

The distribution and formation ages of the fluvial terraces in drainage basin of Uljin Namdae-cheon (river) and around its estuary

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1. Introduction

The main purposes of this research are estimating uplift rates of the fluvial terrace surfaces of Uljin Namdae-cheon (river) for the nuclear power plant construction near middle part of the East coast of the Korean peninsula.

The watershed of Uljin Namdae-cheon is consist of ridges about 900m a.s.l. joined from Eungbong mountain (1,000m) that forms boundary between Uljin, North Gyeongsang Province and Samcheok City, Kangwon Province. The river flows southeast into middle part of the East Sea. The channel extension is about 25km



Fig. 1 Topography of the drainage basin of Uljin Namdae-cheon(river) and its estuary (contour intervals are 50m).

long to the northwest mountainous areas. The drainage area is approximately 126 km², line-upped by 3 major tributaries (Fig. 1, 2).

The bedrocks of drainage basin are almost consist of Precambrian granite gneiss. Precambrian metasedimentary rocks of schist, limestone and quartzite are distributed narrowly along the northwest mountain areas.

2. Distribution and chronology of the fluvial terraces



Topography Classification		Fluvial terrace	Marin terrace
<ul style="list-style-type: none"> abandoned incised meander alluvial fan alluvial cones 	<ul style="list-style-type: none"> clMT1 clMT2 clLT1 clLT2 	<ul style="list-style-type: none"> tFMT1 43m a.s.l.mT tFMT2 32m a.s.l.mT tFMT3 25m a.s.l.mT tFLT1 18m a.s.l.mT tFLT2 10m a.s.l.mT 	<ul style="list-style-type: none"> Thalassostatic terrace surface

Fig. 2 Distributions of the terraces around the Uljin Namdae river and its estuary.

Nine fluvial terrace surfaces were recognised. Those are termed from lower to higher; the 1st lower surface of climatic terrace (cfLT1) and the 2nd lower surface (cfLT2), the 1st lower surface of thalassostatic terrace (tfLT1) and the 2nd lower surface (tfLT2), the 1st middle surface of climatic terrace (cfMT1) and the 2nd middle surface (cfMT2), the 1st middle surface of thalassostatic terrace (tfMT1), the 2nd middle surface (tfMT2) and the 3rd middle surface (tfMT3) along Uljin Namdae river and around its estuary (Fig. 2; Table 1).

The 2nd lower surface of climatic terrace (cfLT2) is formed during last glacial maximum (20-18ka BP), the 1st lower surface of climatic terrace (cfLT1) formed during early glacial period (70-30ka BP), the 2nd lower

surface of thalassostatic terrace (tfLT2) formed at period of ancient shoreline altitude was 10m (77ka BP), the 1st lower surface of thalassostatic terrace formed at period of ancient shoreline altitude was 18m (125ka BP). The formation ages of the middle terrace surfaces are estimated as follows, by correlating with the marine oxygen isotope stages.

- * The 2nd and 1st middle surfaces of climatic terrace (cfMT2 & cfMT1) : MIS 6 (190-130ka BP)
- * The 3rd and 2nd middle surfaces of thalassostatic terrace (tfMT3 & tfMT2) : MIS 7 (250-190ka BP)
- * The 1st middle surface of thalassostatic terrace (tfMT1) : MIS 9 (340-300ka BP)

Table 1. Chronological table of fluvial and marine terrace surfaces, around the Uljin Namdae river and Samchok Ohsip river and their estuary (cf, c : climatic terrace, tf, m : thalassostatic terrace, L : lower surface, M : middle surface, H : higher surface, HH : high higher surface).

Age (Ka.BP)	fluvial terrace (ancient shoreline height of thalassostatic fluvial terrace:m)			marine terrace surface and ancient shoreline height (m)		MIS
	Uljin Namdae river (this paper)	Wangpi river (Song, 1993)	Samchok Ohsip river (Yoon <i>et al.</i> , 2002)	East coast (Choi, 1998)	Hujeong-Jukbyeon (Kim <i>et al.</i> 2007)	
	alluvial plain					1
10	cfLT2	L2	cLII	-120	1st terrace (5~10)	2
	cfLT1	L1	cLI	-50		3 4
30	tfLT2 (10)		mLII (13)	mLII (10)	2nd terrace (15~25)	5 a
70						
130	cfMT2	M	cMII			6
190	cfMT1					
250	tfMT3 (25)		mM (40)	25		7
300	tfMT2 (32)			32		
340		H2	cMI			8
350	tfMT1 (43)		mHII (70)	43		9
430			cH?			10
480			mHI (90)			11
510						12
560			mHHII (110)?			13
						14
			mHHI (150)?			15

3. Uplift rates estimated by the profiles of present river bed and fluvial terraces

The relative height from the present river bed (RH) of the 1st lower surface of climatic terrace (cfLT1) is 10-20m, and the 2nd lower surface of climatic terrace (cfLT2) is 5-10m along main stream of Uljin Namdae river (Fig. 3).

The formation ages of the 1st lower (cfLT1) and the 2nd lower (cfLT2) surfaces of climatic terrace are presumed as 50ka BP, 20ka BP respectively, the uplift rates (amount of RH/absolute age) are as follows.

- * Uplift rate of the 1st lower surface of climatic terrace (cfLT1) along main stream : 0.2-0.4m/ka
- * Uplift rate of the 2nd lower surface of climatic terrace (cfLT2) along main stream : 0.1-0.5m/ka

4. Conclusion

These estimations are similar to the uplift rates of climatic terraces in intermontane basin in Gurye (0.14m/ka : Chang, 1987), Lower fluvial terrace surface along Dong river in Yeongwol (0.2-0.25m/ka : Song, 1998) and Last Interglacial marine surface (125ka BP

at the East coast of Korean Peninsula (0.096m/ka BP : Choi, 1998).

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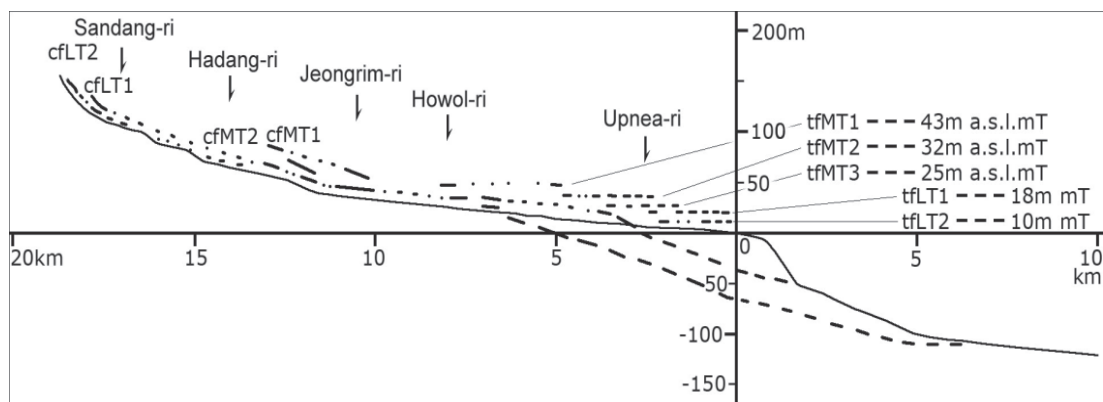


Fig. 3 Longitudinal profiles of present river bed of main trunk of Namdae river, sea floor and fluvial terraces.

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