Evaluation of paleo-tsunamis in Peru – focus on the border Chile-Peru

Carlos Benavente[1] & Michaela Spiske[2, 3]

[1] Instituto Geológico Minero y Metalúrgico

[2] State Museum of Natural History, Karlsruhe, Germany

[3] University of Basel, Switzerland

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Tsunami Research

A goal → Save lives

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Tsunami Research

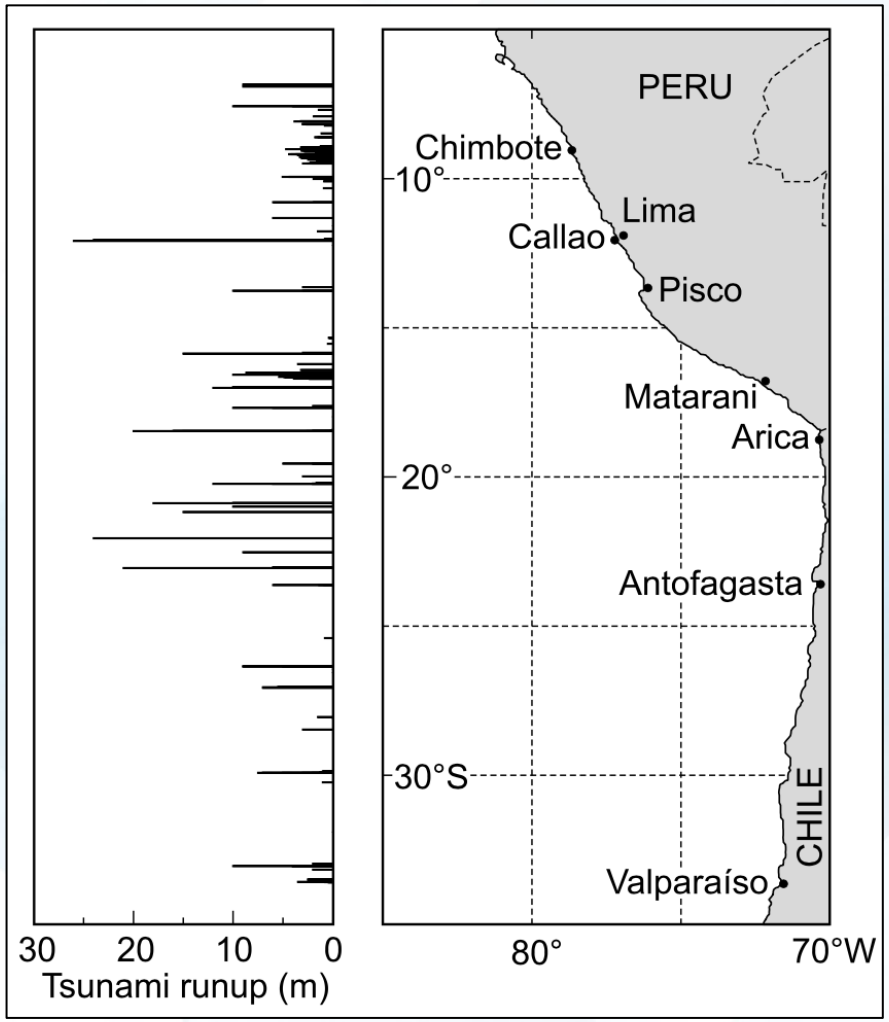
Questions:

1. Where?
2. How big?
3. How often?

But…

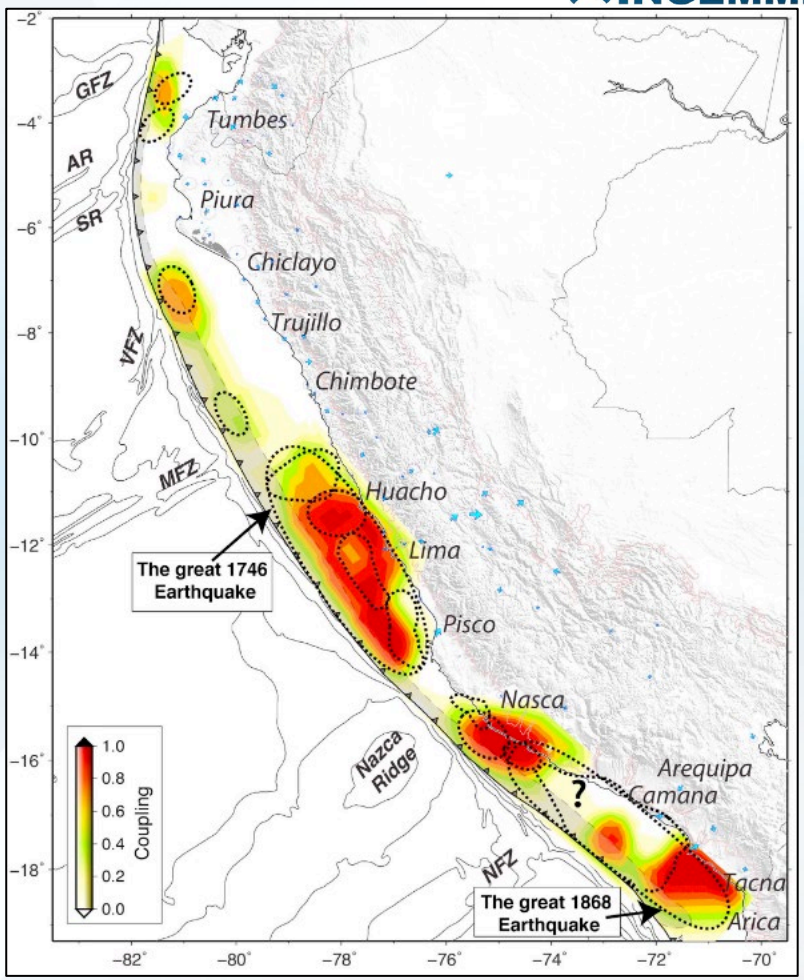
- Historic records are short and tsunami recurrence intervals are long.

We have the answers to many of these questions (Single events).



Kulikov et al., 2005

Distribution of tsunami run-up heights along the coasts of Peru and northern Chile for the period 1562–2003.



Villegas et al., 2016

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Paleotsunami Research

How can geology help tell our history?

I am sure you will not be surprised to hear that geologists have a role to play in answering these questions in areas with a short history, such as Peru, whose antecedents are limited to the last 500 years.

We must use other tools that allow us to increase the window of observation.

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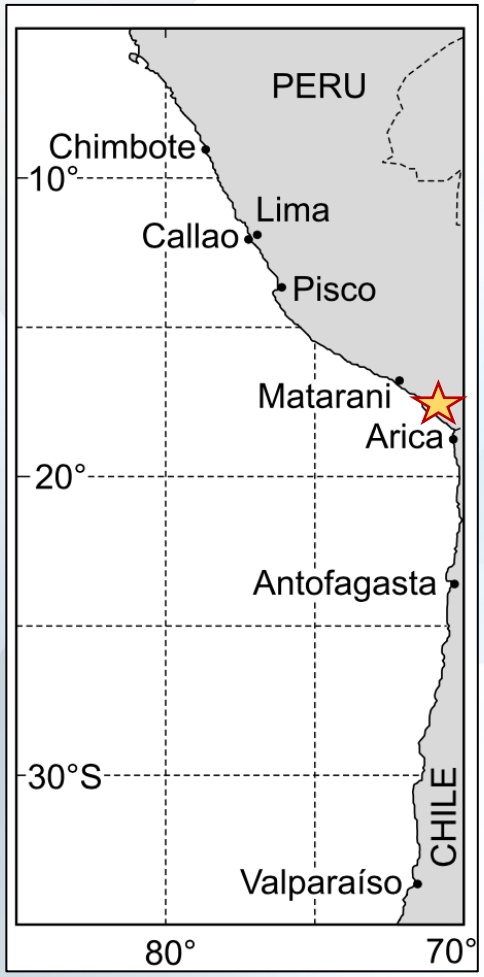

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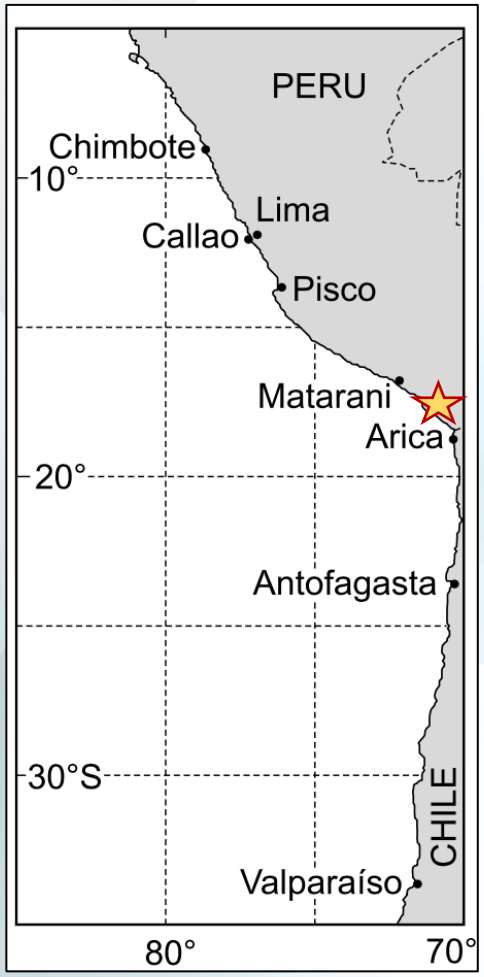

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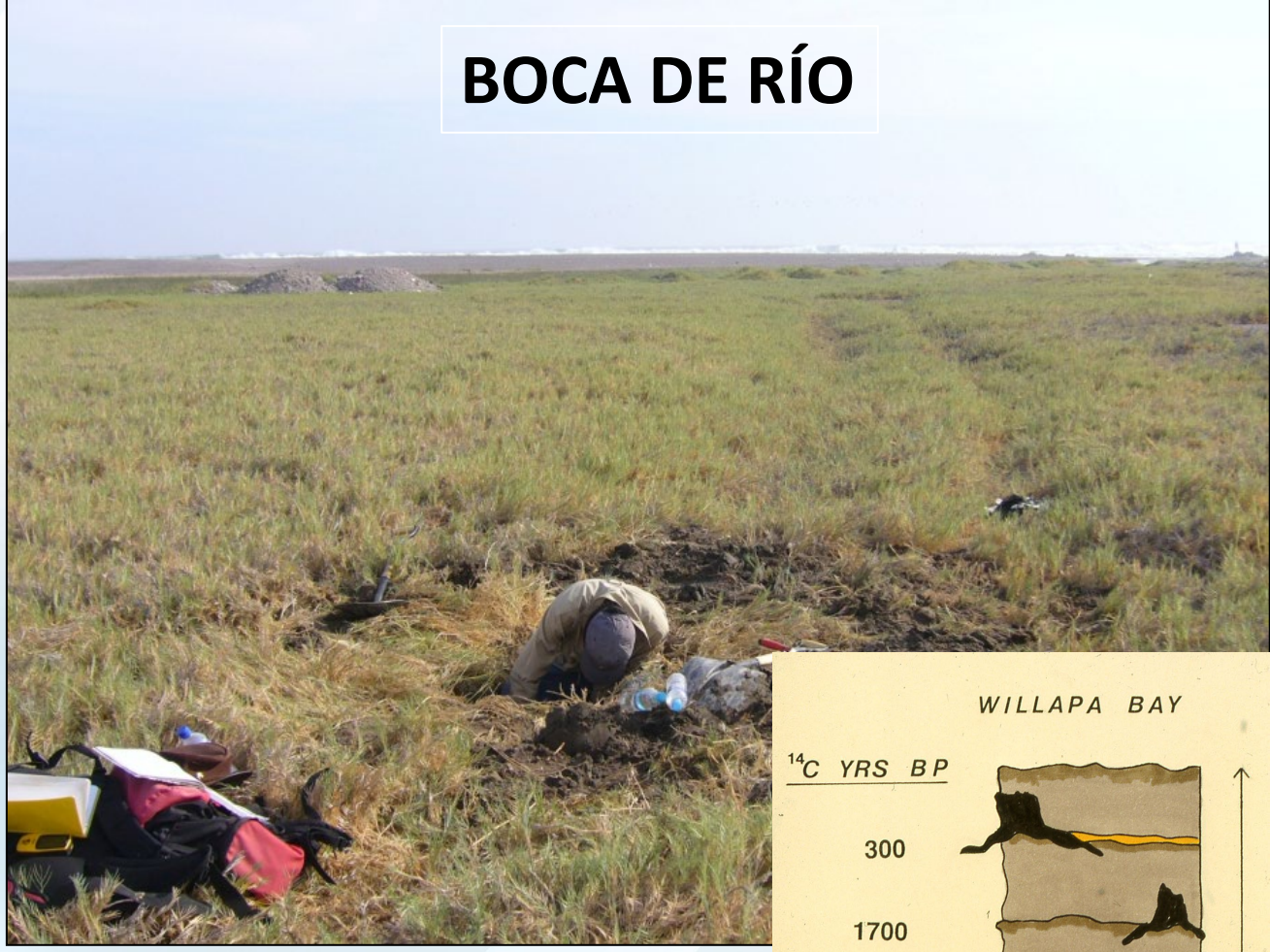
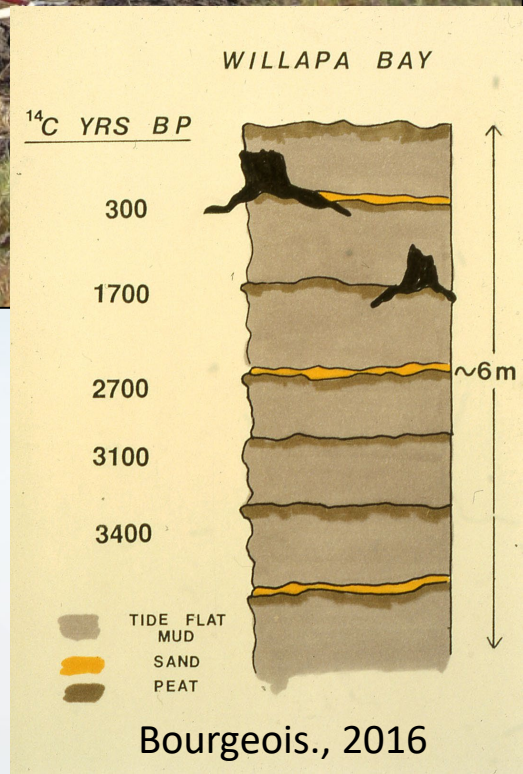
Paleotsunami Research

- Tsunami deposits can be preserved in the stratigraphy.

- Their identification will help improve:
  - ✓ Hazard maps.
  - ✓ Understand tsunami behaviour.
  - ✓ Calibrate, test and improve tsunami runup models
  - ✓ Educate the public.





Bourgeois., 2016

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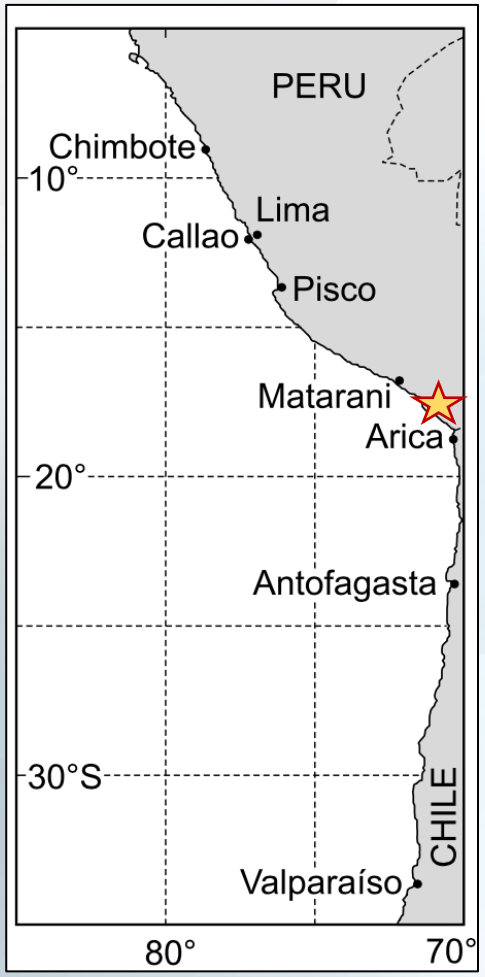
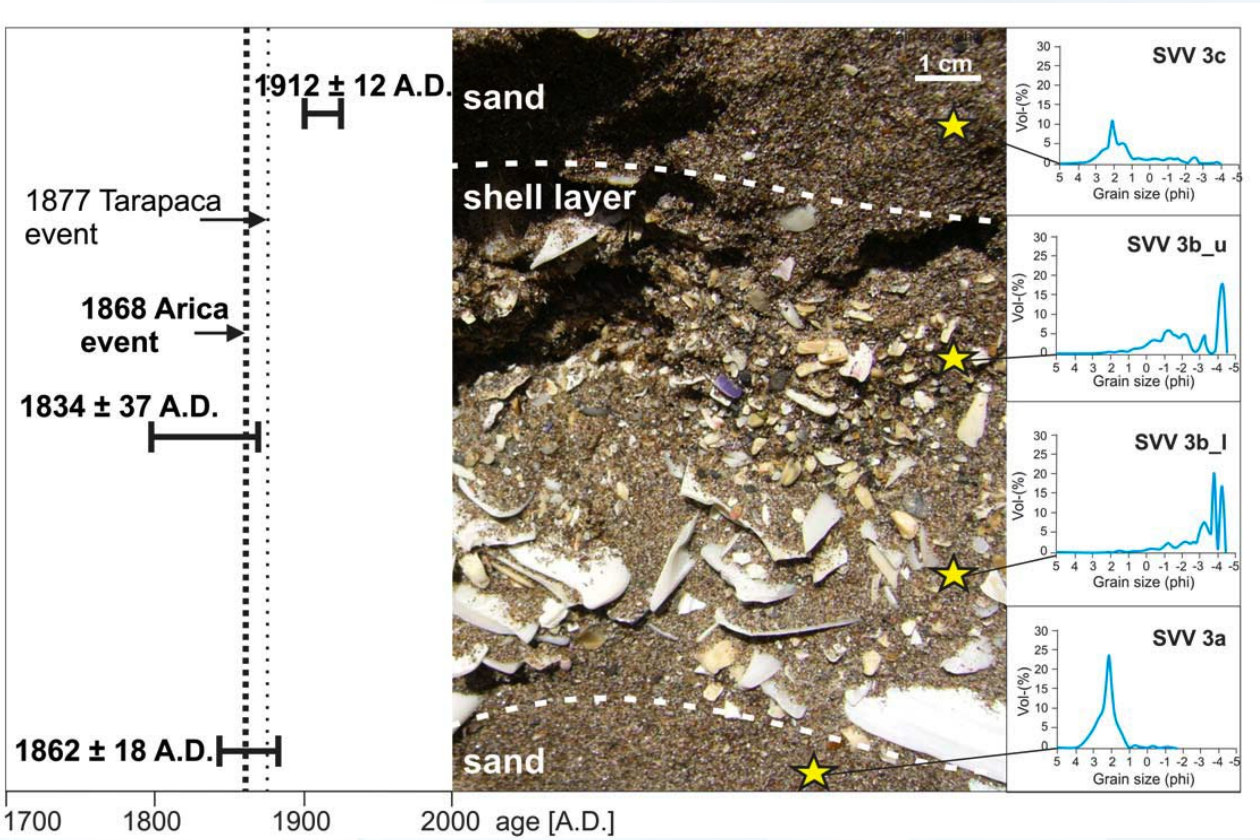
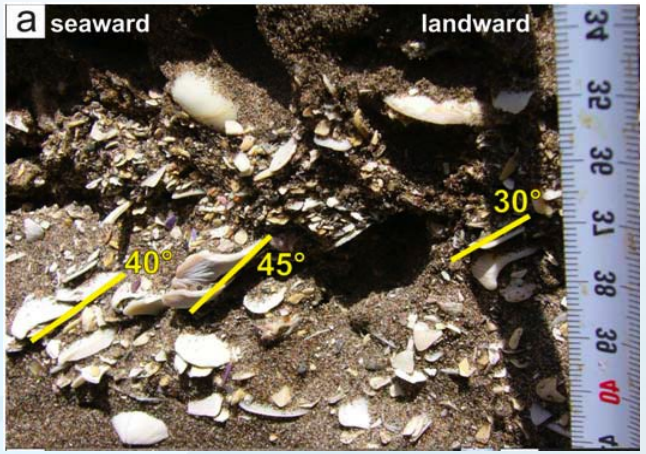
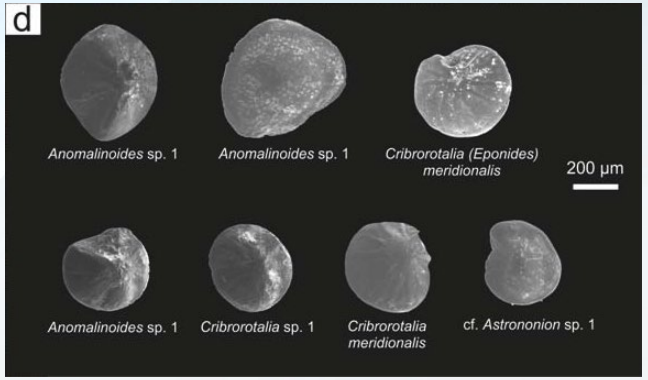




Granulometry >





deep sea benthic foraminifera

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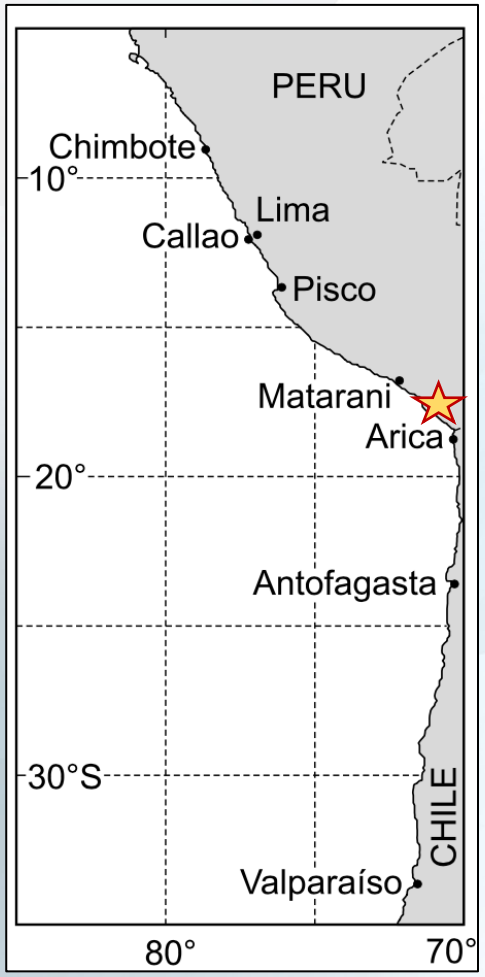

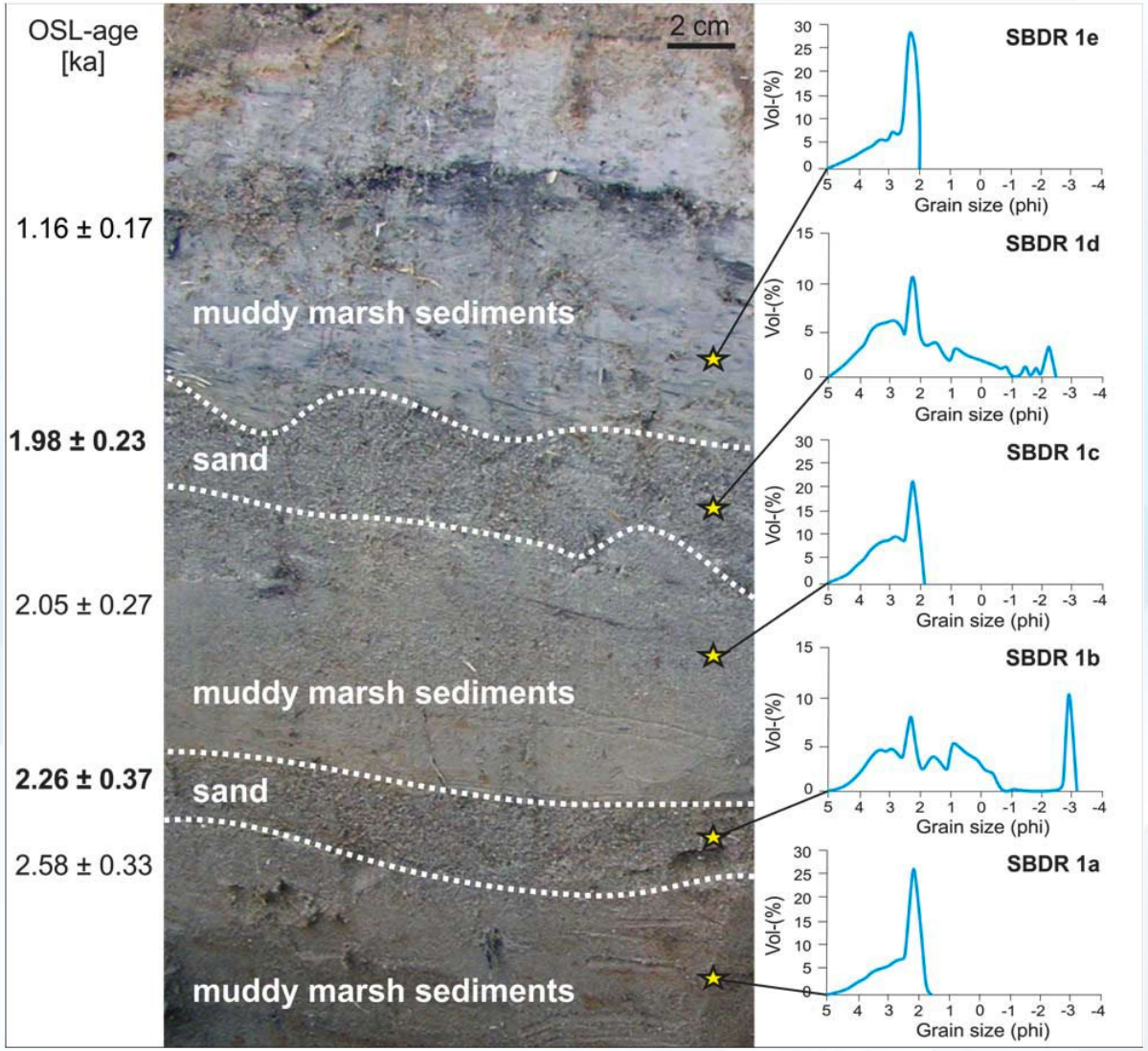

- We identify older deposits (2 ka and 2.3 ka).
- They allow for the generation of more hazard scenarios.

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Available online at www.sciencedirect.com
ScienceDirect
Sedimentary Geology 200 (2007) 347–361
Sedimentary Geology
www.elsevier.com/locate/sedgeo
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A simple model for calculating tsunami flow speed from tsunami deposits

Bruce E. Jaffe [a,*], Guy Gelfenbuam [b]

[a] U.S. Geological Survey 400 Natural Bridges Dr., Santa Cruz, CA 95060, United States
[b] U.S. Geological Survey 345 Middlefield Rd., Menlo Park, CA 94025, United States

- ➔ Estimation of the depth and velocity of the flow.
- ➔ Estimation of tsunami magnitude.
- ➔ And in combination with a dating method we can give accurate information on tsunami recurrence.

- Granulometry
- Thickness
- Mineral Density

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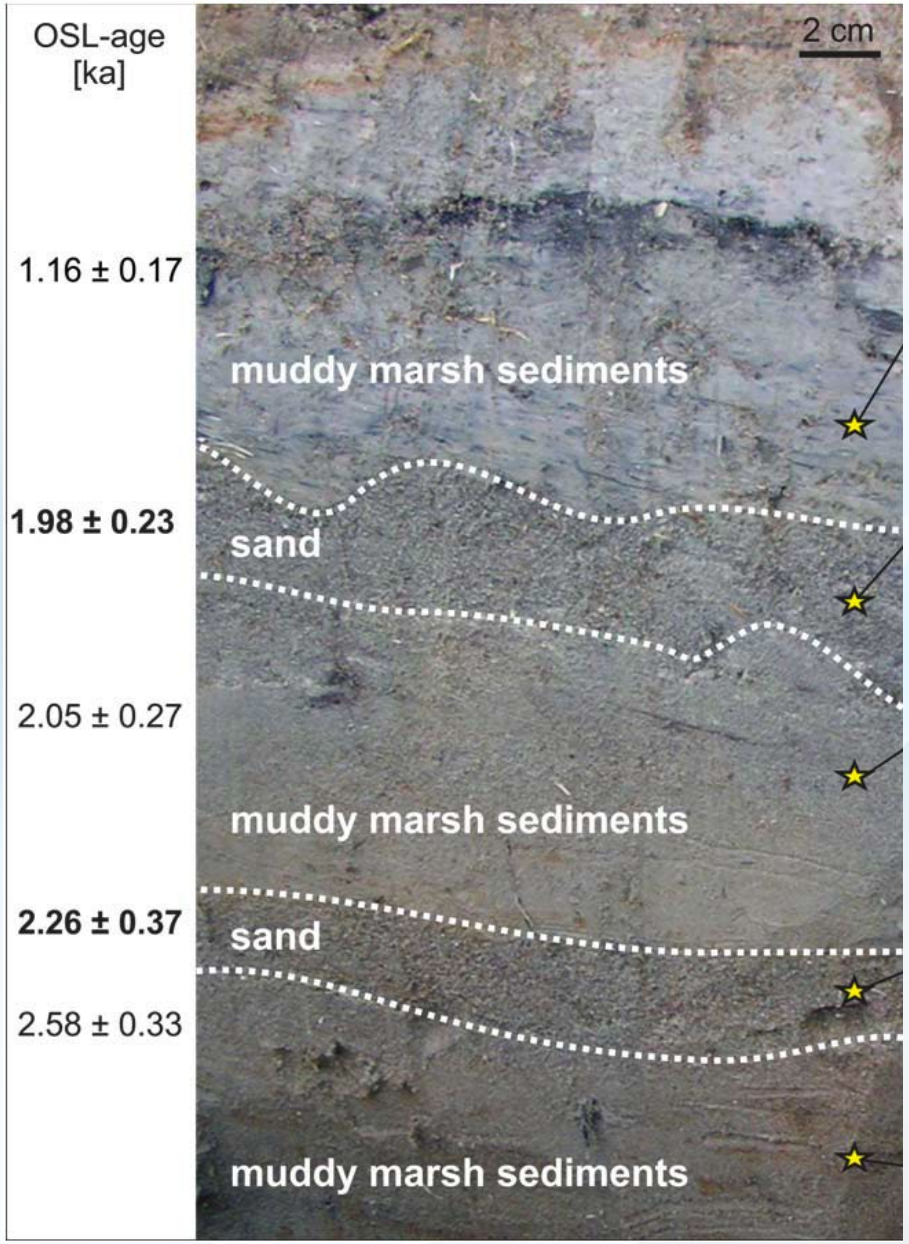
Tsunami Deposit:
Boca de Rio-southern Peru

Model result:
Flow Depth: 6.1 m
Flow velocity: 7.8 m/s

Model result:
Flow depth: 5.1 m
Flow velocity: 7.1 m/s



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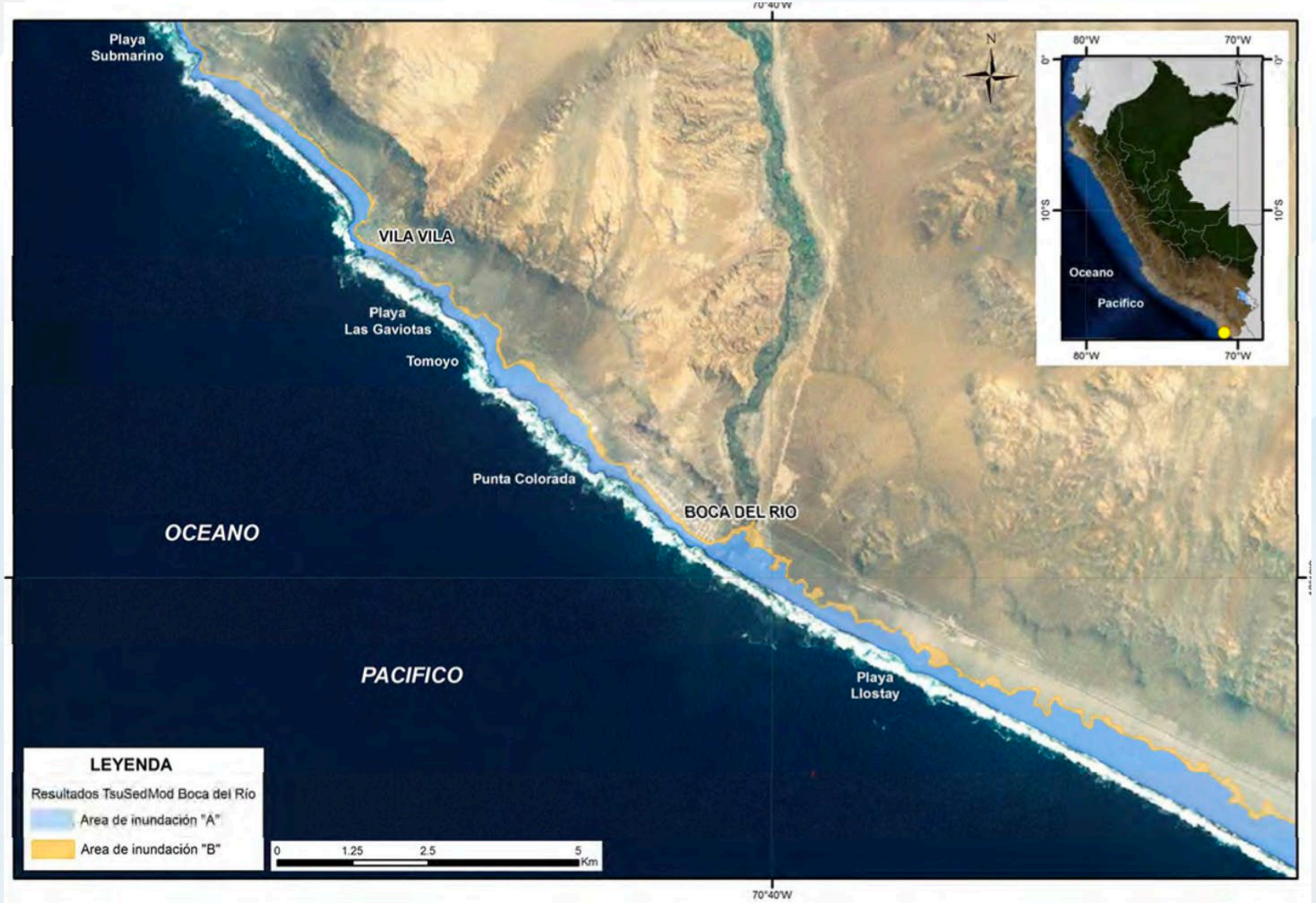

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Final comments

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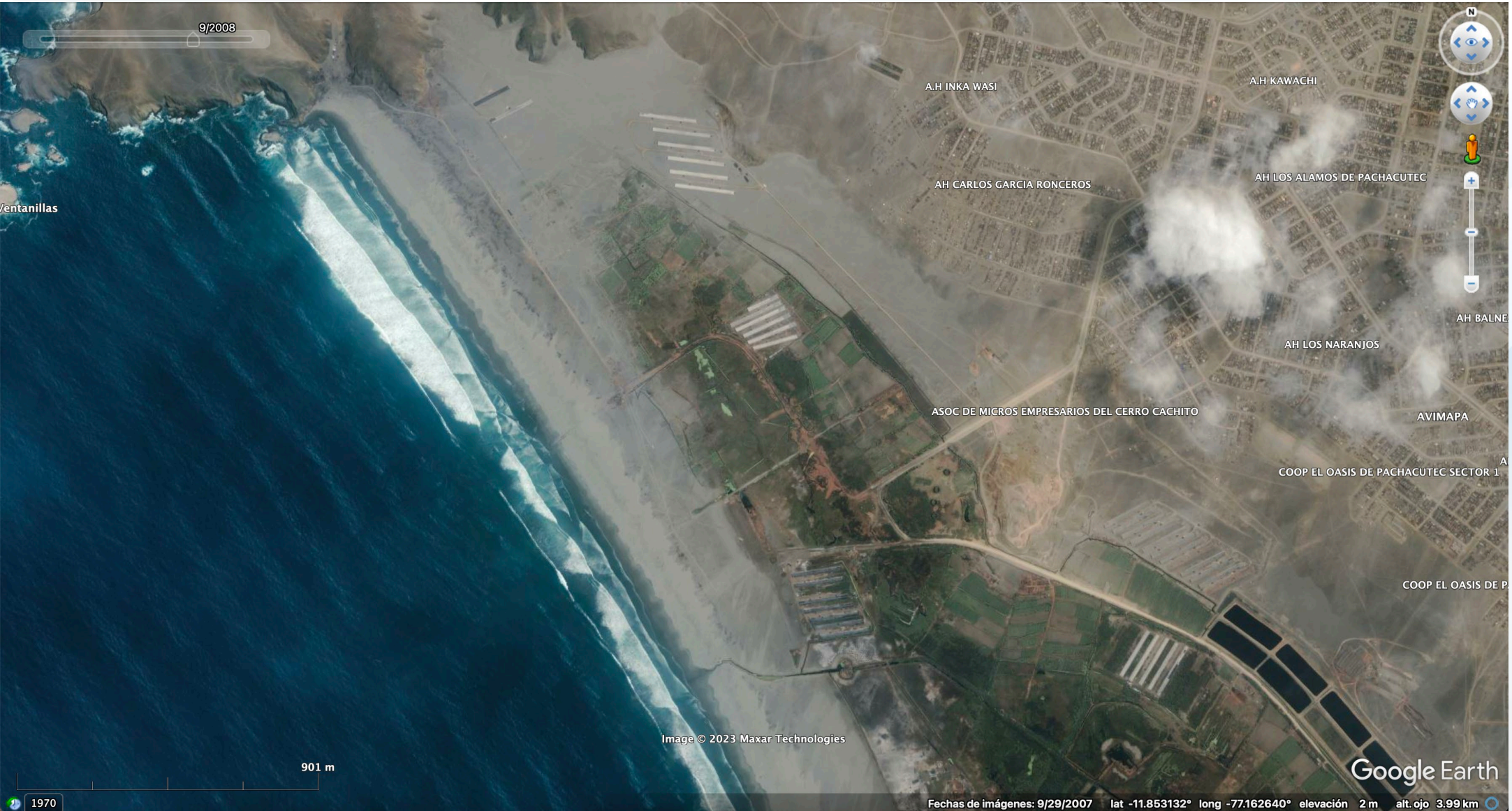

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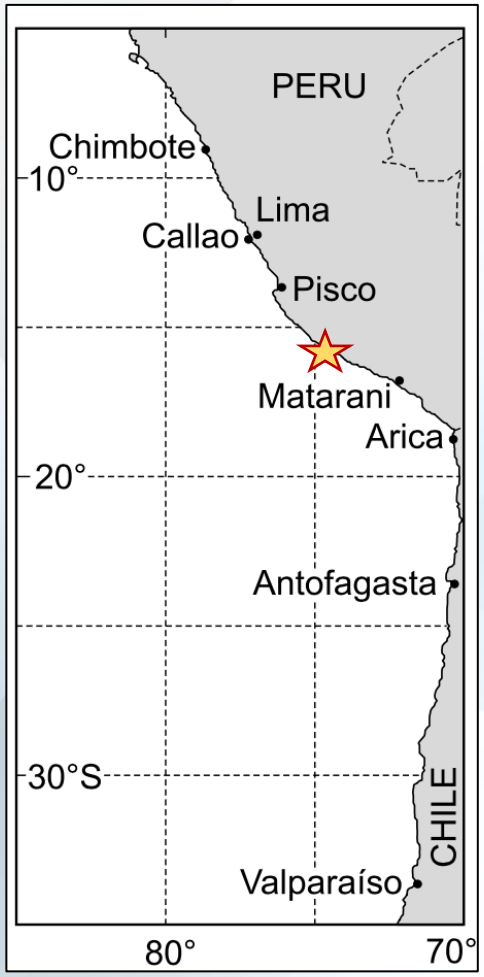

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