

## Ohsaki-Watabe's Max. Acceleration—OWAC

The program OWAC (Ohsaki-Watabe's Max. Acceleration) is a functional subprogram that calculates the maximum acceleration of seismic motions on the bedrock for given the magnitude of the earthquake and the epicentral distance.

### OWAC ( Ohsaki-Watabe's Max. Acceleration )

#### 【Purpose】

To calculate the maximum acceleration of the earthquake motion on the bedrock for given the magnitude of the earthquake and the epicentral distance.

#### 【Usage】

( 1 ) How to connect

OWAC(EM, R) (unit: Gal)

Argument	Type	Parameter in calling program	Return Parameter
EM	R	Magnitude of earthquake	Unchanged
R	R	Epicentral distance (unit : km)	Unchanged

( 2 ) Necessary subroutines and function subprograms

None

#### 【Calculation Method】

The calculation is based on the following equation by Ohsaki-Watabe.

$$\alpha_{\max} = 10^{0.440M - 1.38 \log \sqrt{R^2 + d^2} + 1.04}$$

where  $\alpha_{\max}$  : Maximum acceleration (unit: Gal)

$M$  : Magnitude of earthquake

$R$  : Epicentral distance (unit: km)

$d$  : Focal depth (unit: km) =  $10^{0.353M - 1.435}$

The focal depth  $d$  is assumed to be 1/2 of the following equation by Iida, which gives the radius of the aftershock region.

$$D = 10^{0.353M - 1.134}$$

## 【Program List】

```

C ***** OWAC 1
C   FUNCTION SUBPROGRAM FOR OHSAKI-WATABE'S ACCELERATION OWAC 2
C ***** OWAC 3
C OWAC 4
C           CODED BY Y. OHSAKI OWAC 5
C OWAC 6
C   PURPOSE OWAC 7
C   TO COMPUTE THE MAX. ACCELERATION IN GALS OF EARTHQUAKE MOTION OWAC 8
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C   EPICENTRAL DISTANCE. AS THE FOCAL DEPTH, HALF OF IIDA'S RADIUS OWAC 10
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C OWAC 19
C   SUBROUTINES AND FUNCTION SUBPROGRAMS REQUIRED OWAC 20
C   NONE OWAC 21
C OWAC 22
C   FUNCTION OWAC(EM, R) OWAC 23
C OWAC 24
C   D=10.** (0.353*EM-1.435) OWAC 25
C   OWAC=10.** (0.440*EM-1.38*ALOG10(SQRT(R*R+D*D)))+1.04 OWAC 26
C   RETURN OWAC 27
C   END OWAC 28

```

## 【Example】

Calculate the maximum acceleration of seismic motion on the bedrock for an earthquake of magnitude 7.3 with an epicentral distance of 25.0km.

```

DATA EM/7.3/, R/25.0/
C
C   AMAX=OWAC(EM, R)
C   WRITE(6, 601) EM, R, AMAX
C   STOP
C
601 FORMAT(' M', TR3, F7.1// ' R', TR3, F7.1, TR1, ' (KM)' //
*       ' AMAX', F7.1, TR1, ' (GAL)' )
END

```

Output:

```

M       7.3

R       25.0 (KM)

AMAX   174.8 GAL)

```