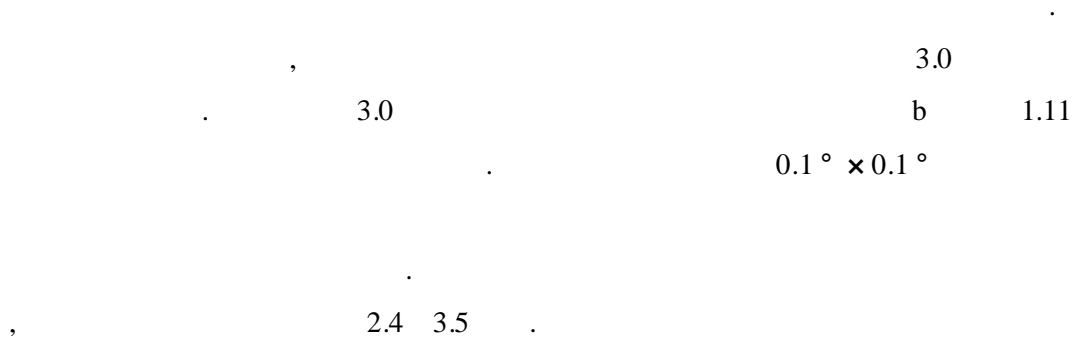


가

Completeness Test of Earthquake Catalog by Korea Meteorological Agency

19



ABSTRACT

Minimum magnitudes (M_c) for estimation of seismicity parameters were analyzed for the earthquake catalog of Korea Meteorological Agency (KMA). The temporal variation of earthquake frequency suggests that a proper M_c be 3.0 for the whole southern part of the Korean Peninsula. The b-value with M_c of 3.0 is estimated to be 1.11, which is larger than those of the previous studies. To see the spatial variation of M_c , the southern part of the peninsula were divided into grids of 0.1×0.1 degree. At the greater portion of grid points, the local earthquake catalogs do not satisfy given statistical criteria. The grid points whose local earthquake catalogs meet the criteria mostly distribute in the eastern part. M_c at these points ranges 2.4 to 3.5.

가

2000 가

가 1905

1978 ([1]). 1978

1978 2000 ([1])

(M_c)

(magnitude type)가 가

가 1978

가 1978

가 /

([2]),

([3], [4]), (4)

(1)

([6]).

$$\log_{10} N = a - bM \tag{1}$$

N M

가 가 (Fig. 2)

(M_c)

([6]). , M M_i a

b a b a ,

b, M_i (1)

(2) (Goodness of fit; GOF)

M_i 가 (2) GOF 가

M_i 가 M_c 85% GOF

$$GOF(a, b, M_i) = 100 \times \left(1 - \frac{\sum_{M_i}^{M_{max}} |B_i - S_i|}{\sum_{B_i}} \right) \quad (2)$$

B_i S_i

1.

GOF (34° 38° , 126° 130°)

가 . Fig. 1 0.2 3.0 가 (3.0 1980)

. , 3.0 1990
 가 가 1991 ([1])
 가 가 . Fig. 1
 3.0
 Fig. 2 $M_c=3.0$
 . 3.0 ,
 $M_c=1.9$ ()
 $M_c=3.3$ (*GOF* 가 85%) 가 . $M_c=1.9, 3.0, 3.3$
GOF =59, 83, 85% , $b=0.78, 1.11, 1.17$. *GOF* 86% , M_c
 $=3.4, b=1.18$.
 , $M_c=3.0$
 $b=1.11$ ([1], [7])
 , (Stable continental region) 가
 $b=1.016 \pm 0.107$ ([8]) .
 $M_c=3.0$ Table 1 . Table 1
 $a=5.66$ $b=1.11$ (*GOF* =83%) (1) .
 Table 1 $M=2.0$ 3.0 115 가
 . ([1]) 1/2
 , 가 가

Table 1. Comparison of observed and predicted cumulative frequencies for $M_c=3.0$. The observation period is 23 years, A.D. 1978 to 2000. The predicted frequencies were calculated by equation (1) with $a=5.66$ and $b=1.11$.

	$M = 2.0$ 2.5	$M = 2.5$ 3.0
Observed frequency (f_o)	68	173
Predicted frequency (f_p)	2258	629
$(f_p - f_o)$ /year	95	20

2.

0.1° × 0.1° , (Local earthquake catalog)

50 km
200 가 200
10 km 가 200 km , 200 km
가 200
200 200 km
가 , 가

200 (Fig. 4).
200 km

110 km
Fig. 3 ([1])
"L"

200 km 200 Fig. 4
200 , GOF

85% . GOF

Fig. 6 7
GOF Fig. 3

가
Fig. 5 . Fig. 5 200 가 가
GOF 85%

Fig. 5 3.5
3.5

200
Fig. 5 , 2 (Bimodal distribution)

Fig. 6 GOF M_c . M_c

2.4 3.5 , M_c 가

(, 2001) (M_c) b

(Intraplate region) 가

23 가

1978 가

가 가

1. 3.0 , a
 $=5.66, b=1.11$,
 2.0 3.0 100 가 3.0
 1990 가 ,

2. $0.1^\circ \times 0.1^\circ$ 가
 M_c 2.4 3.5

가

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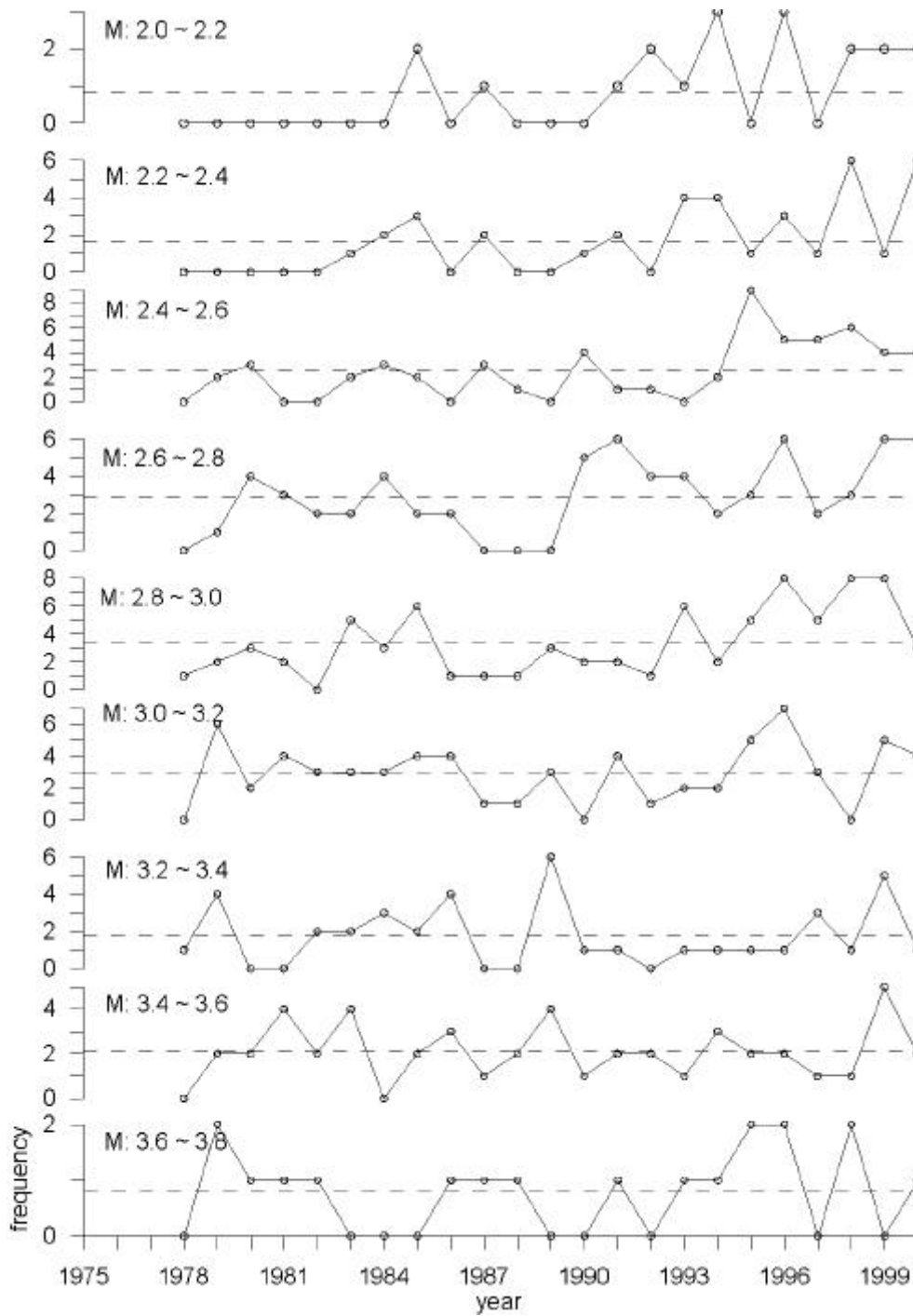


Fig. 1. Temporal variation of magnitude-grouped earthquake frequency in the southern part of the Korean Peninsula. Horizontal dashed lines represent mean earthquake frequencies.

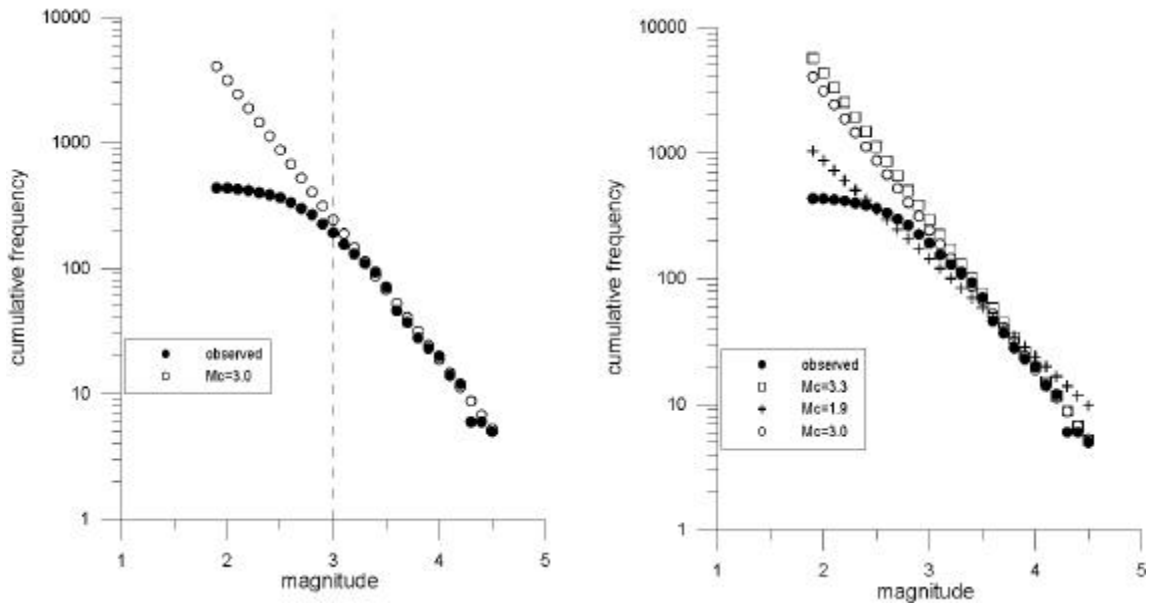


Fig. 2. Comparison of observed and predicted cumulative earthquake frequencies for various M_c . Left: observed (closed circles) and predicted (open circles) cumulative earthquake frequencies for $M_c=3.0$. Right: predictions for $M_c=1.9$ (crosses) and $M_c=3.3$ (squares) are superimposed.

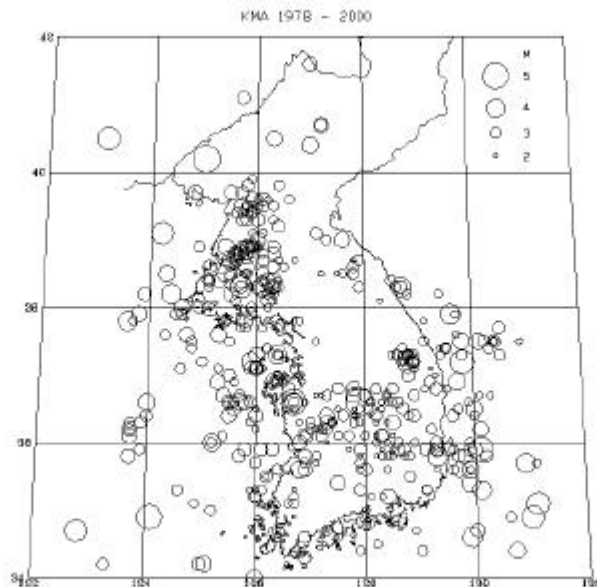


Fig. 3. Distribution of earthquakes reported by Korea Meteorological Agency (2001).

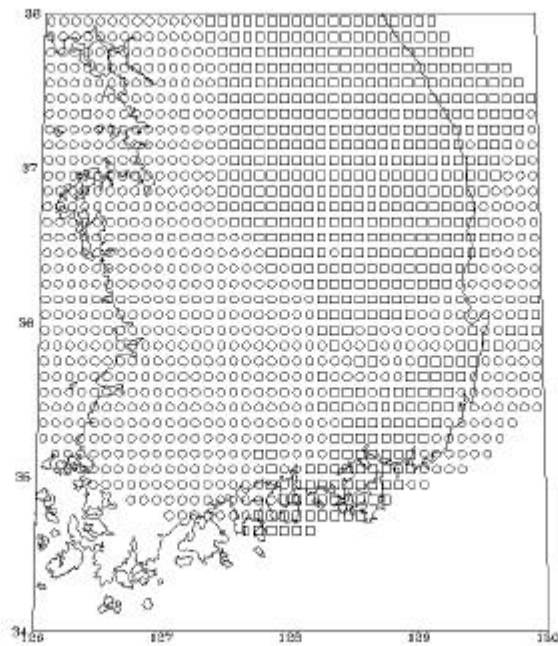


Fig. 4. Distribution of grid points whose local earthquake catalogs meet the given criteria: (1) more than 200 events within the radius of 200 km, (2) *GOF* 85%. Squares represent the grid points satisfying both the criteria (1) and (2), while circles represent those satisfying only the criterion (1). Grid spacing is 0.1° both in latitude and longitude.

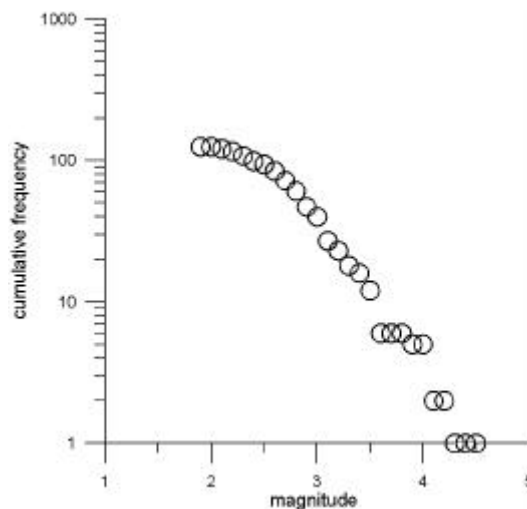


Fig. 5. Example of incomplete magnitude-frequency distribution at a grid point whose local earthquake catalog contains more than 200 events within 200 km but *GOF* is below 85%.

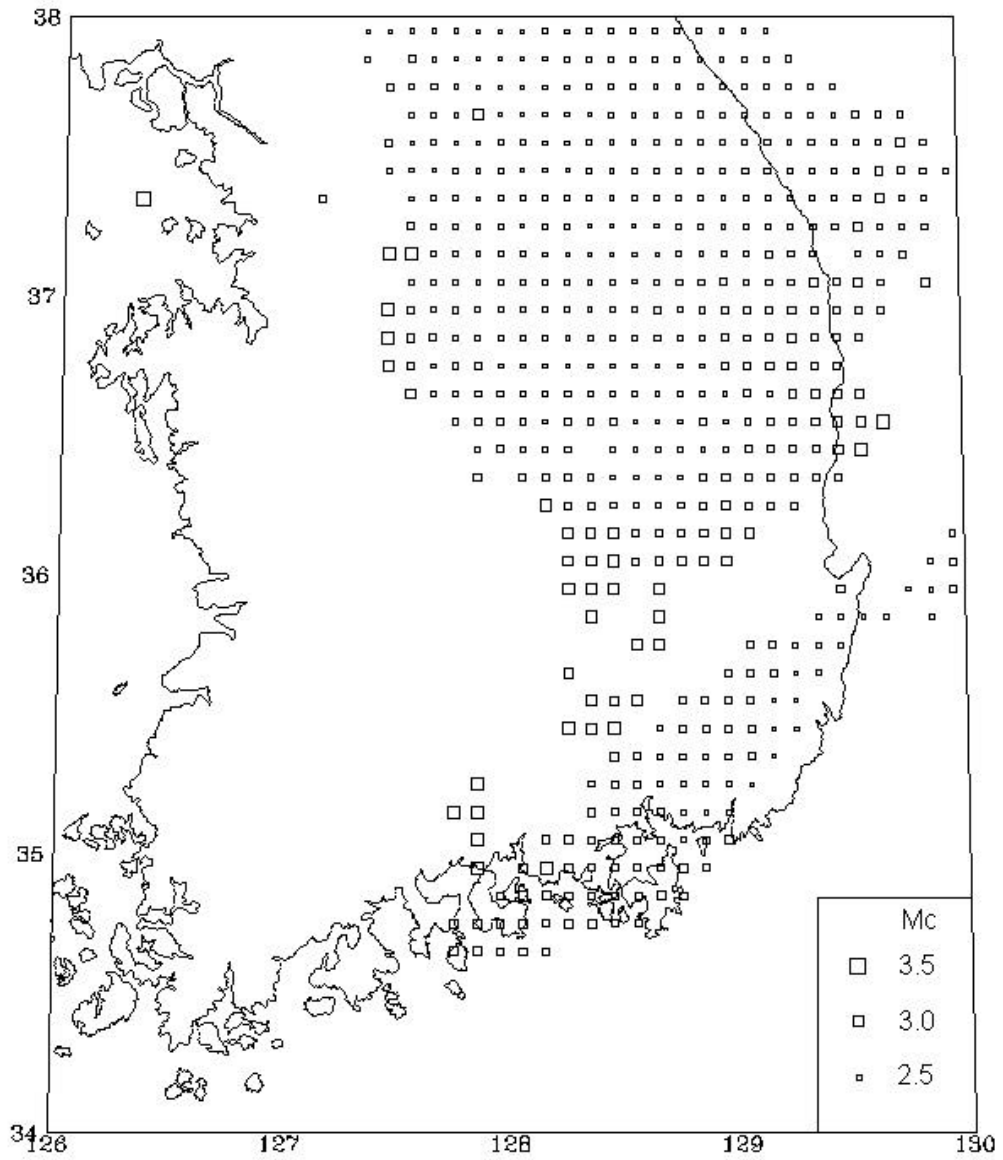


Fig. 6. Spatial variation of M_c .