



**The Abdus Salam
International Centre for Theoretical Physics**



2053-12

**Advanced Workshop on Evaluating, Monitoring and Communicating
Volcanic and Seismic Hazards in East Africa**

17 - 28 August 2009

Monitoring and evaluating seismic hazard in Eritrea

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Monitoring and Evaluating Seismic Hazard in Eritrea

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Outline

- **Introduction**
- **Seismic monitoring**
- **Geodetic monitoring**
- **Seismic hazard assessments**

Introduction

- **Massawa city damages**
 - **Heavily damaged, 1884**
 - **Almost destroyed, 1921**
 - **Slight damages, 2002**
- **Assab city damages**
 - **Dobi graben event, 1989**
- **Bada events, 1993**
- **North east Ethiopia event, 2005**

Seismic monitoring

- **First seismographs in Eritrea**
 - **Asmara station, 1913**
 - **Massawa station, 1914?**
- **Asmara station (ASME), 1980s**
 - **Proper functioning since 1992**
- **A basalama station (ABSE), 1998**

Seismic monitoring (cont...)

- **Sheeb station (SHBE), 2004**
- **Gelealo station (GELE), 2006**

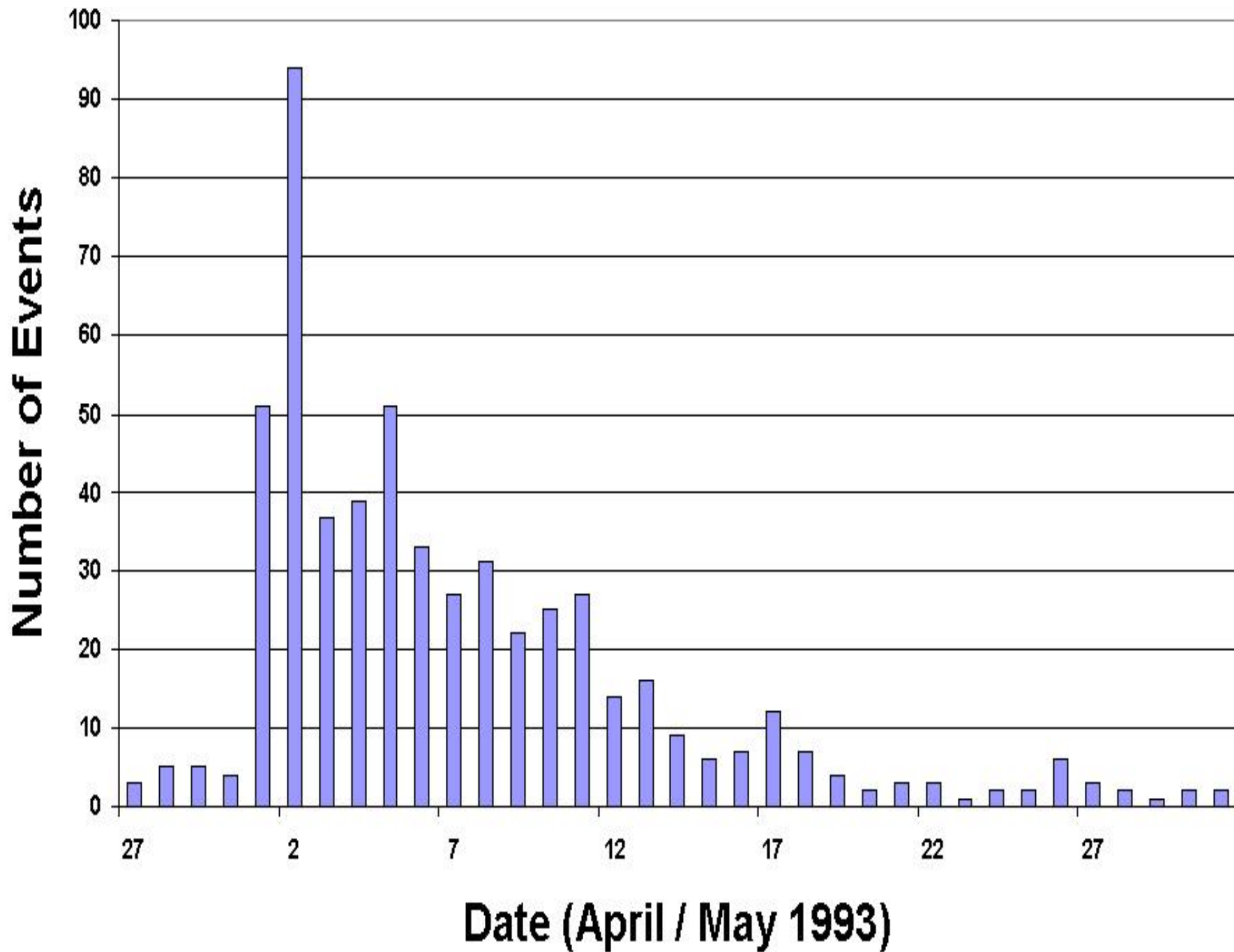
Station	Station Location			Seismometer	Component
	Latitude (N)	Longitude (E)	Altitude (m)		
ASME	In the move				
ABSE	14° 15' 48.0"	39° 19' 37.8"	2392	L – 4	1 vertical
SHBE	15° 51' 16.2"	39° 03' 16.9"	225	4 – Hz Geop	3
GELE	15° 06' 50.9"	40° 05' 16.1"	20	4 – Hz Geop	3

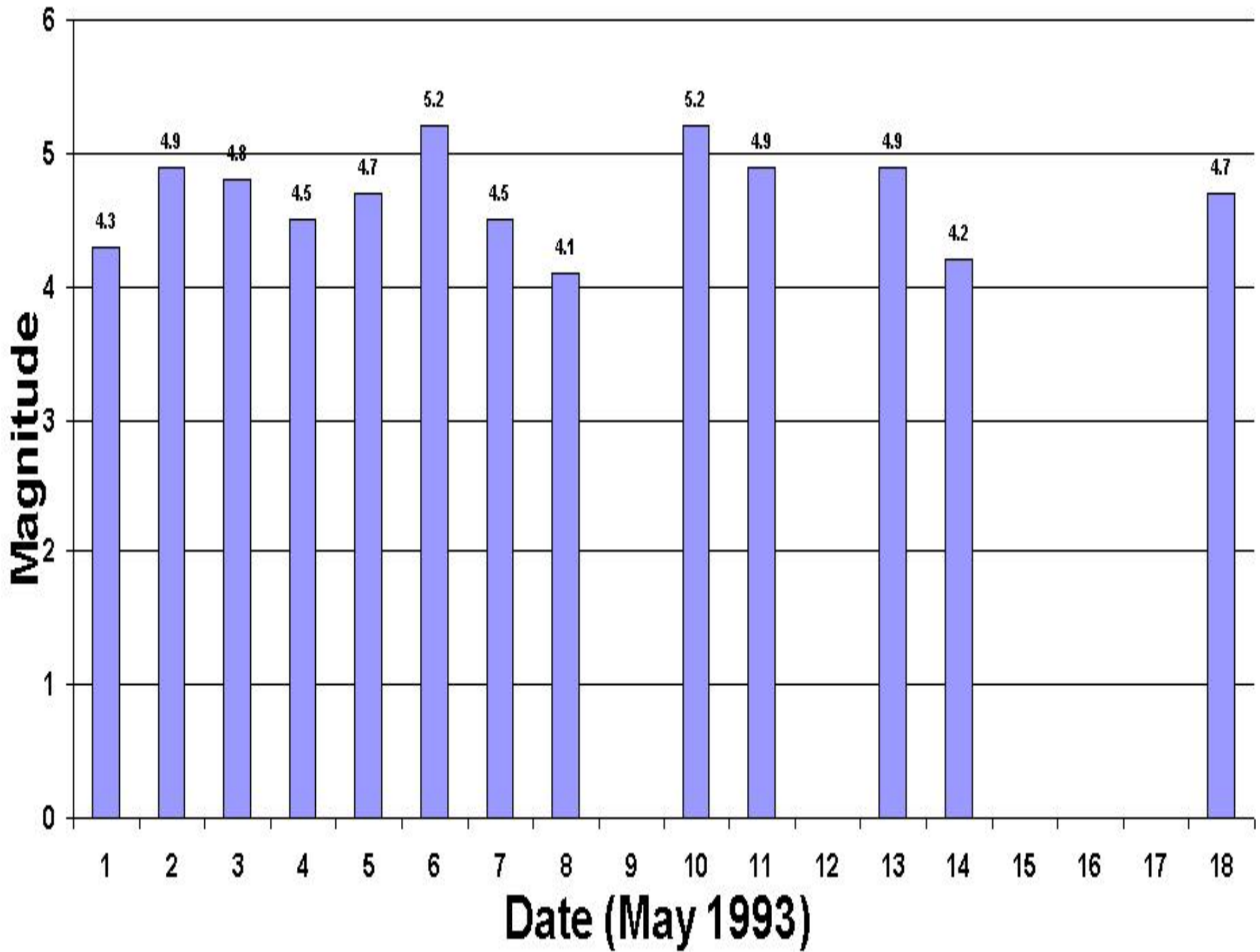
Seismic monitoring (cont...)

- **Bada (northern Afar), 1993**
 - **Only ASME operational**
 - **ISC data obtained – 18 events located**

Seismic monitoring (cont...)

- **Bada event (cont...)**
 - **b – value of 1.67**
 - **absence of dominant main shock**
 - **swarm**





Seismic monitoring (cont...)

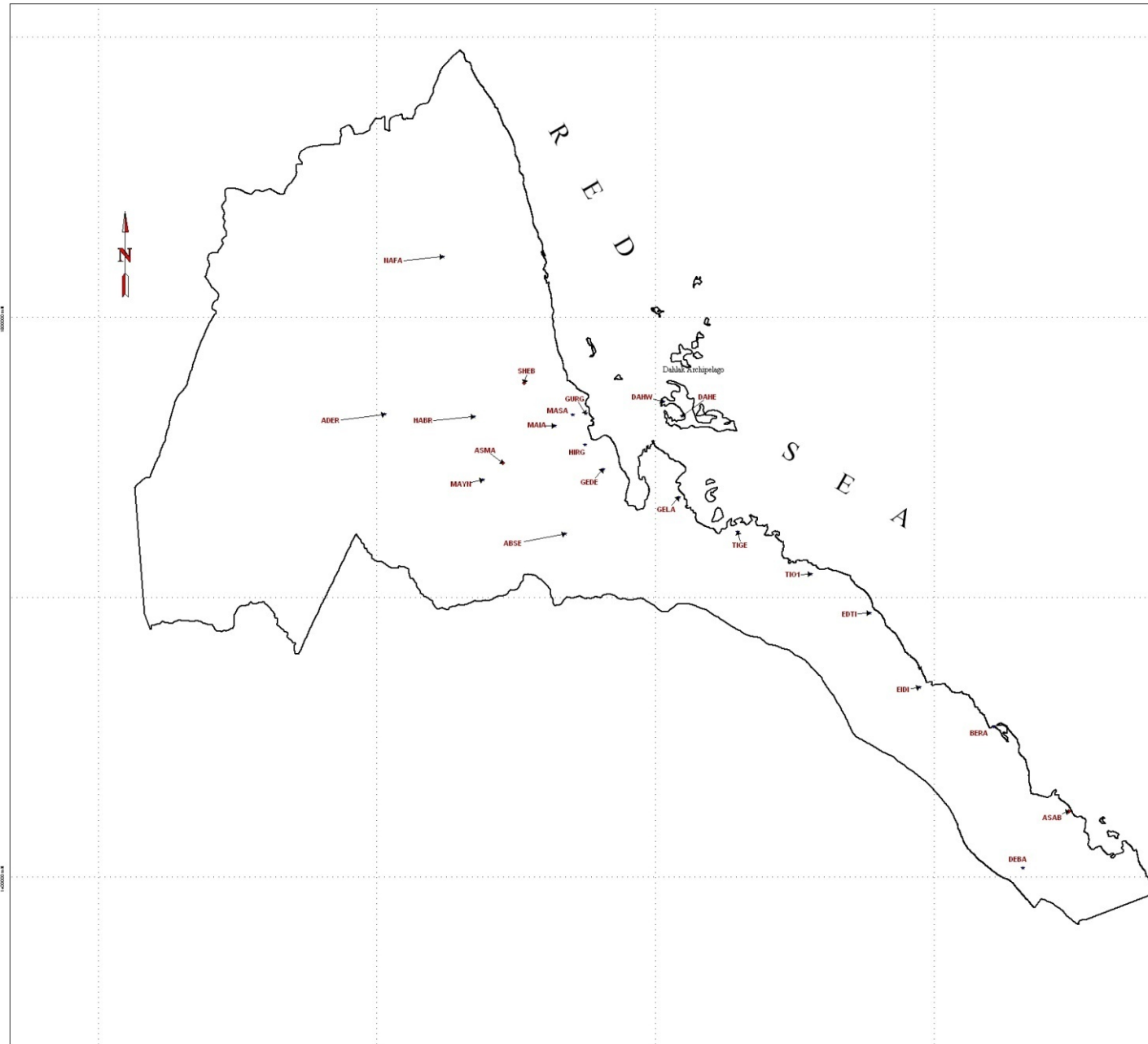
- **Massawa swarm, 2002**
 - **ASME station**
 - **ABSE station**
 - **No data from abroad**
- **Northeastern Ethiopia event, 2005**

Geodetic monitoring

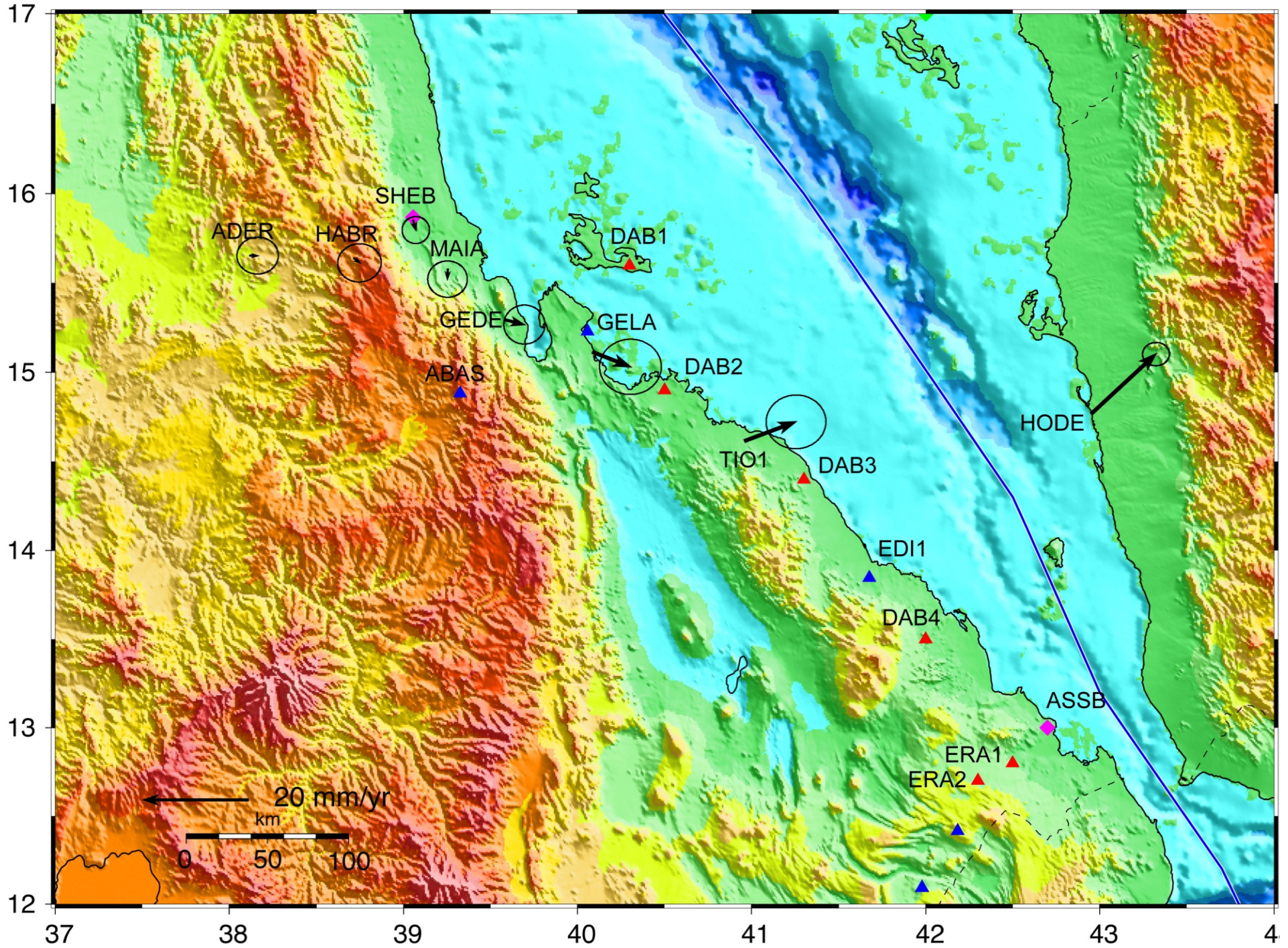
- **Collaborative efforts**
 - **Earth sciences department**
 - **Geological survey of Eritrea**
 - **Earth and planetary science dept., MIT**

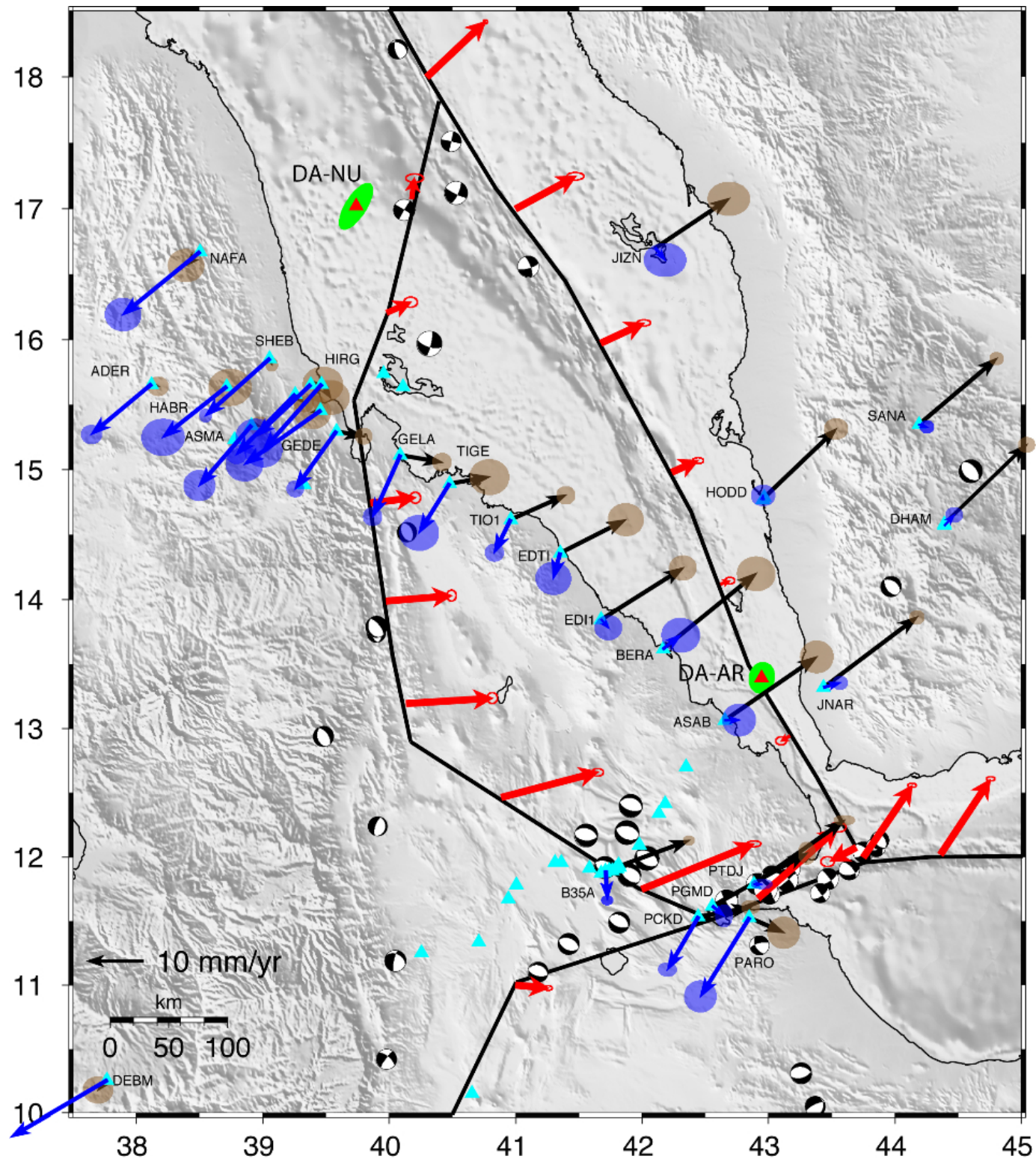
Legend

- ★ Survey Mode GPS Station
- ◆ Permanent GPS Station



Geophysical Laboratory	
Geophysical Laboratory Ethiopian Seismic Network	
Date: 10/11/2005	
Author: S. H.	
Editor: Amare	
Printer: S. H.	
Scale: 1:1000000	Scale: 1:1000000





Seismic hazard assessment

- **First assessment, Gouin, 1976**
- **Second assessment , Kebede and Asfaw, 1996**
- **Third assessment, Midzi et al., 1999**

Seismic hazard assessment (cont...)

- **Refine the assessments**
 - **Update details of seismotectonic source zones**
 - **Intensify seismicity studies**
 - **Intensify geodetic studies**