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Sistema de Alerta y Vigilancia ante Erupciones Volcánicas en Guatemala y difundido en Centroamérica

"From detection to action: A Lahar Early Warning System for Santiaguito Volcano, Guatemala"

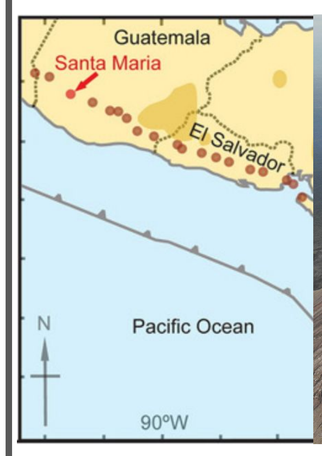
Amilcar Roca[1], Roberto Mérida*[1], Edy Maldonado[2].

1 Instituto Nacional de Sismologia, Vulcanologia, Meteorologia e Hidrologia, INSIVUMEH

2 Coordinadora Nacional para la Reducción de Desastres, CONRED.

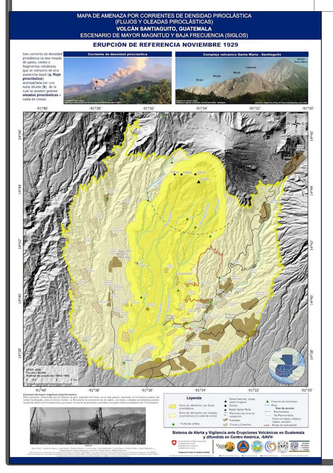
***Presenting author | Email: ermerida@insivumeh.gob.gt**

INTRODUCTION



- SANTIAGUITO VOLCANO, LOCATED IN GUATEMALA'S WESTERN HIGHLANDS, RANKS FIRST IN GUATEMALA'S VOLCANIC RELATIVE THREAT RANKING (2020) AND WAS THE PRIMARY FOCUS OF THE SAAV PROJECT, WHERE THE FOUR PILLARS OF AN EARLY WARNING SYSTEM (EWS) WERE IMPLEMENTED.

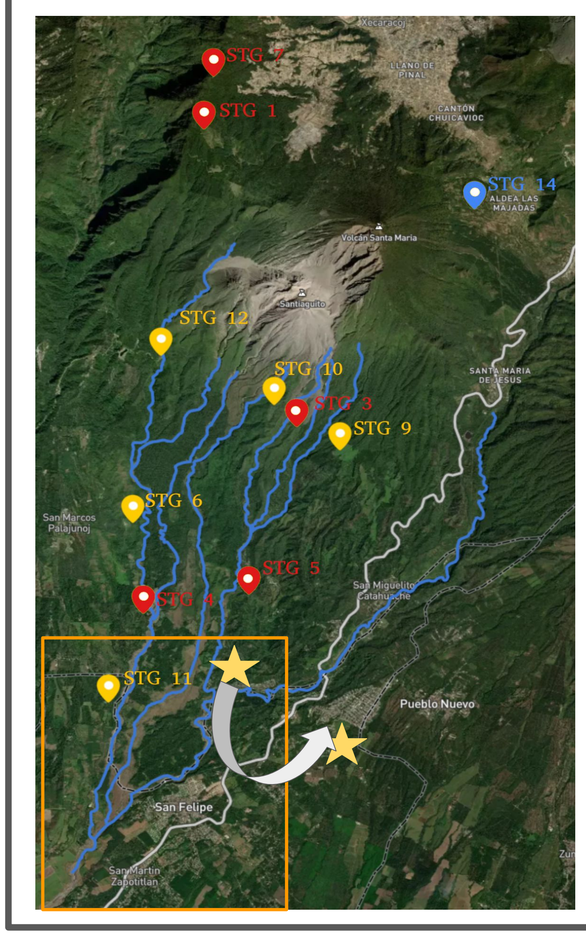
PILLAR 1	PILLAR 2	PILLAR 3	PILLAR 4
• GEOLOGICAL AND GEOMORPH. MAPS. • HAZARD MAPS (LAHAR AND PDC) • VULNERABILITY MAPS. • 100TH ANNIVERSARY SANTIAGUITO SYMPOSIUM	• 12 STATION MONITORING NETWORK: SEISMIC, INFRASOUND, WEBCAM. WEATHER	• RADIO AND VIDEO SPOTS • FIELD CAMPAIGNS • VIRTUAL DASHBOARDS • LAHAR EWS.	• 22 LOCAL AND 7 MUNICIPAL DRR COMMITTEES • VOLCANIC CRISIS AND EVACUATION DRILLS IN 22 COMMUNITIES

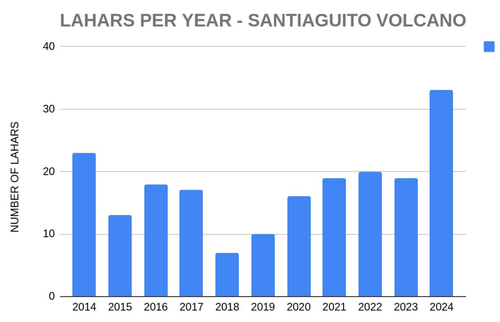


HAZARD MAPS

VOLCANO WEBCAMS

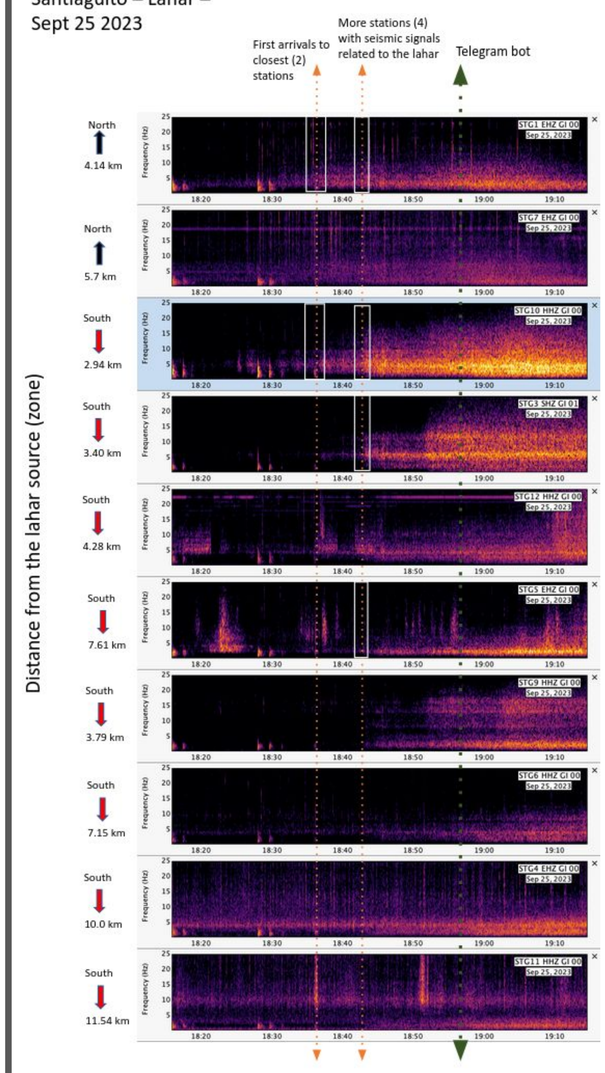
WHY A LAHAR EWS?





- LAHARS ARE A RECURRENT HAZARD
- ALL SANTIAGUITO DRAINAGES CONVERGE INTO THE SAME CHANNEL
- LAHARS HAVE DESTROYED AND FORCED THE RELOCATION OF TOWNS IN THE PAST

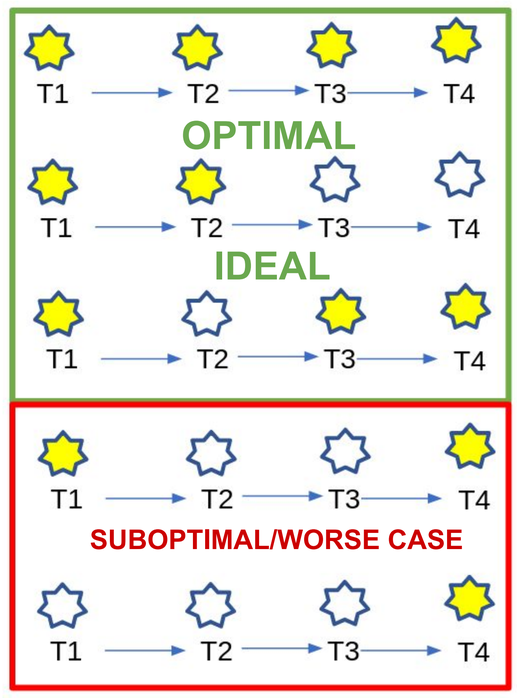
METHODS AND RESULTS



- REAL TIME DATA INTEGRATED IN SEISCOMP4
- STA/LTA APPROACH FOR DETECTION
- OPTIMIZED AND TESTED WITH DATA FROM 49 EVENTS DURING 2022 AND 2023
- 90% ACCURACY
- NO FALSE EVENTS (FULLY TESTED ON CONTINUOUS DATA)
- DETECTIONS BETWEEN 8 AND 23 MINUTES AFTER ONSET
- PUBLIC IS INFORMED 20 TO 40 MINUTES BEFORE LAHAR REACHES THE TARGET ZONE
- CONNECTED TO TELEGRAM

TELEGRAM MESSAGE ALERTS

- T1: RAIN FORECAST (8 AM) *MANUAL MESSAGE*
- T2: RAIN DETECTION (HOURS TO MINUTES BEFORE THE LAHAR) *MANUAL MESSAGE*
- T3: LAHAR DETECTION *AUTOMATIC MESSAGE*
- T4: LAHAR CONFIRMATION AND BULLETIN ISSUED *MANUAL MESSAGE*



SUSTAINING AND ADVANCING THE EWS

1. **ROBUST MONITORING**
   - CONTINUOUS MAINTENANCE OF MULTIPARAMETRIC NETWORKS IN EXTREME ENVIRONMENTS
2. **INSTITUTIONAL ANCHORING**
   - RETENTION OF TECHNICAL EXPERTISE + CLEAR GOVERNANCE PROTOCOLS
3. **COMMUNITY OWNERSHIP**
   - LOCAL CAPACITY-BUILDING + ACTIONABLE RISK COMMUNICATION
4. **CAP-COMPLIANT SMS ROLLOUT**
   - TRANSITION TO STANDARDIZED, AUTOMATED ALERTS FOR INTEROPERABILITY AND WIDER REACH
5. **SIREN NETWORK DEPLOYMENT**
   - INSTALL SOLAR-POWERED SIRENS IN HIGH-RISK COMMUNITIES FOR REDUNDANT WARNING CAPABILITY

ACKNOWLEDGEMENTS

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Early Warnings for All

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