Declaration

I hereby declare that the thesis entitled "**Frequency magnitude distribution of large earthquakes with special reference to Kopili fault and surrounding regions of NER, India**", submitted to the School of Sciences, Tezpur University in partial fulfillment of the requirements for the award-of the Doctor of Philosophy in Physics, is a record of original research work carried out by me. Any text, figures, theories, results or designs that are not of my own creation are appropriately referenced in order to give owing credit to the original author(s). All the sources of assist have been assigned due acknowledgement. I also declare that neither this work as a whole nor a part of it has been submitted to any other University or institute for any degree, diploma, fellowship or any other similar title or recognition.

Date: 16-01-2025

Place: Tezpur University

Vickey Sharma

(Vickey Sharma)
Department of Physics
School of Sciences
Tezpur University
Tezpur-784028,
Assam, India

CERTIFICATE OF THE SUPERVISOR

This is to certify that the thesis entitled "**Frequency magnitude distribution of large earthquakes with special reference to Kopili fault and surrounding regions of NER, India**", submitted to the School of Sciences, Tezpur University in partial fulfilment of the requirements for the award of the Doctor of Philosophy in Physics, is a record of original research work carried out by **Mr. Vickey Sharma** under my supervision and guidance.

All help received by him from various sources have been duly acknowledged.

No part of the thesis has been submitted elsewhere for award of any other degree.

(Dr. Rajib Biswas)
Designation: Associate Professor
School: School of Science
Department: Physics
Date: 16-01-2025
Place: Tezpur-784028, Assam, India

Dedication

I dedicate this thesis to my

beloved parents, and my partner

Acknowledgement

*First and foremost, I am deeply thankful to my esteemed supervisor, **Dr. Rajib Biswas**, Associate Professor in the Department of Physics at Tezpur University, Assam. His invaluable advice, continuous support, motivation, and patience have been crucial throughout this journey. His insightful guidance was instrumental in helping me achieve my research goals. I would also like to express my heartfelt thanks to my Doctoral Committee members, **Prof. Pralay Kumar Karmakar** from the Department of Physics at Tezpur University, and **Prof. Gazi Ameen Ahmed** in the same department, for their timely advice, valuable feedback, and insightful evaluation of my progress throughout my PhD work.*

*I would like to extend my heartfelt gratitude to our Hon'ble Vice-Chancellor, **Prof. Shambhu Nath Singh**, for their inspiration, guidance, and for providing all the essential resources needed to conduct my research.*

*I am very thankful to **Dr. Devajit Hazarika**, Scientist and Associate Professor (ACSiR) at the Wadia Institute of Himalayan Geology (Govt. of India), in the functioning of the Generic Mapping Tool (GMT) and for his constant guidance and motivation.*

*I am very thankful to my lab mates- **Nilutpal** daa, Asha baa, Bijoy daa, Upama, Pohar and Special thanks to **Nikhil, Ankush Medhi and Sritam Biswas** for their help in thesis submission.*

*I am deeply thankful to my hostel seniors—Manas daa, Pitambar daa, Kumar daa, Bharkhang daa, Sanjib daa, Bhagi bhai, Ankur daa, and Pritam bhai—for their warmth and kindness. I also want to extend my heartfelt gratitude to my friends **Padum, Debarun (Babu), Reetom (Sultan), Biswa bhai, Bidhan, Souvick (Tintin)**, **Nishant Shukla**, **Sunny,** Abinash, Bikash, Jotin, Saransha, Sita, and Subham. Their unwavering friendship and support have been truly invaluable to me, and I am genuinely appreciative of each one of them.*

*I am profoundly grateful to my **Mumma ji** and **Daddy ji** for their limitless love and blessings. My heartfelt thanks also go to my **Didi ji**, whose unwavering love and* *inspiration have been a guiding light throughout my life. Additionally, I deeply appreciate the steadfast moral support of* ***my partner (Dr. Vidushi Pathak****). Their unwavering belief in me has been a constant source of strength and motivation throughout this journey.*

I also apologize to the others whom I may have been left out or inadvertently overlooked.

Vickey sharma

List of Tables

List of figures

Abbreviation	Meaning
GR	Gutenberg-Richter
IBR	Indo-Burma ranges
LSF	Least Square Fit
MLE	Maximum Likelihood Estimation
GEV	Gumbel extreme value
NEHSZ	Northeast Himalayan Seismic Zone
SASZ	Shillong–Assam Seismic Zone
BSSZ	Bengal Subsurface Seismic Zone
IBSTZ	Indo-Burma Seismic Thrust Zone
K-S	Kolmogorov-Smirnov
IBZ	Indo-Burma zone
GSN	Global Seismographic Network
EAFZ	East Anatolian fault zone
ISC	International Seismological Centre
USGS	United States Geological Survey
EMR	Entire Magnitude Range
MAXC	Maximum Curvature
FMD	Frequency-magnitude distribution
PSHA	Probabilistic Seismic Hazard Analysis
GMPEs	Ground motion prediction equations
IST	Indus Suture Thrust
MCT	Main Central Thrust
MBT	Main Boundary Thrust
DF	Dauki fault
NT	Naga-Disang thrust
CMF	Churachandpur-Mao fault
KF	Kabaw fault
SF	Sylhet fault
NDMA	National Disaster Management Authority
IMD	India Meteorological Department
GFT	Goodness of fit test

EBZ	Eastern Boundary Zone
DT	Dapsi Thrust
DhF	Dudhnoi Fault
CMF	Churachandpur Mao Fault
EHS	Eastern Himalayan Syntaxis
MCB	Myanmar Central Basin
ECDF	Empirical cumulative distribution function
SCDF	Standard cumulative distribution function
NAF	North Anatolian Fault
EAF	East Anatolian Fault
DSF	Dead Sea Fault
BZFT	Bitlis-Zagros Fold Belt
LC	Lesser Caucasus
GC	Greater Caucasus
KOERI	Kandilli Observatory and Earthquake Research Institute
CUVI	Visual Cumulative Inspection
MG	Motihari Gauri Shanker fault
SD	Standard deviation
OF	Oldham fault

Symbols	**Meaning**
M_W	Moment magnitude
M_{Wg}	Das magnitude scale
MS	Surface magnitude scale
MD	Duration magnitude scale
ML	Local magnitude scale
Mb	Body magnitude scale
δb	Standard deviation in b-value
M_{max}	Maximum Magnitude
M_C	Minimum magnitude of completeness
Λ	Seismicity rate
T(m)	Mean return period
H	Most probable maximum annual magnitude
H(t)	Most probable maximum magnitude over time period(t)
P(t)	Probability of occurrence of different magnitude
Dmax	Maximum D-value