

應用HHT分辨地下水中的地震訊號

Identification of earthquake signal from groundwater level records using HHT method

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Outline

Introduction

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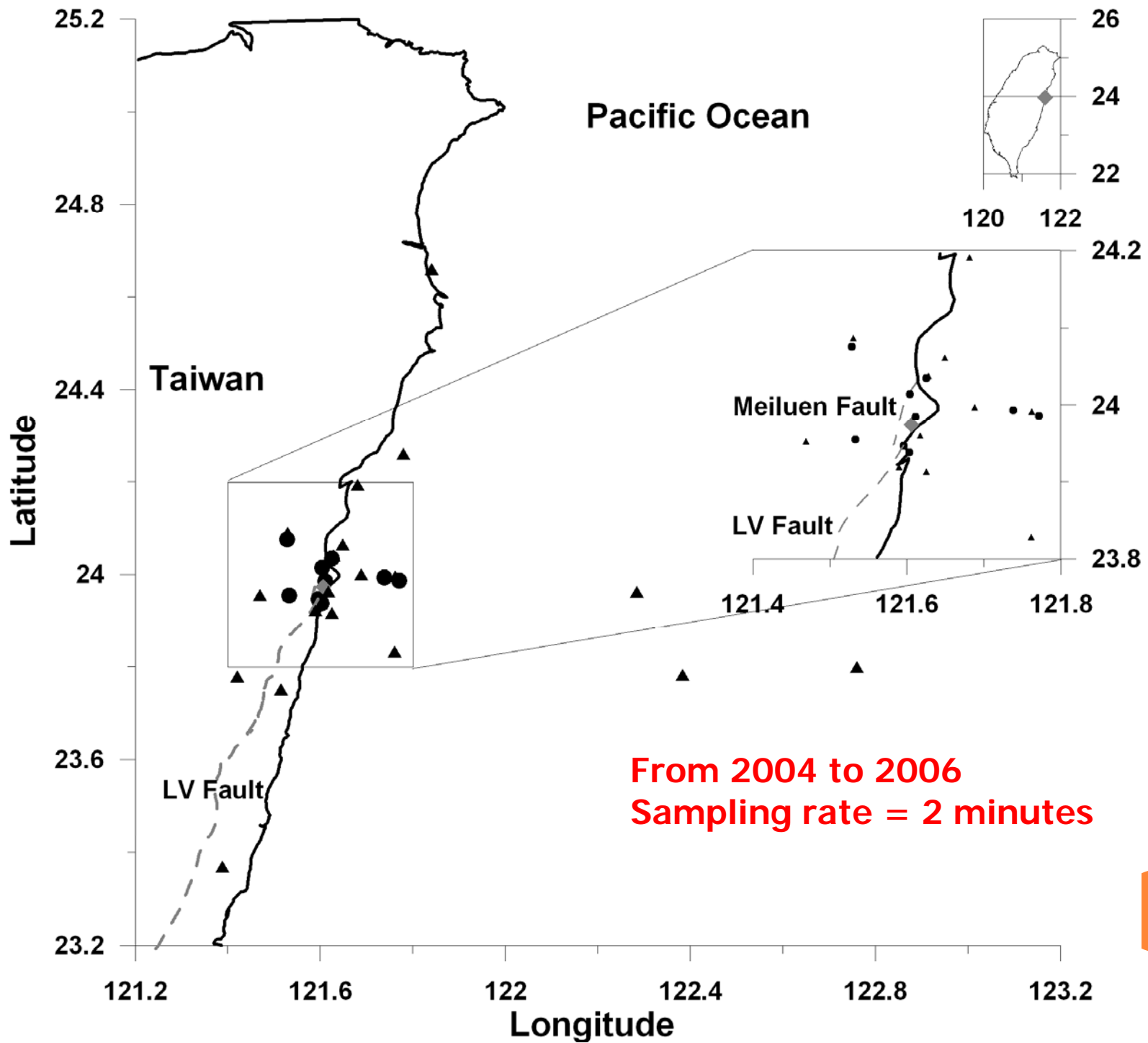
Introduction

- **The groundwater level is a composite result coming from responses of atmospheric pressure, Earth tide and precipitation.**

(Bredehoeft, 1967; Van der Kamp and Gale, 1983;)

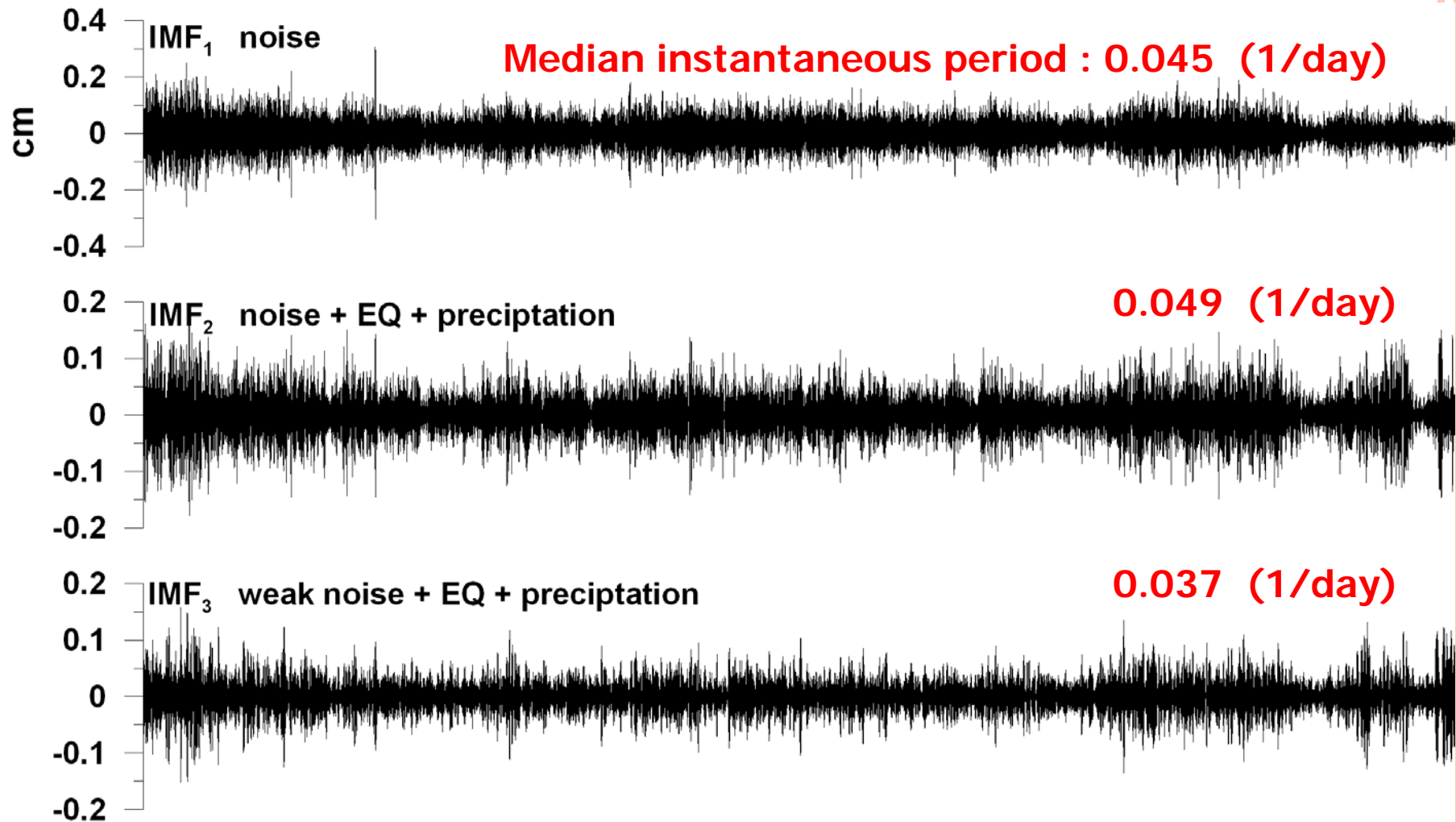
- **Groundwater level records have the potential to retrieve the earthquake signals only if the other auxiliary observations, such as barometers, pluviometers and variations of the Earth tide, can be filtered out and/or separated from earthquake ones.**

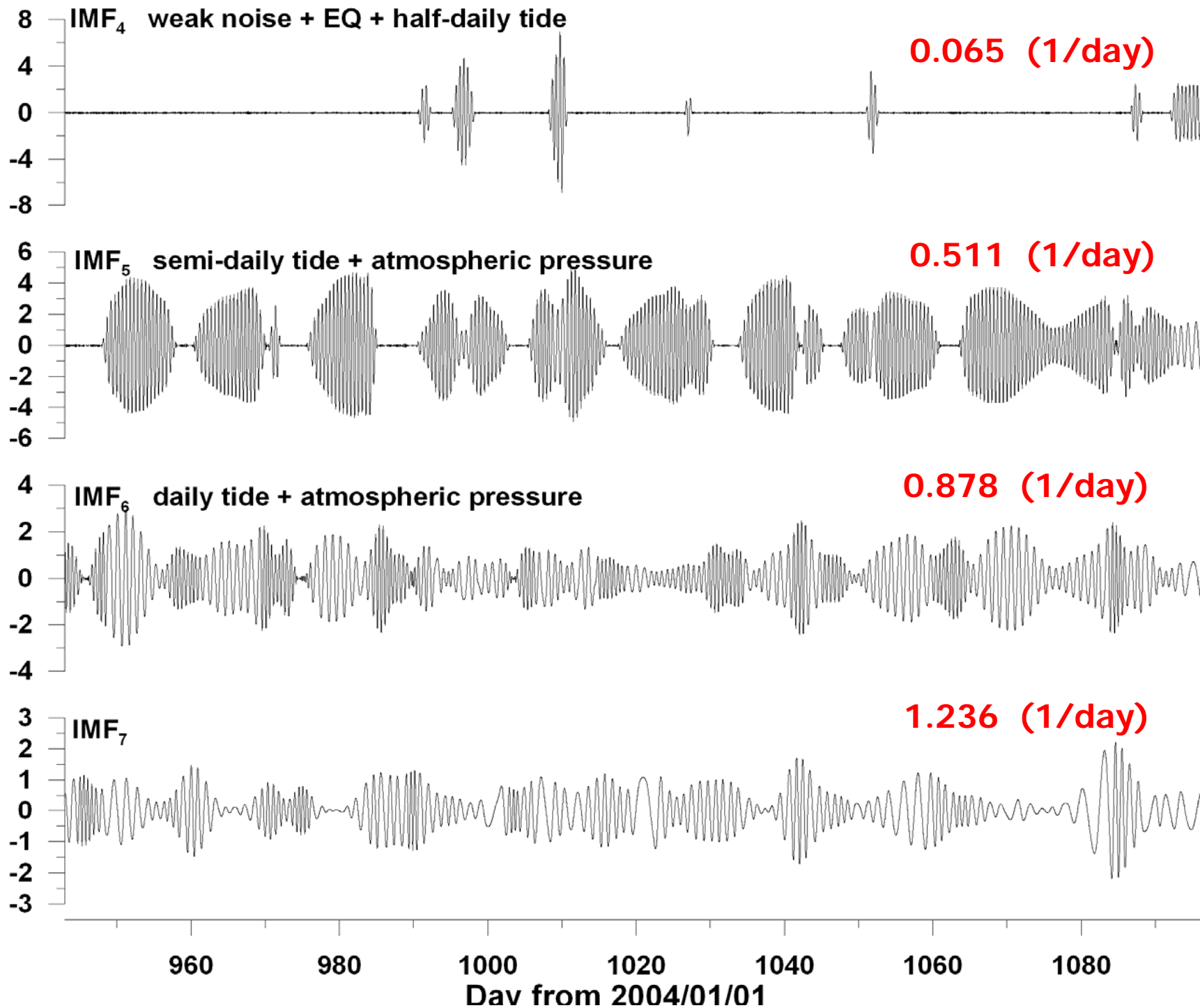


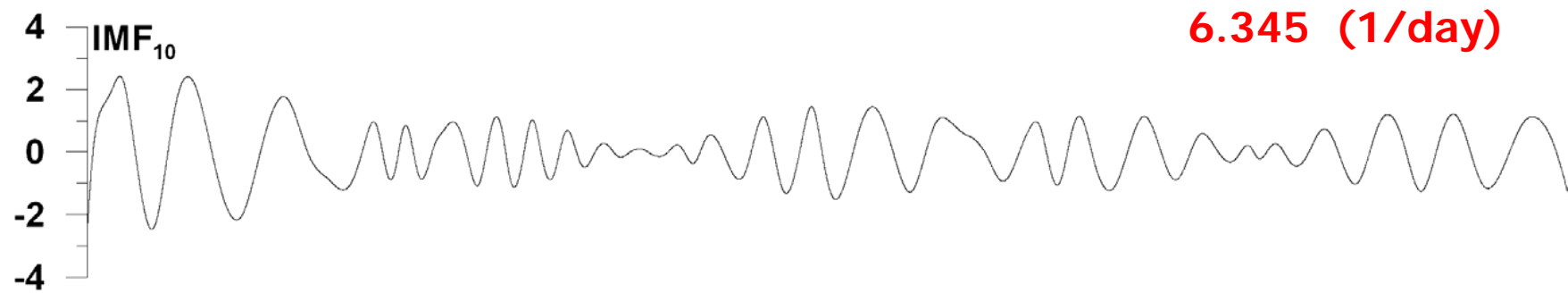
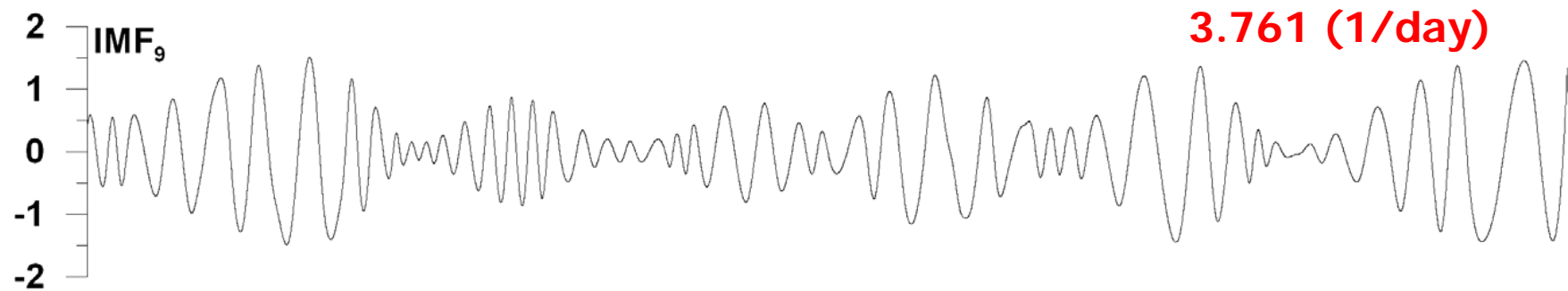
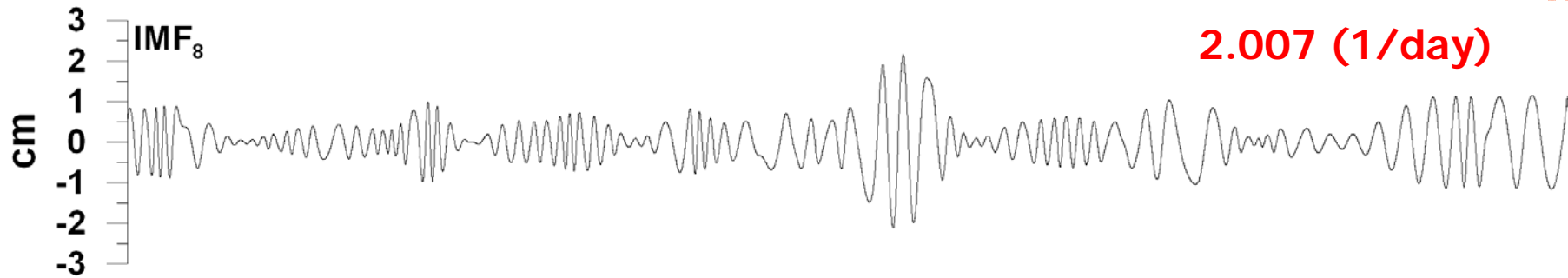


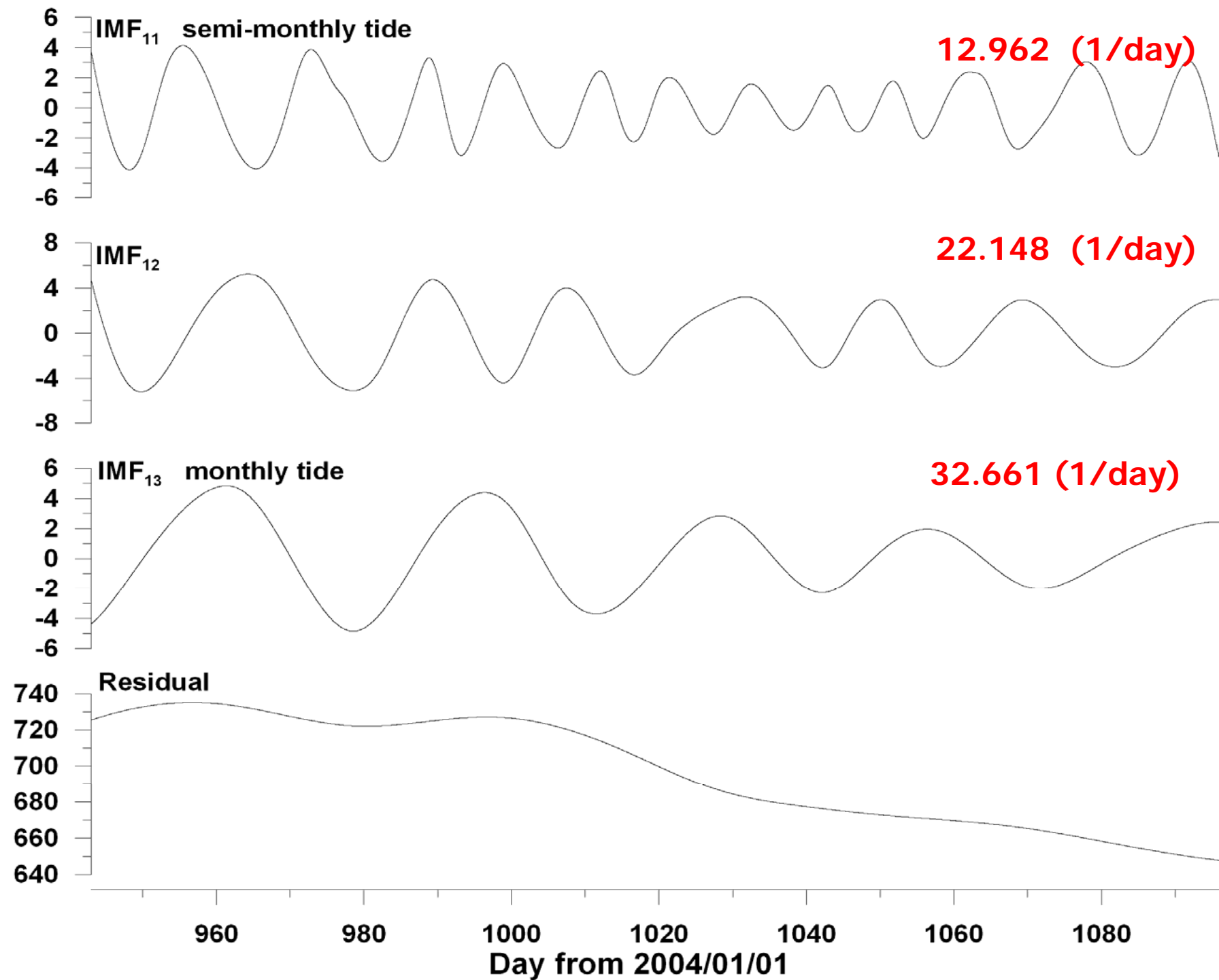
IMF_s of the groundwater level

July to December in 2006




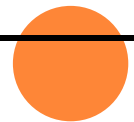


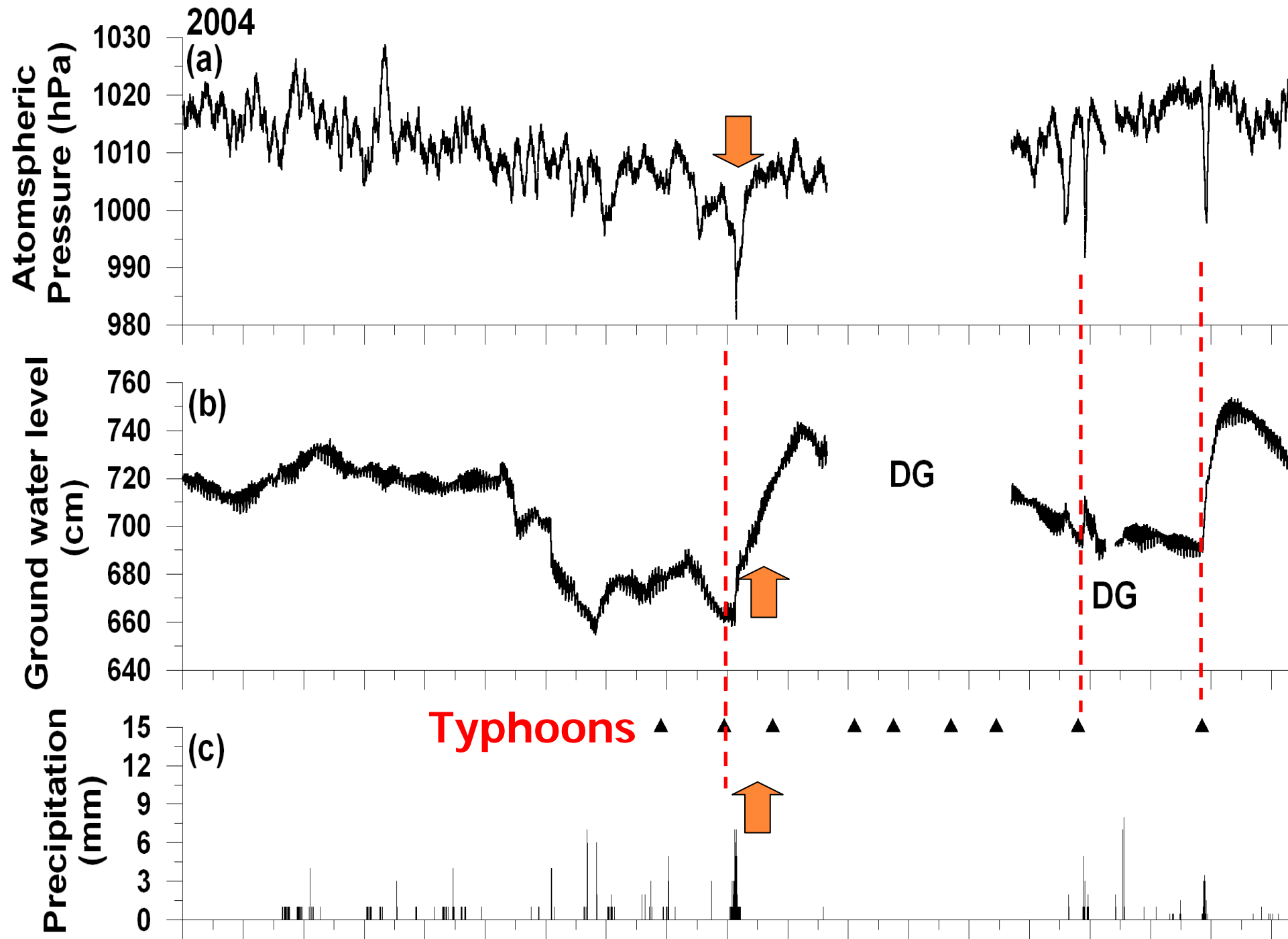


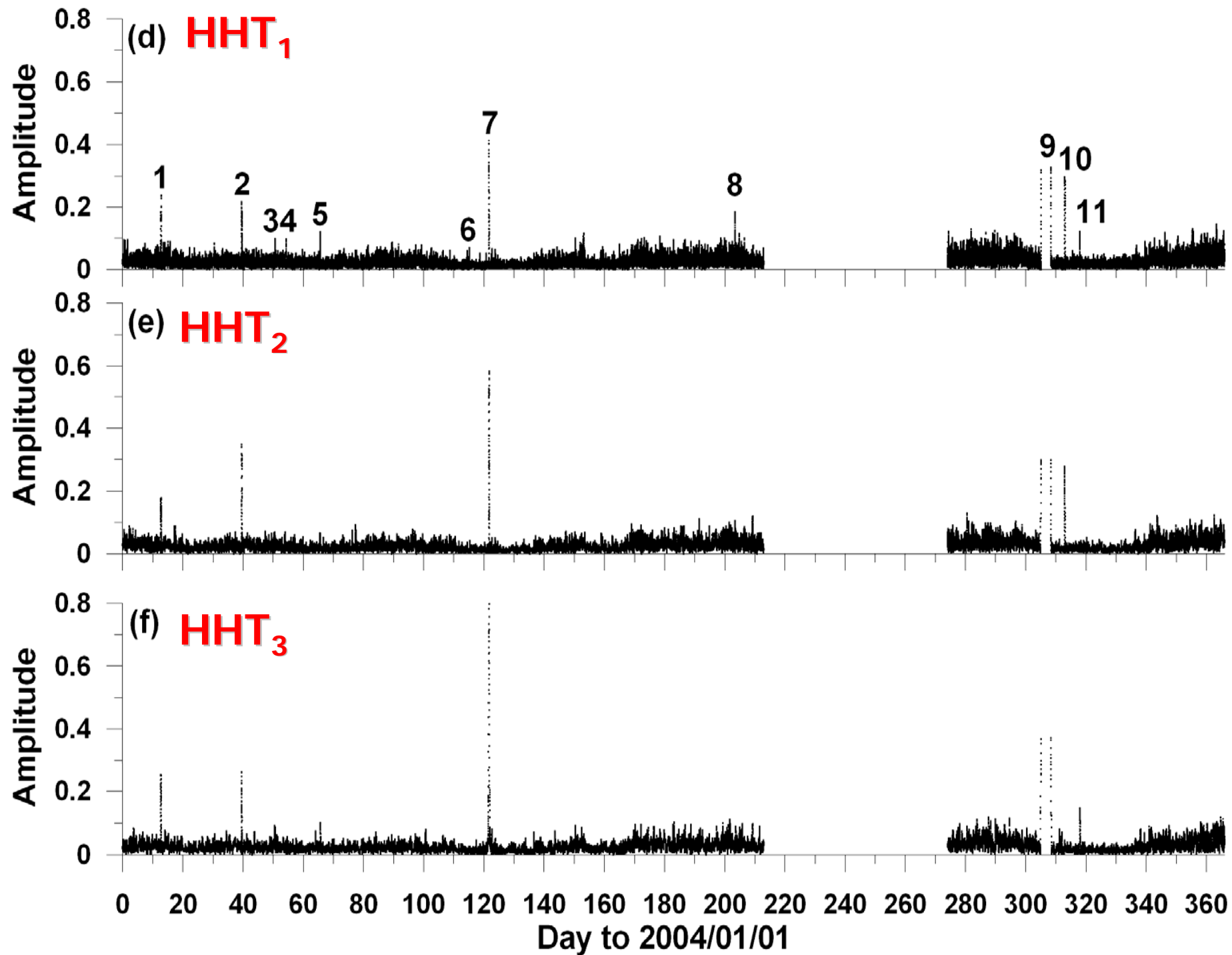


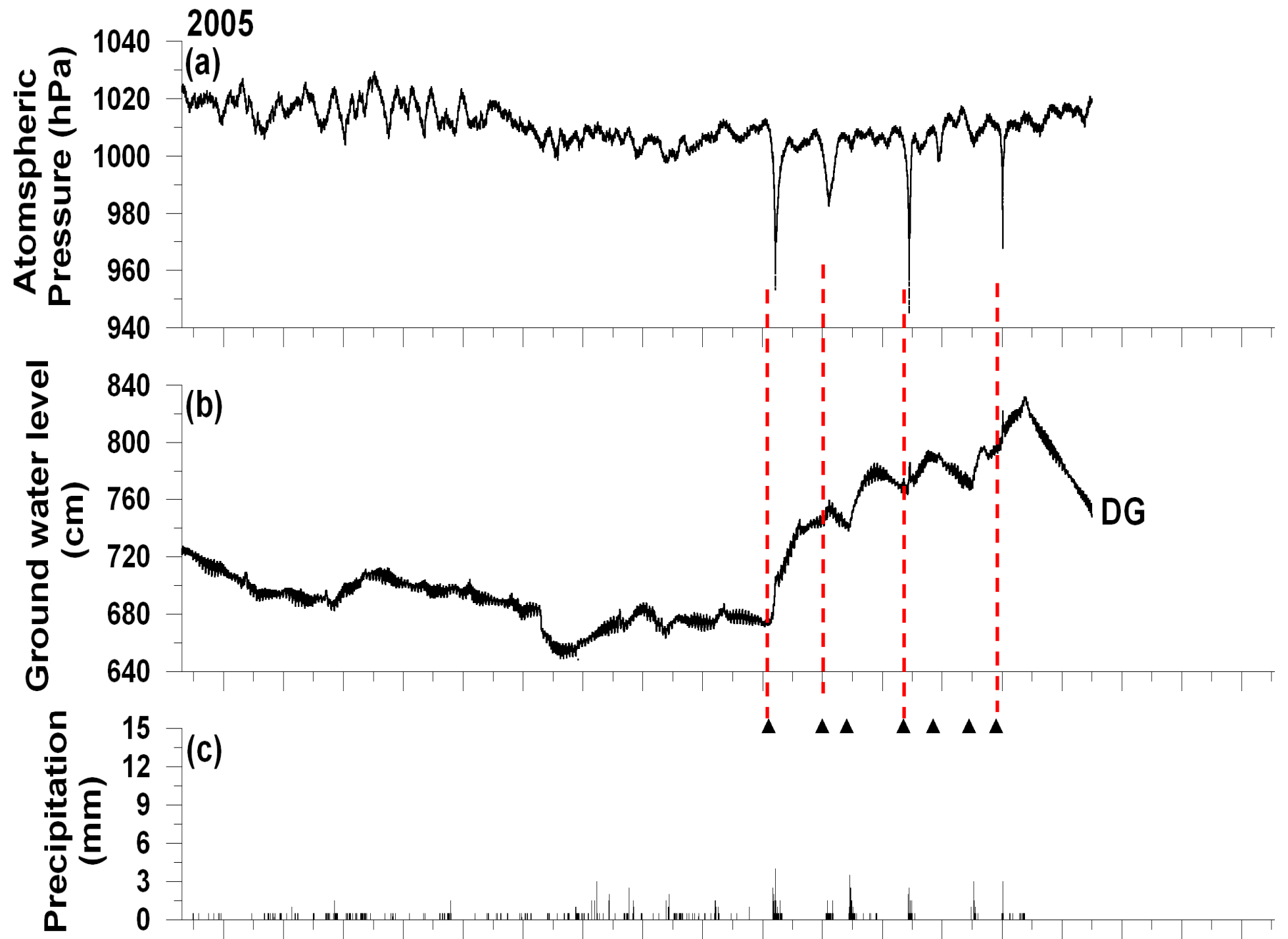
The median periods and their descriptions of IMFs in

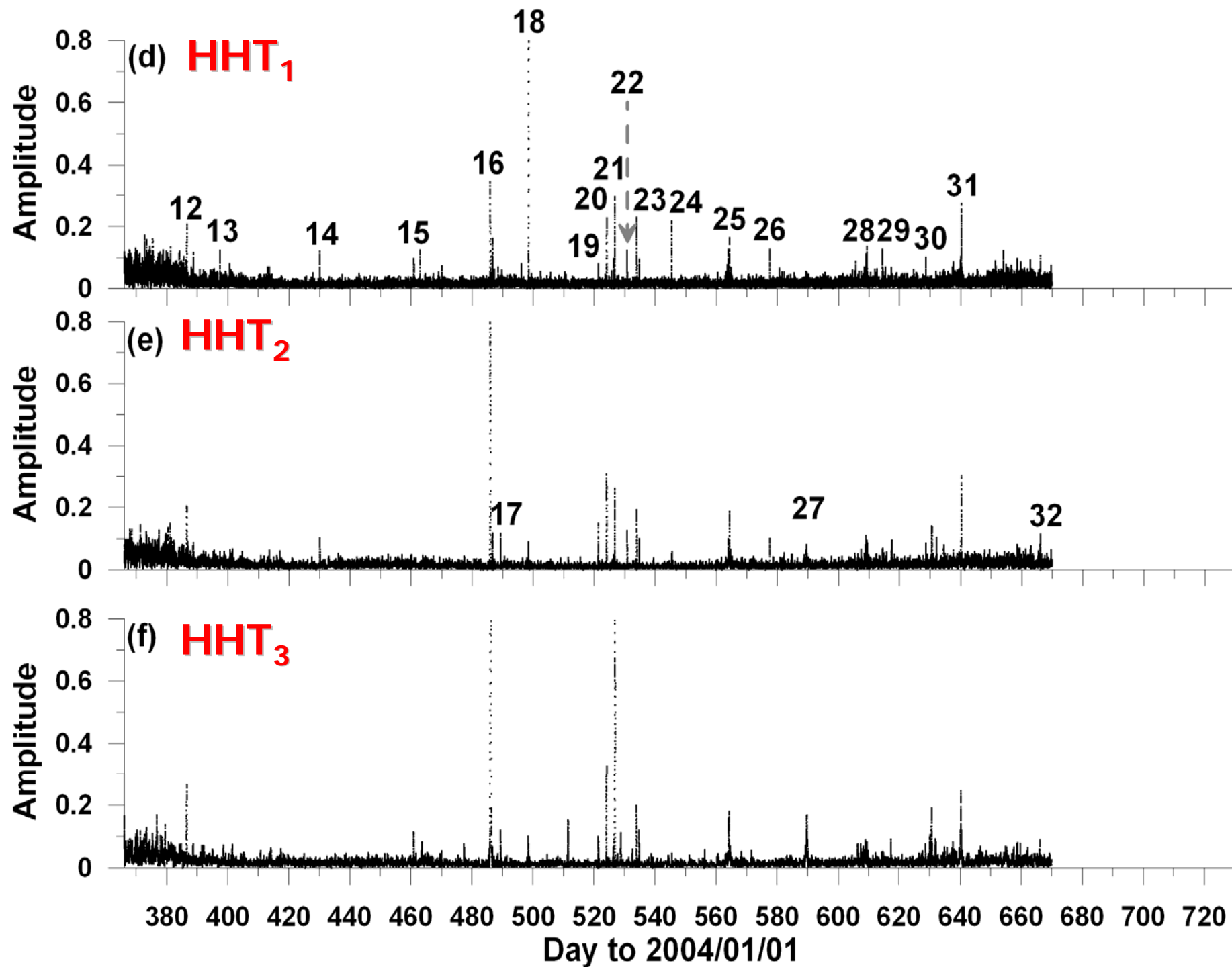
IMFs	median period (day)	Signals
1	0.045	noise
2	0.049	noise + EQ + precipitation
3	0.037 	weak noise + EQ + precipitation
4	0.065	weak noise + EQ + half-daily tide
5	0.511	half-daily tide + atmospheric pressure
6	0.878	daily tide + atmospheric pressure
7	1.236	
8	2.077	
9	3.761	
10	6.345	
11	12.962	half-monthly tide
12	22.148	
13	32.661	monthly tide

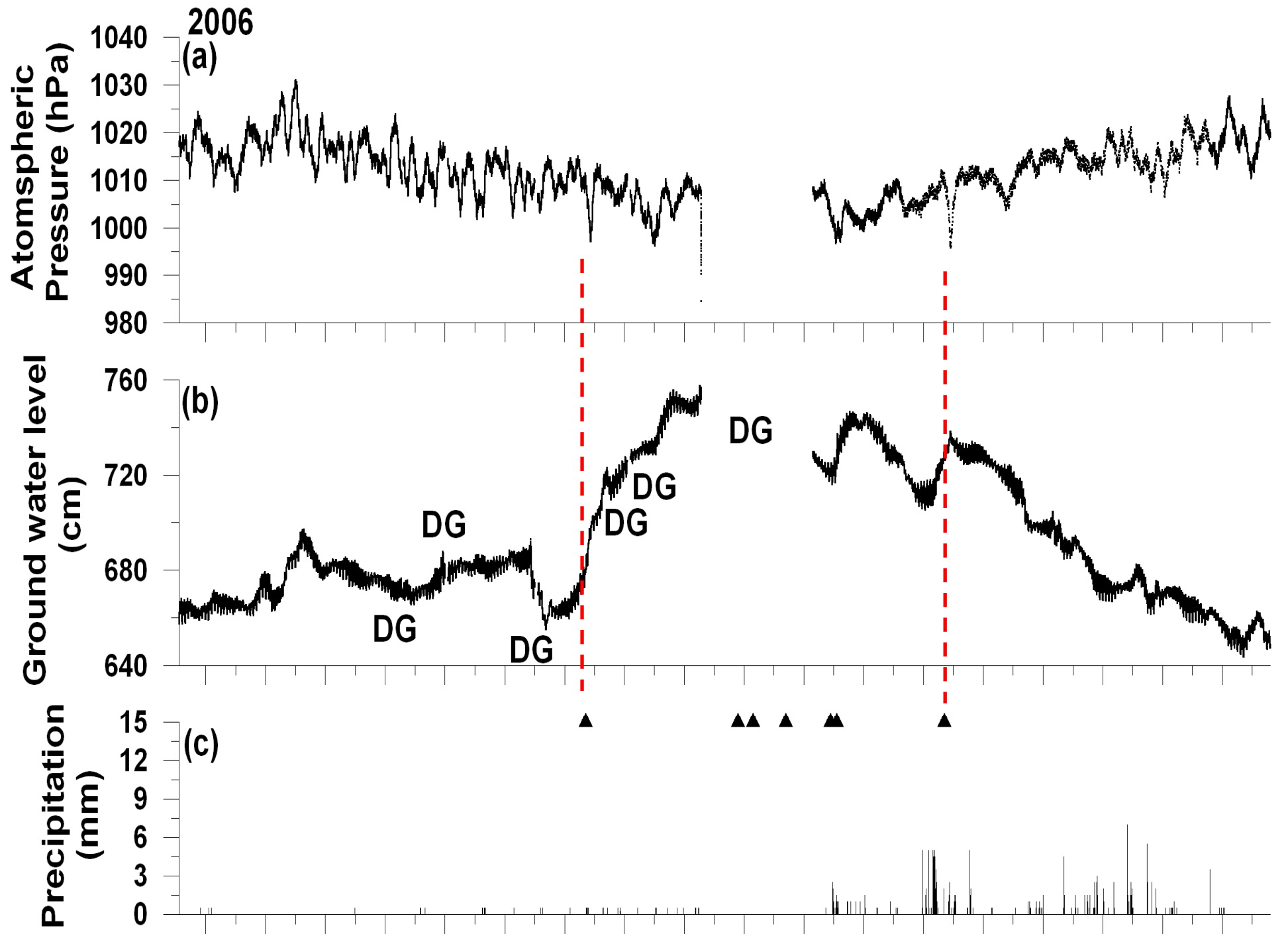


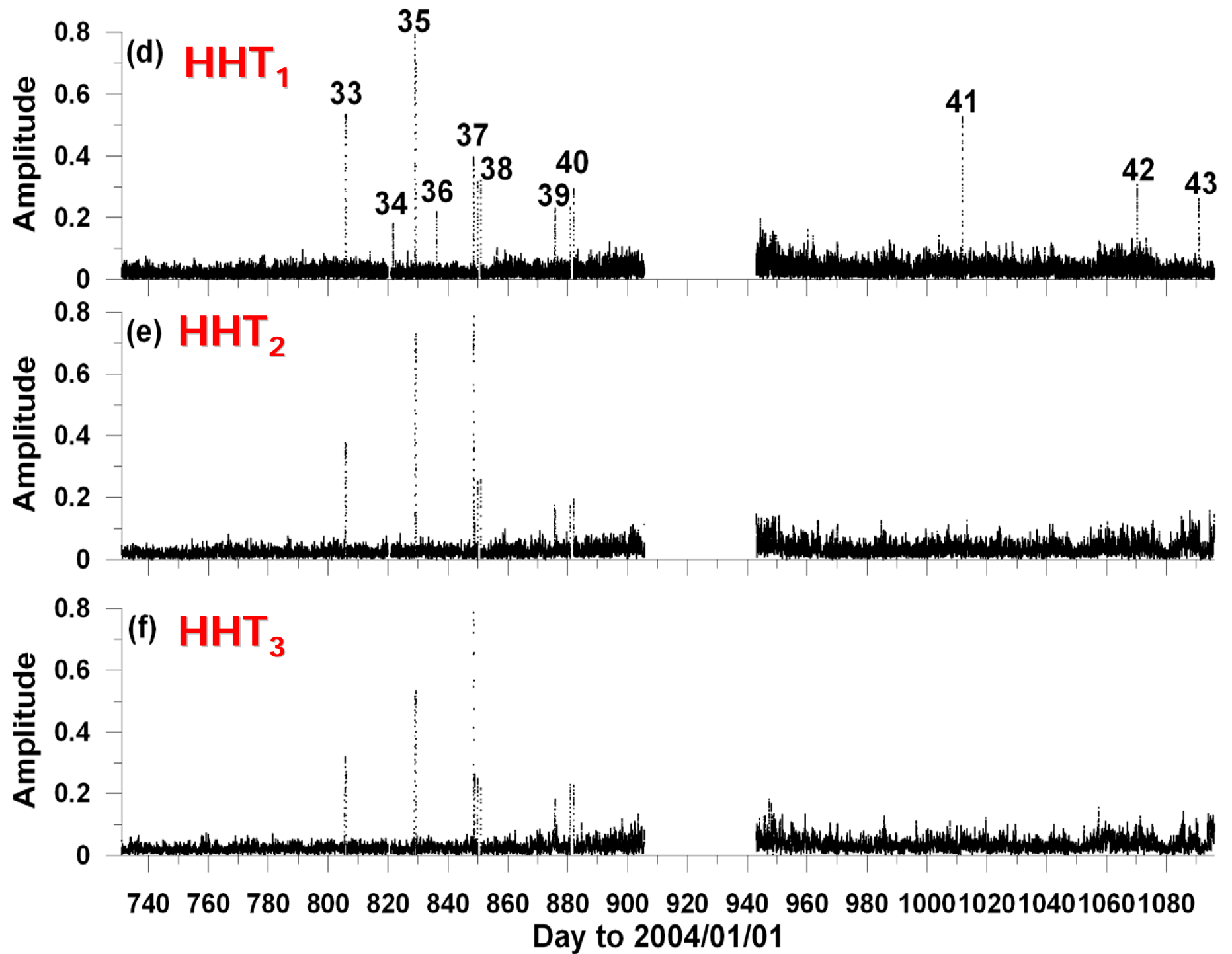


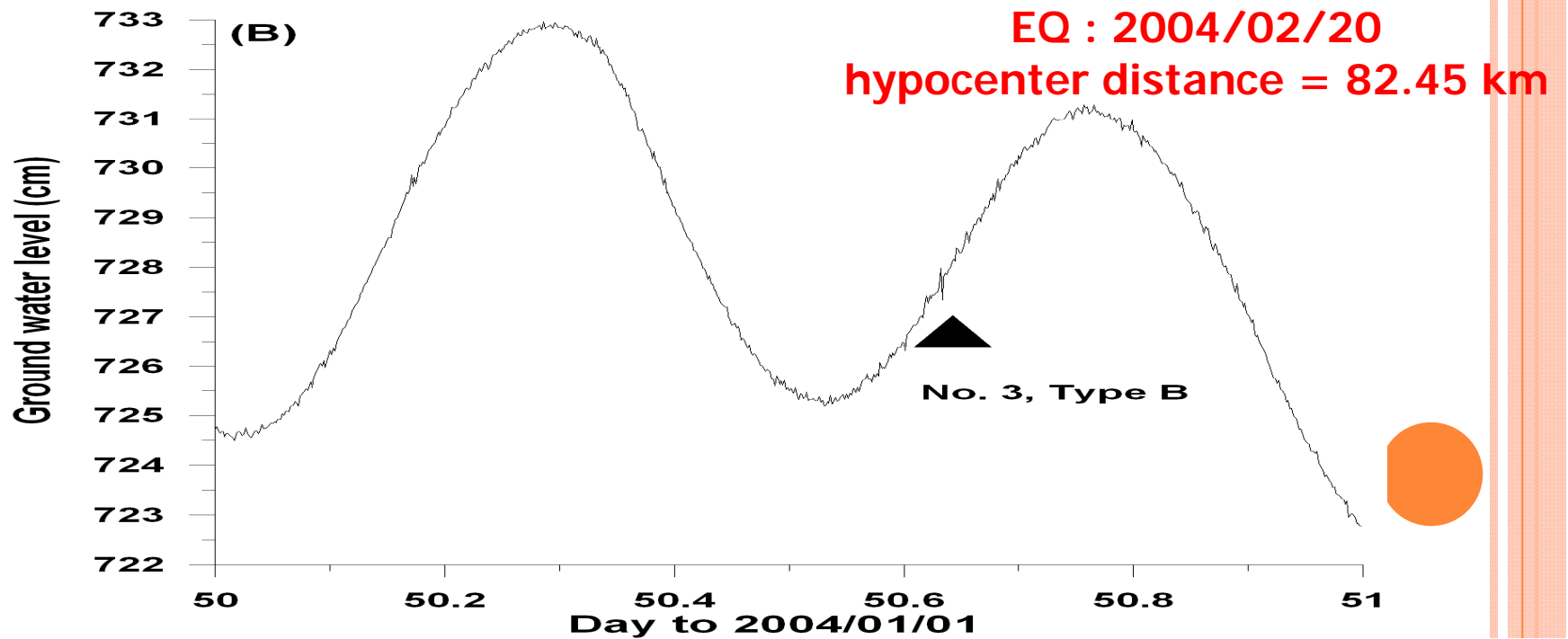
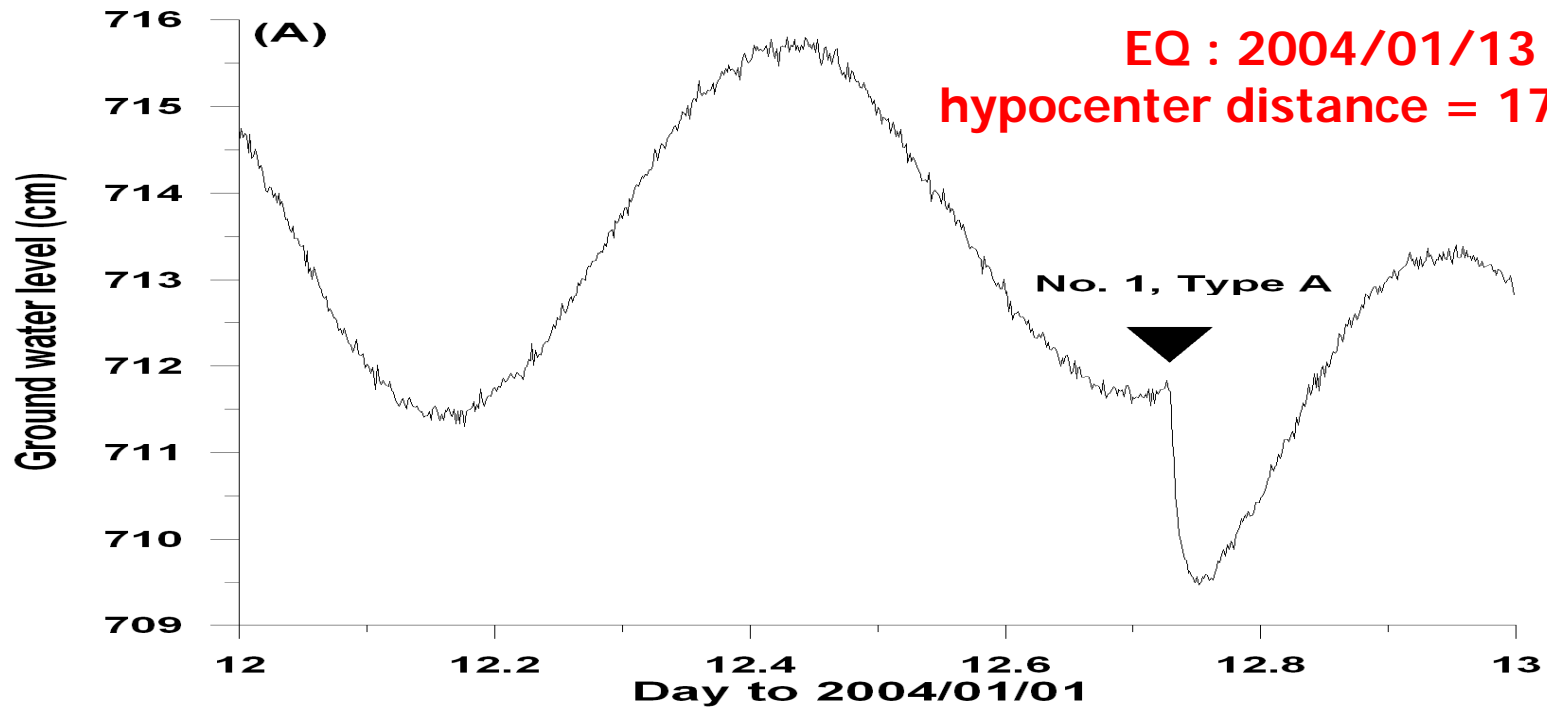




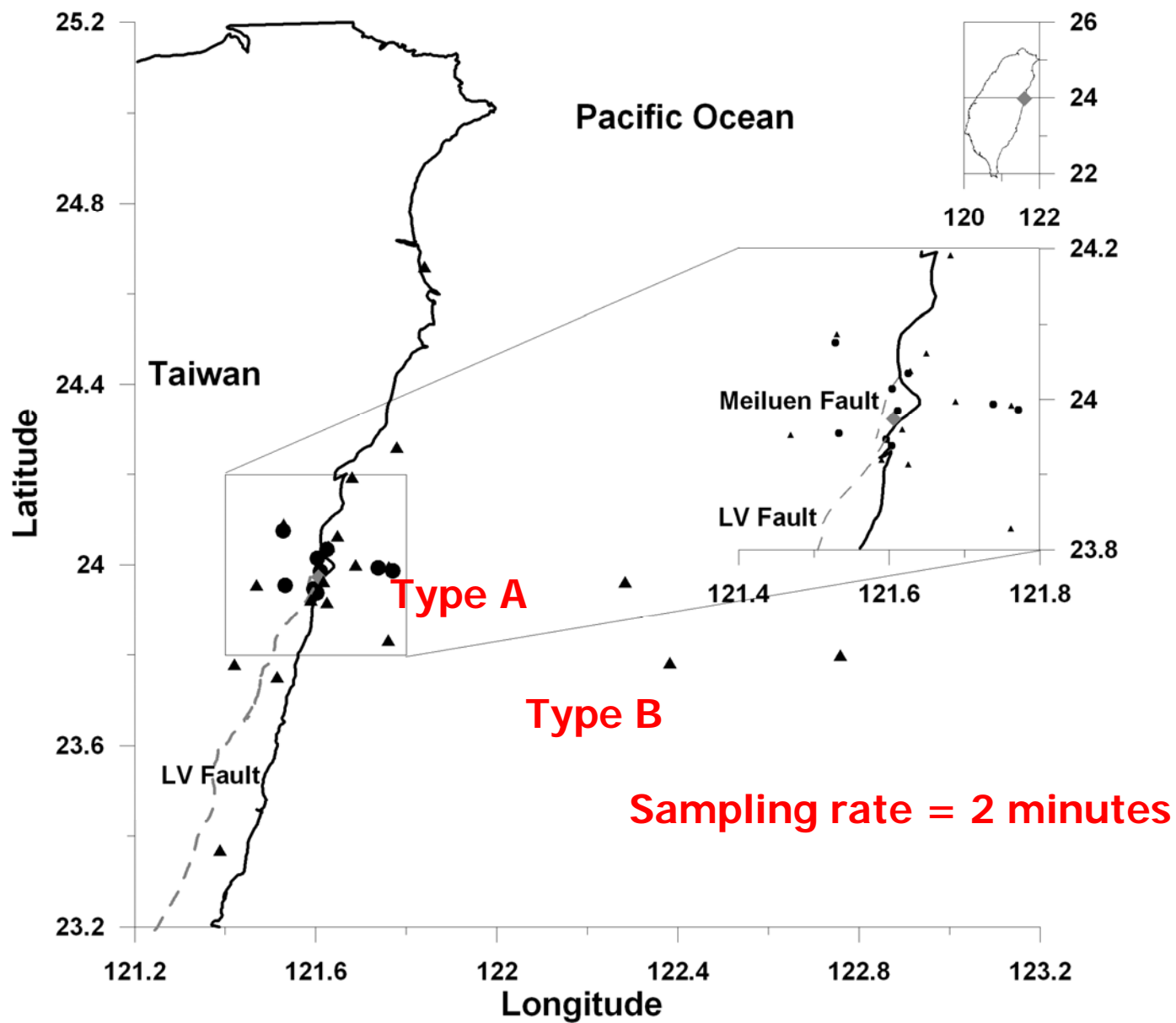


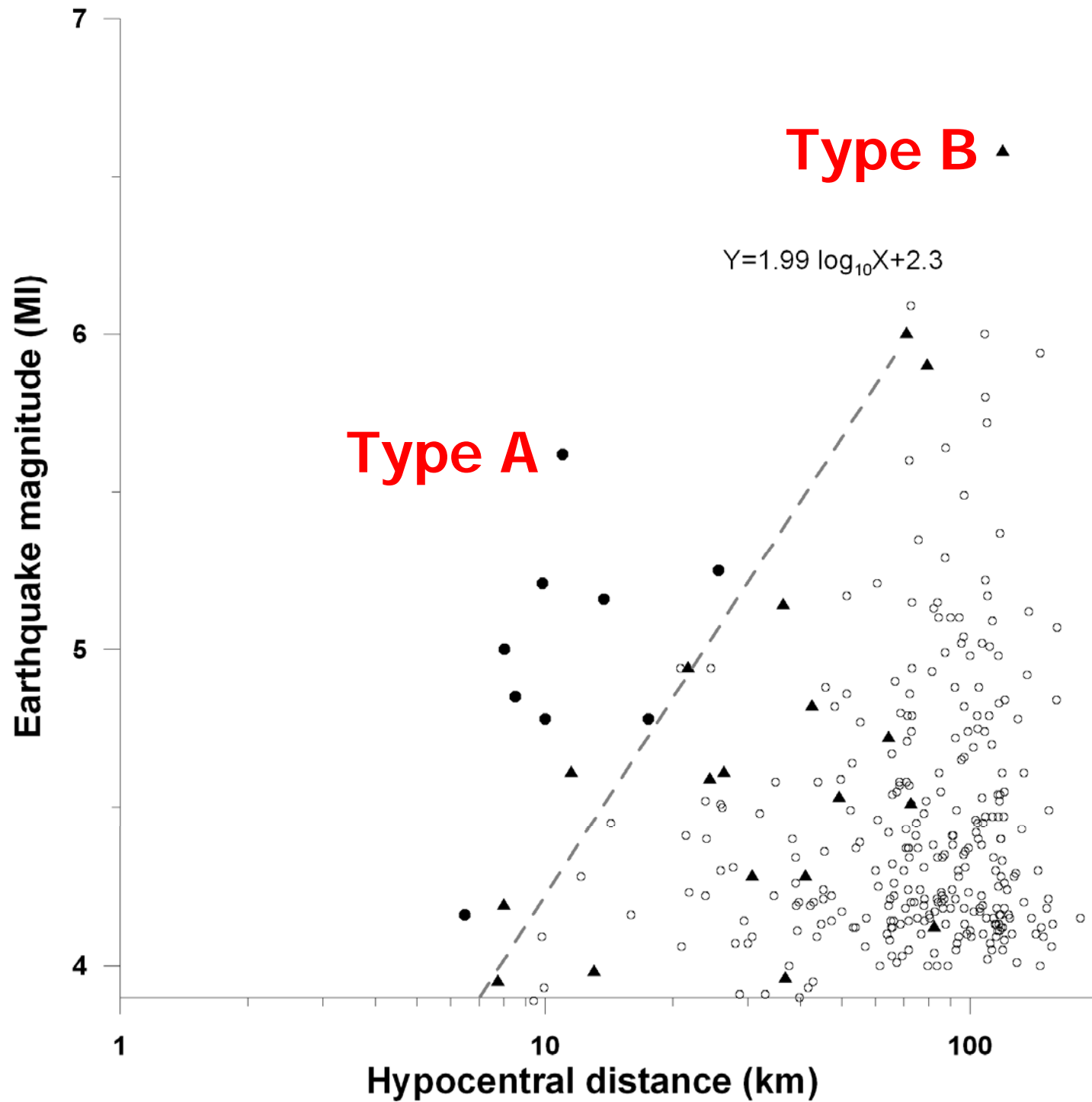






Epicenter distance





Conclusions

- Many major **sources can be** clearly **identified** in the groundwater level records, and their instantaneous frequencies can be related with the semi-daily, daily, semi-monthly, monthly tides **without the input of barometer, precipitation and Earth tide information.**
- **The HHT₃ series** that composed by every 3 observed points provide an effective way to **reduce the noise and stand out the co-seismic signals.**

