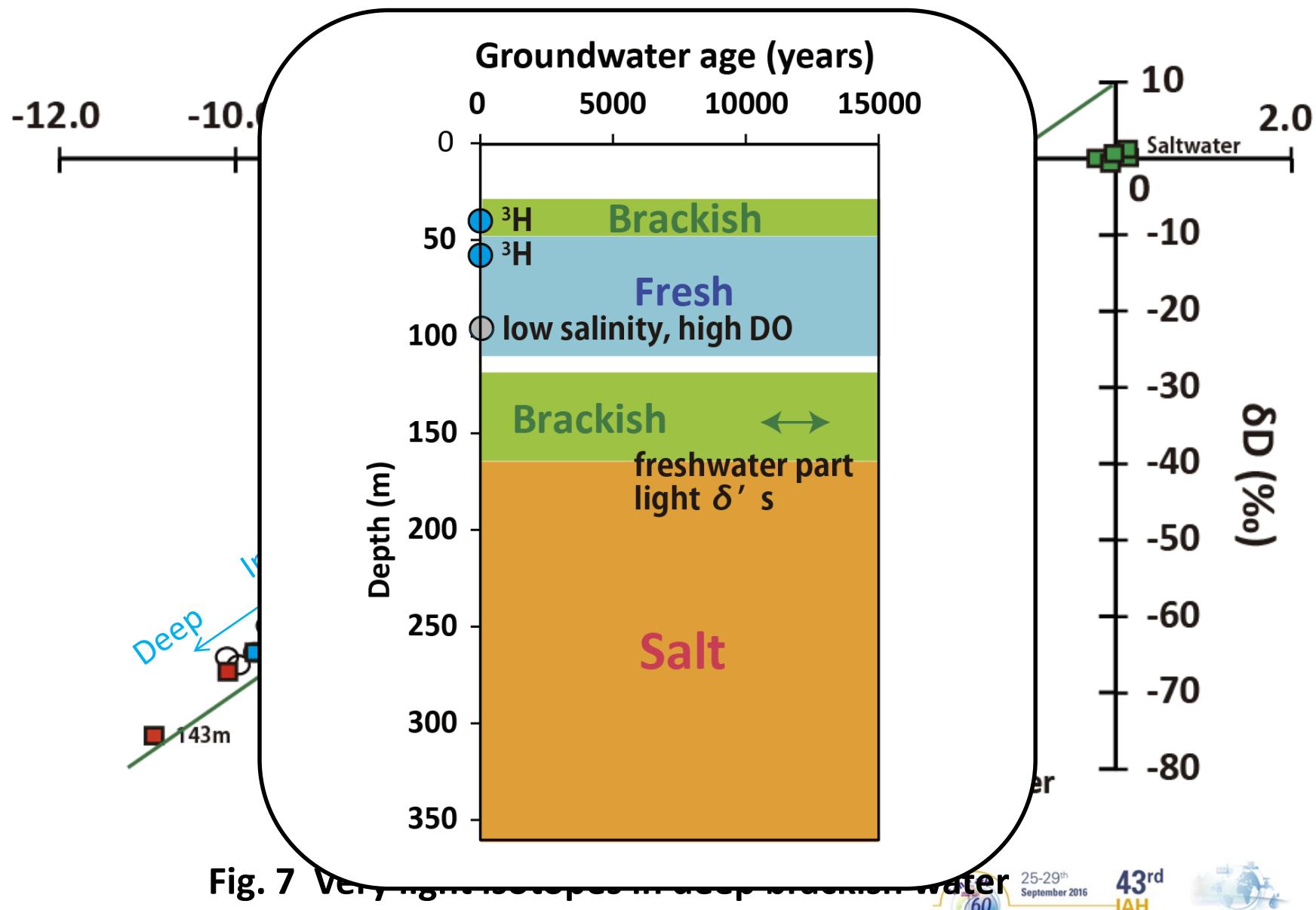
# Results of drilling





**Fig. 6 Distribution of saltwater wedges based on the drilling results**

# Result of isotope analysis



# Calculation of adjusted $^{14}\text{C}$ ages by NETPATH (USGS, Plummer et al., 1994)

**Initial water : Seawater**

**Final water : Saltwater & brackish water**

**Constraints : C and  $\delta^{13}\text{C}$**

**Phases :  $\text{CH}_2\text{O}$ , Volcanic gas, Calcite**

	$\delta^{13}\text{C} (\text{\textperthousand})$	$^{14}\text{C} (\text{pMC})$
DIC in sea water	-0.6 <sup>*1</sup>	100 <sup>*2</sup>
Carbides	-20, -25, -30 <sup>*3</sup>	7 <sup>*4</sup>
Volcanic gas	-10, -5, 0 <sup>*5</sup>	0
Calcite	0 <sup>*6</sup>	0 <sup>*6</sup>

Given parameters for NETPATH (USGS, Plummer, 1994 )

\*1: Tsuchiya and Wada (2002)

\*2: Tsuboi et al. (2012)

\*3: Yamamoto et al.(2005)

\*4: Estimated from  $^{14}\text{C}$  value of carbides in geologic cores

\*5: Sano and Marty (1995)]

\*6: Plummer et al.(1994)

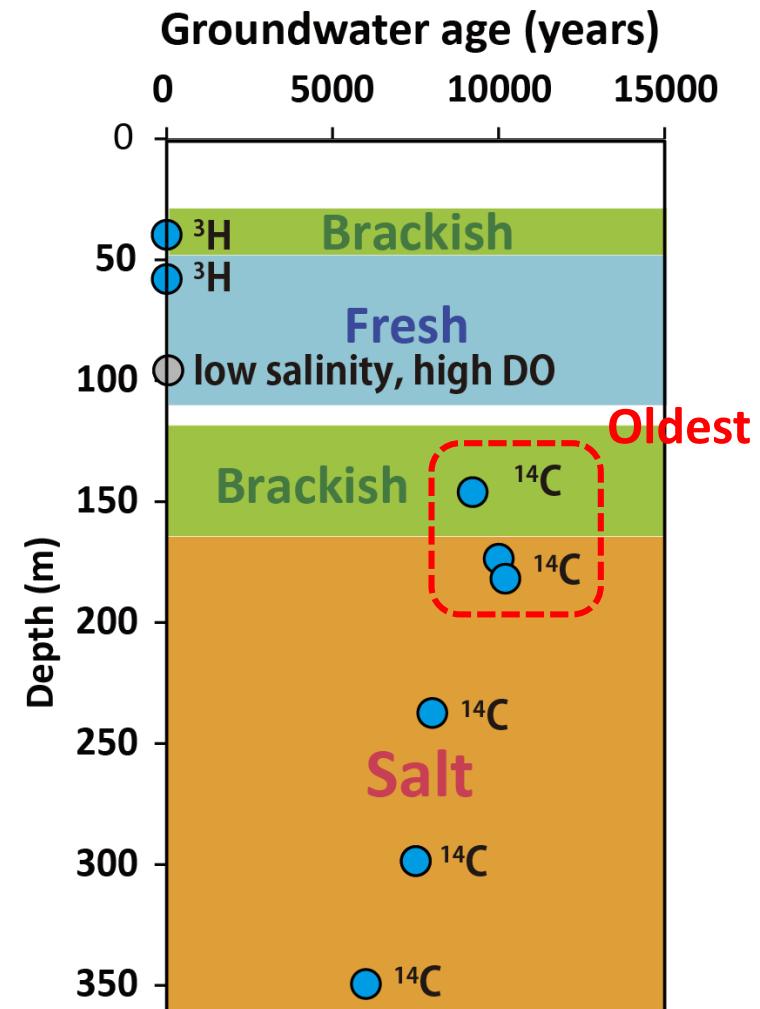
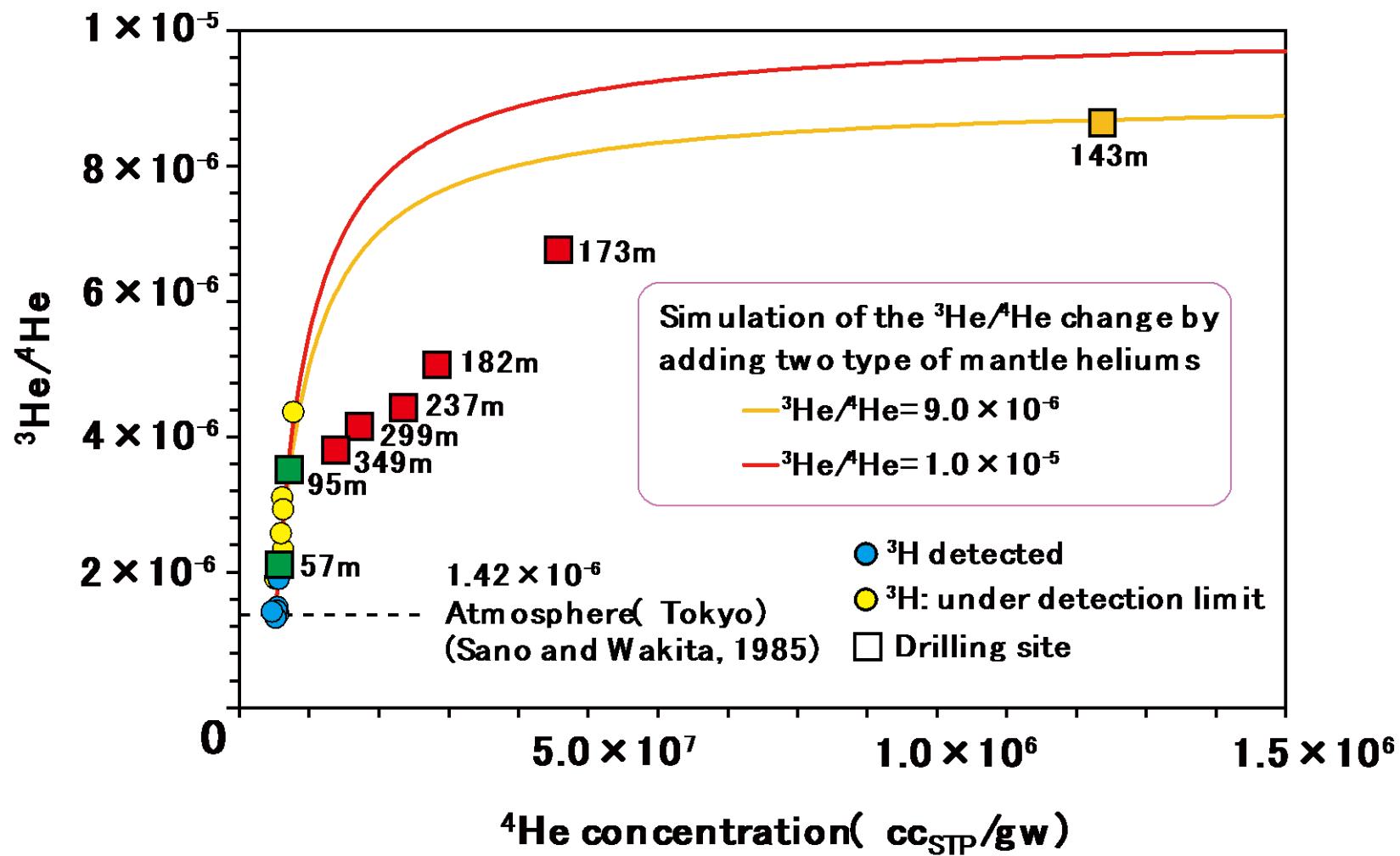


Fig. 8 Vertical profile of groundwater age



**Fig. 9 Comparison of helium concentrations and simulation to account for helium additions from the mantle**

# Conclusions

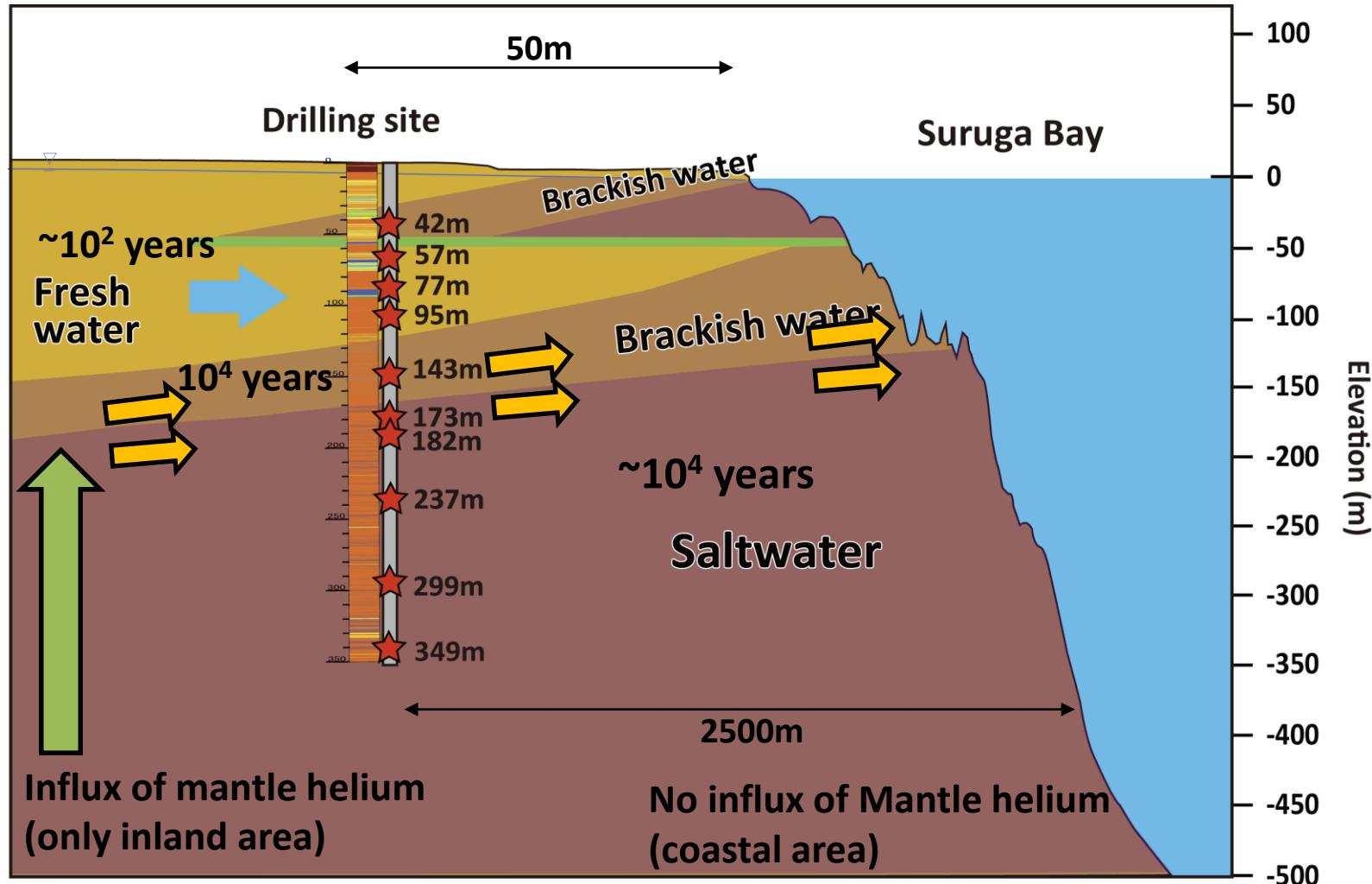


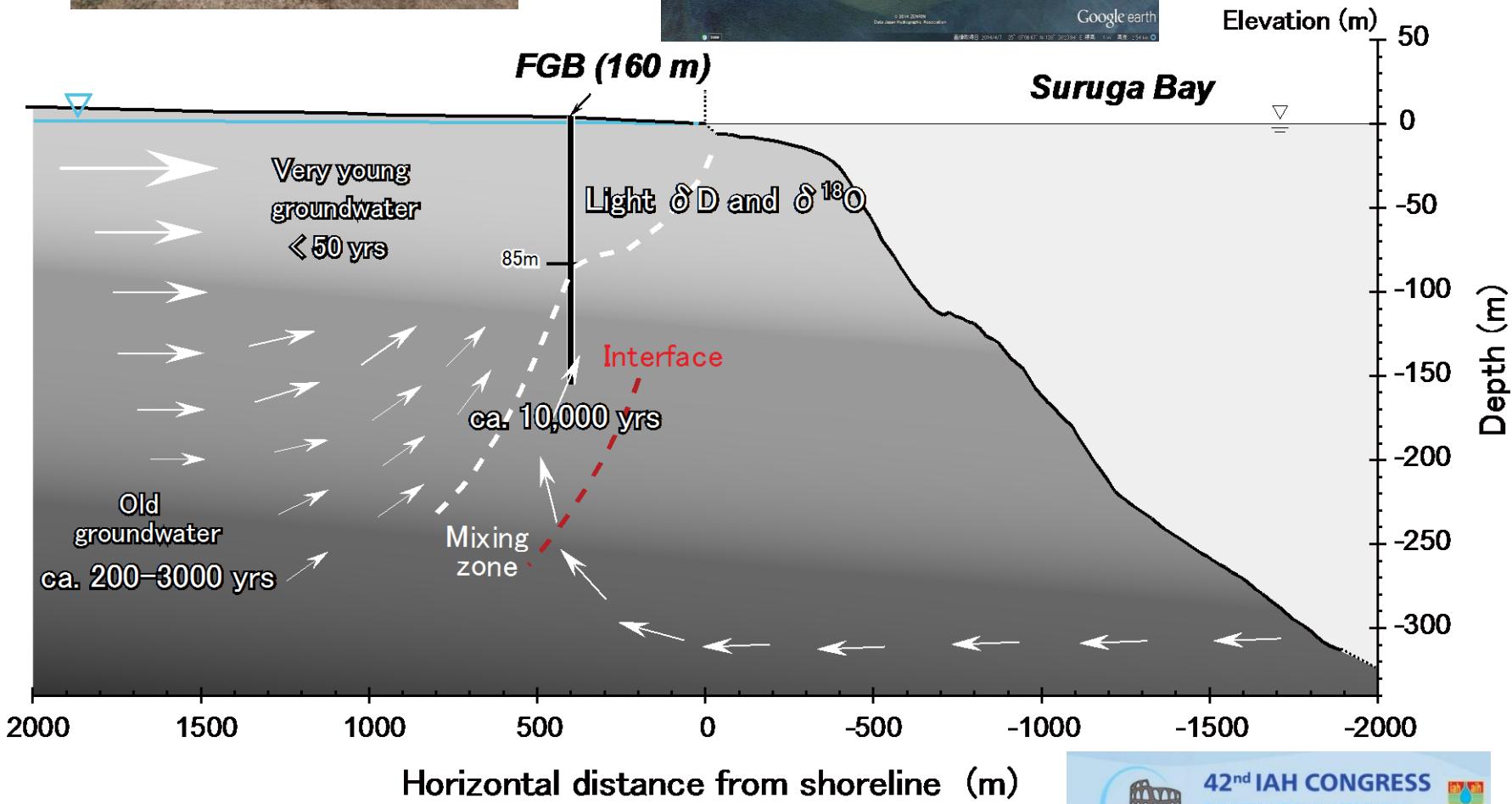
Fig. 10 Flow and age of groundwater at the study area

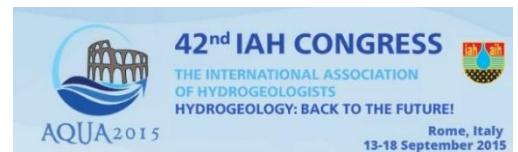
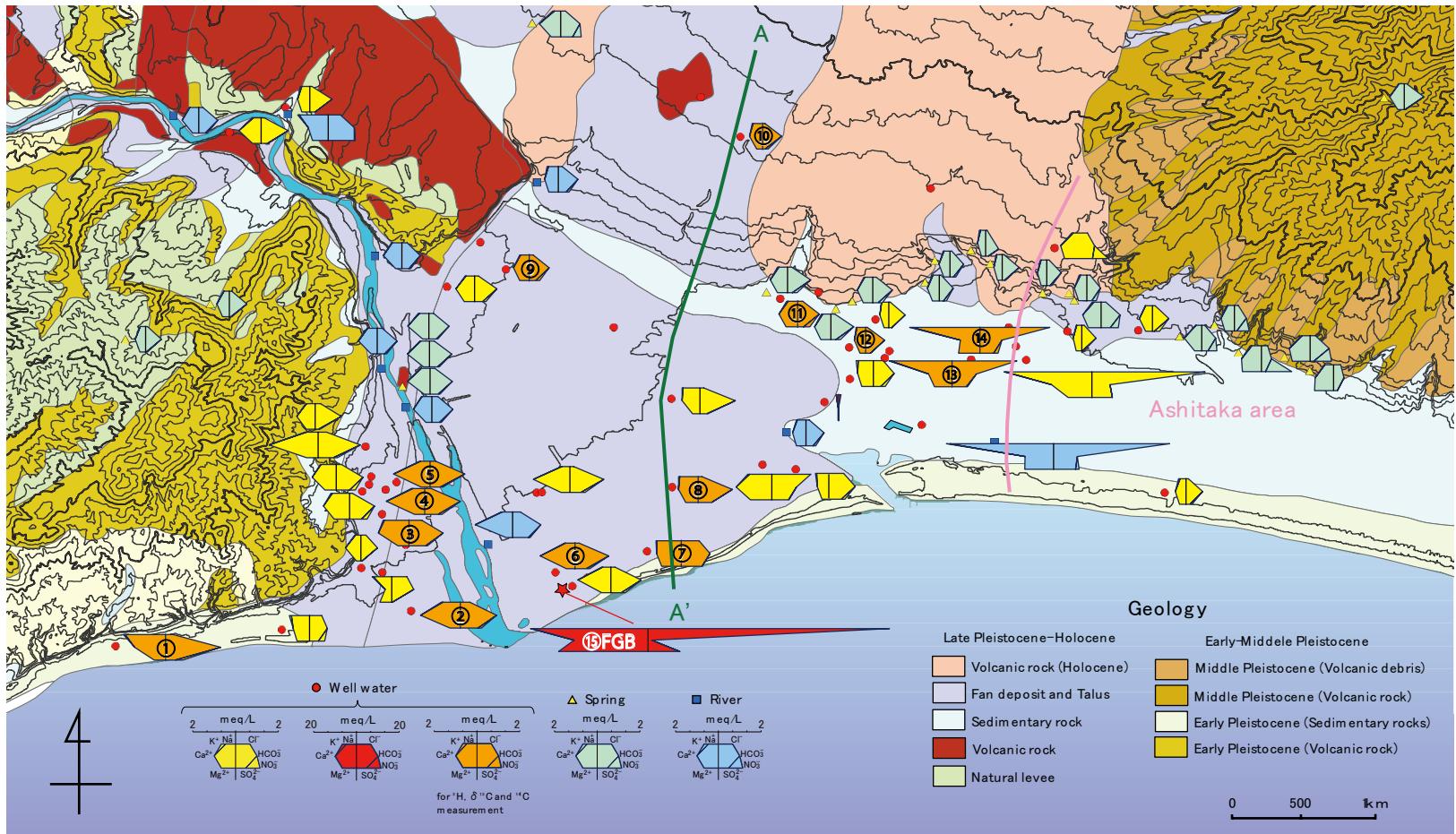


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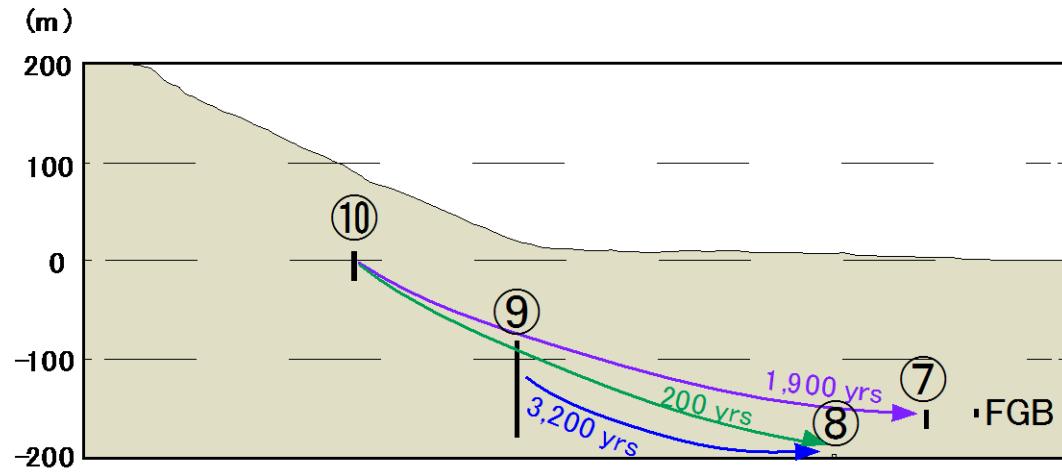
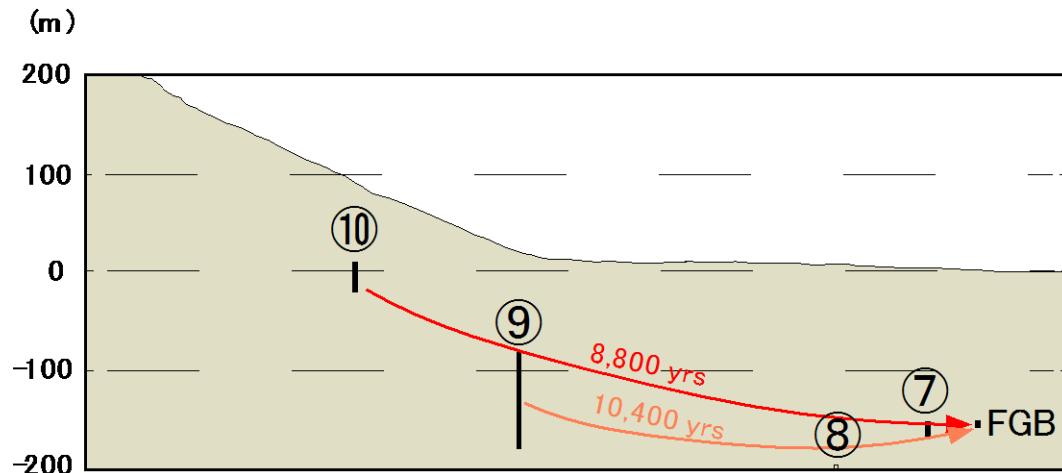
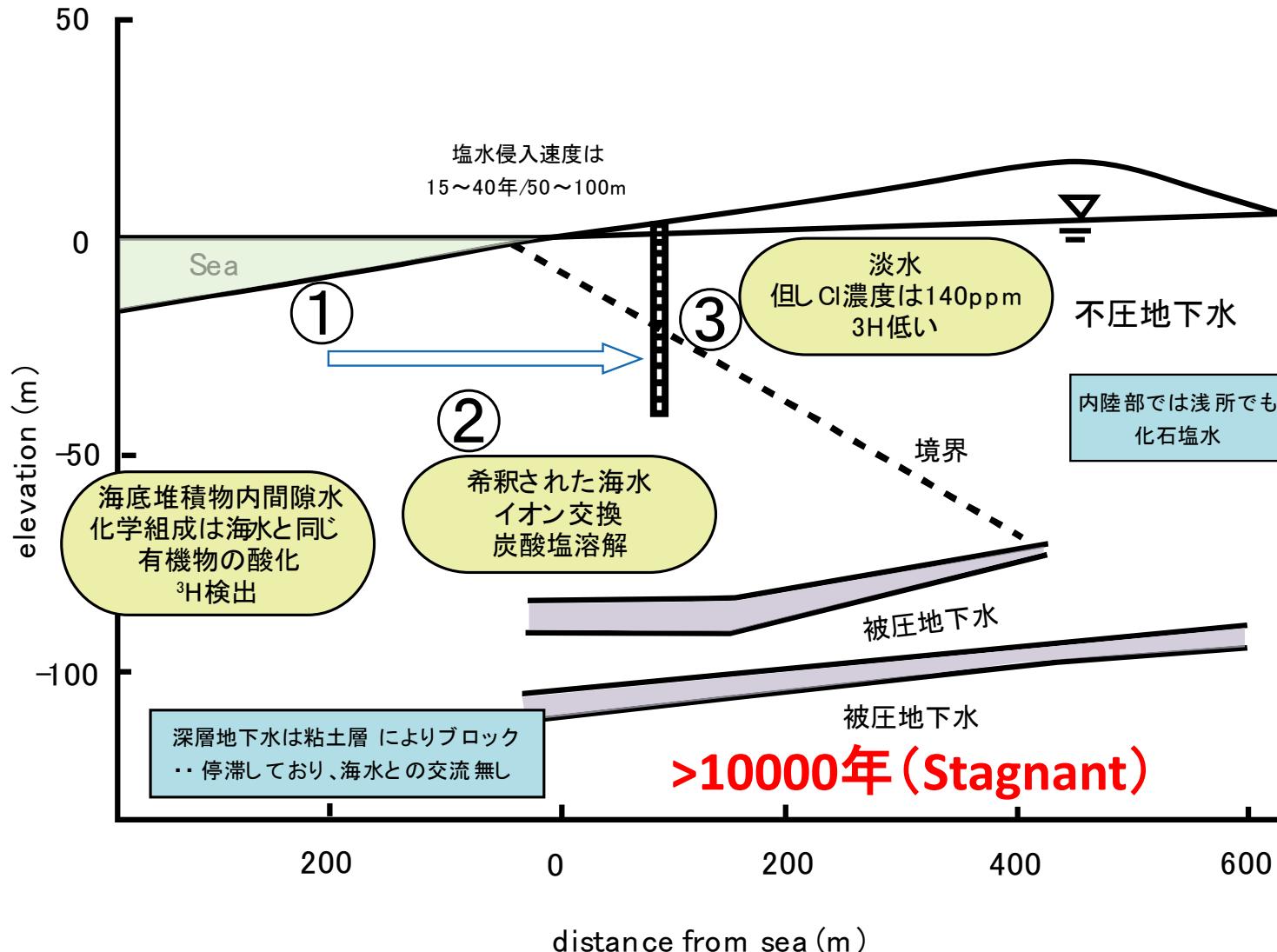


Fig.11 Results of calculations

The fitting calculation shows the  $^{14}\text{C}$  age of the brackish water at the FGB site was approximately 10,000 years (above). Conversely, the  $^{14}\text{C}$  of ⑦ and ⑧ (freshwater) were modern to 3,200 years (bottom).

# 塩淡境界周辺地下水の<sup>14</sup>C年代を測定した研究例



Sivan et al., 2005; Yechiel, 2008を基に発表者が作成