

The age determination of marine terraces by Japanese key tephras in the Southeastern part of Korean Peninsula

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There are four steps of marine terraces, continuously distributing along the east coast of Korean peninsula. They are named L2, L1, M and H3 terrace from the lower one, respectively. They are divided by their location, height, dissection feature and continuity of their distribution. The elevation of the L2 terrace is around 10 meter, L1 terrace is 10-25 meter, M terrace is 20-60 meter and H3 terrace is 40-80 meter. The two terraces higher than the H3 terrace (called H2 and H1) are also distinct at limited locations. L1 and M terraces are the comparatively continuous of the above terraces. The age of above terraces have still discussion, because there were no key beds that implicate the age. This study revealed that the age of terrace by the discovery of key tephra over the L1 terraces. The Japanese tephra such as Ata tephra (100-120ky) were found at Sanhadong, Wolsung, Yonghanri and Shinchang-ri. The Aso-4 tephra (ca. 90ky) were also found at Wolsung. The AT tephra (ca. 25ky) were also found at the several localities. Each tephra was identified by the proper refraction index and chemical composition of glass and pyroxene. The amount of glass of those tephra is very small, because generally tephra were deposited flowing by the prevailing westerly winds and dissolved in the acidic environments. In spite of the tephra distribution in Korean peninsula is located on the north part of the volcanoes, the scale of eruption of AT, Aso and Ata volcanoes were very

huge enough to reach at this area. Furthermore above tephra were found in the sea bottom core, and age is determined as MIS 5c (Aso-4), as MIS 5d-5e(Ata), and as just boundary between MIS 2 and 3(AT). This discovery is very useful to decide the age of L1 terraces, due to the deposition of above tephra just over the L1 terrace. The L1 terrace was concluded to be MIS 5e. The loess chronology also support above results also.

Table 1 . Correlation of marine terrace ages between previous studies in the southeastern part of Korean Peninsula

Geologic time		Marine terraces from Pohang to Ulsan						
		Kim, S.W. (1973)		Oh, G.H. (1977,1980)		Jo, W.R. (1978)		
Quaternary	Holocene	Jujeonri T.	3-7m	Holocene	1-3m	•	•	
	Upper Pleistocene	Last Glacial	Jeongjari T. Bangeojin T. Hwajeongri T.	10-20m 30-40m 50-60m	Lower T. (Sanhari)	10-20m	Marine T. III Marine T. II	10-20m 30-35m
		Last Interglacial	Yeompori T.	70-80m	•	•	•	•
	Lower Pleistocene		Bonhwajae T.	90-130m	Middle T. (Eupcheonri)	30-50m	Marine T. I	45-50m
		Middle	•	•	High T. (Gampo)	60-80m	•	•
		Lower	•	•	•	•	•	•
Tertiary	Pliocene	•	•	•	•	•	•	
Age determination method		- C-14 age from Jeongjari terrace		- Continuity of terraces - Terrace distribution		- Flatness of terrace - Distribution pattern - Color of top soil		
Uplift rate		1.1-1.4 mm/yr		High T. : 0.4-0.1mm/yr Middle T. : 0.7-0.1mm/yr		0.35mm/yr		

Geologic time		Marine terraces from Pohang to Ulsan						
		Lee, D.Y. (1985)		Kim, J.Y. (1990, 1998)		Choi, S. G. (1996, 2001)		
Quaternary	Holocene	1st T. (Songha T.)	3-5m	1st M. T.	3-4m	•	•	
	Pleistocene	Upper	Last Glacial	•	•	•	•	•
			Last Interglacial	•	•	2nd M. II	8-10m	Lower M.T. II (77ka)
		Middle	2nd T. (Naa T.)	10-15m	2nd M. T. I	15-18m	Lower M. T. I (125ka)	18m
			3rd T. (Weolseong T.)	35-42m	3rd M. T. II 3rd M. T. I 4th M. T. 5th M. T.	20-25m 35-42m 40-60m 70-80m.	•	•
	Lower	4th T. (Eupcheon)	50-60m	Erosion Surface/ Marine Platform	> 90m	•	•	
Tertiary	Pliocene	5th T. (Bonghwajae T.)	75-90m	•	•	•	•	
Age determination method		- C-14 age - Terrace distribution - Sedimentary facies - Paleomagnetism		- C-14 age - Terrace distribution - Sedimentary facies - Paleomagnetism		- Amino acid age		
Uplift rate		0.07mm/yr		ca 0.1mm/yr		0.0096mm/yr		

Geologic time		Marine terraces from Pohang to Ulsan						
		Choi, S.J. (2004)		Choi, J.H. et al. (2002), Kim, J.W. et al. (2004)		Inoue et al. (2002), This study		
Quaternary	Holocene	T1	0.5-0.6m	1st T.	4-8m	•	•	
	Pleistocene	Upper	Last Glacial	•	•	•	•	•
			Last Interglacial	T2 (80ka)	10-12m	2nd T. (80ka)	10-20m	Lower T. II (100ka)
		T3b (100ka) T3a (125ka)		20-22m 33m	3rd T. (125ka)	35-45m	Lower T. I (125ka)	20-25m
	Middle	T4 (200ka)	40m	4th T. (200ka)	45-55m	Middle T. (214ka)	30-40m	
		T5	60-64m			Higher T. III (328ka)	50-60m	
	T6	75-77m	Higher T. II			80-100m		
Lower	•	•	•	•	•	•		
Tertiary	Pliocene	•	•	•	•	•	•	
Age determination method		- OSL age from T2		- OSL age data from 3terraces		- Tephra chronology - Loess stratigraphy		
Uplift rate		0.19mm/yr		0.266mm/yr		0.1mm/yr		