Paleotsunami Investigations in the Western Makran
IGCP UNESCO (740)

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ICG/IOTWMS Regional Working Group for the North-West Indian Ocean (RWG-NWIO) Tuesday 30th May 2023

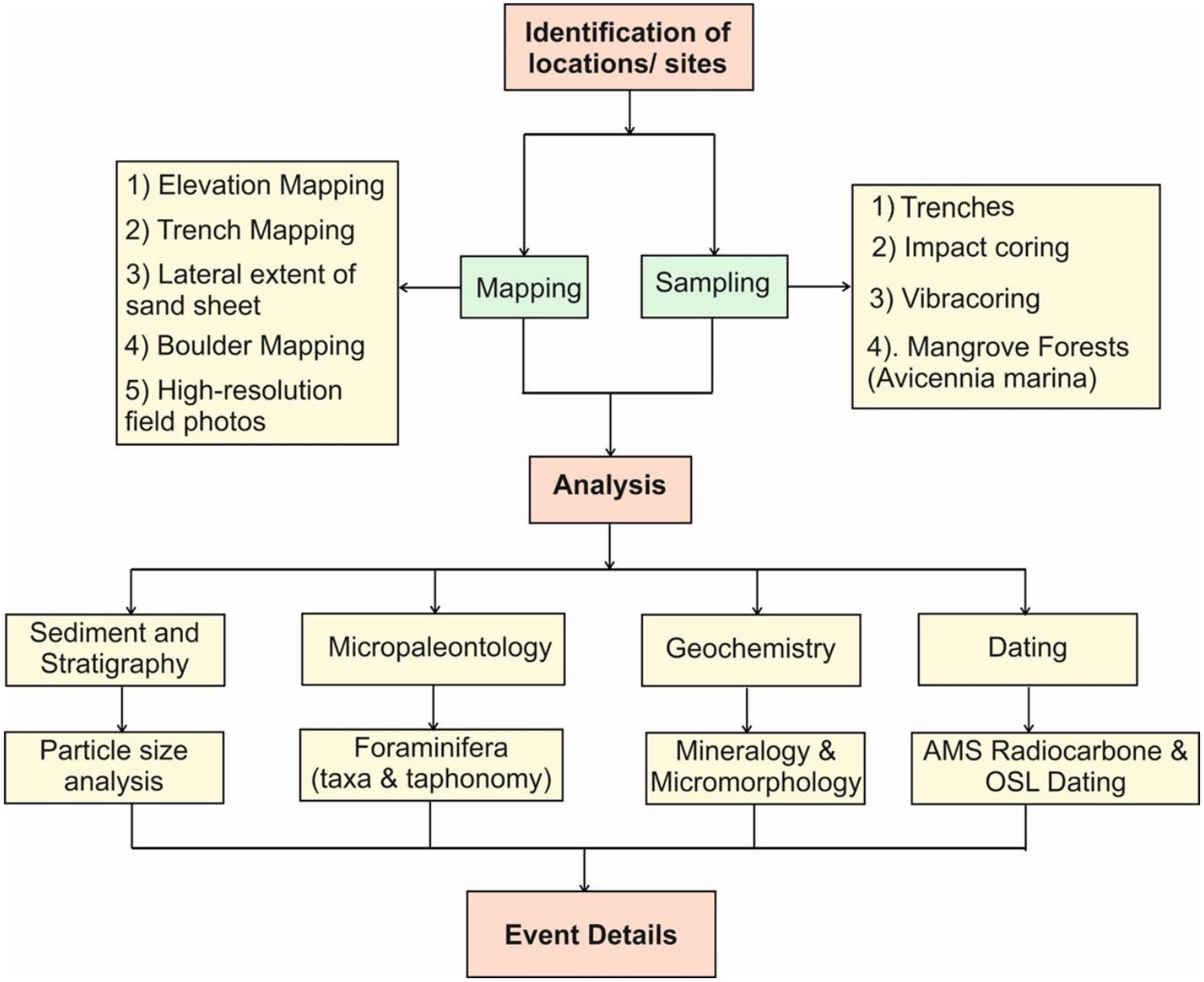
Aims of project:

- ✓ To construct the chronology of the historic/prehistoric tsunami events.
- ✓ To understand the recurrence of tsunamis/ large magnitude earthquakes.
- ✓ Improve Risk assessment methods and practices.
- ✓ Training and knowledge transfer on the knowledge of paleotsunami and its important and impact.
- ✓ Identification, mapping and dating of uplifted coastal terraces: for reconstructing the active tectonic history.

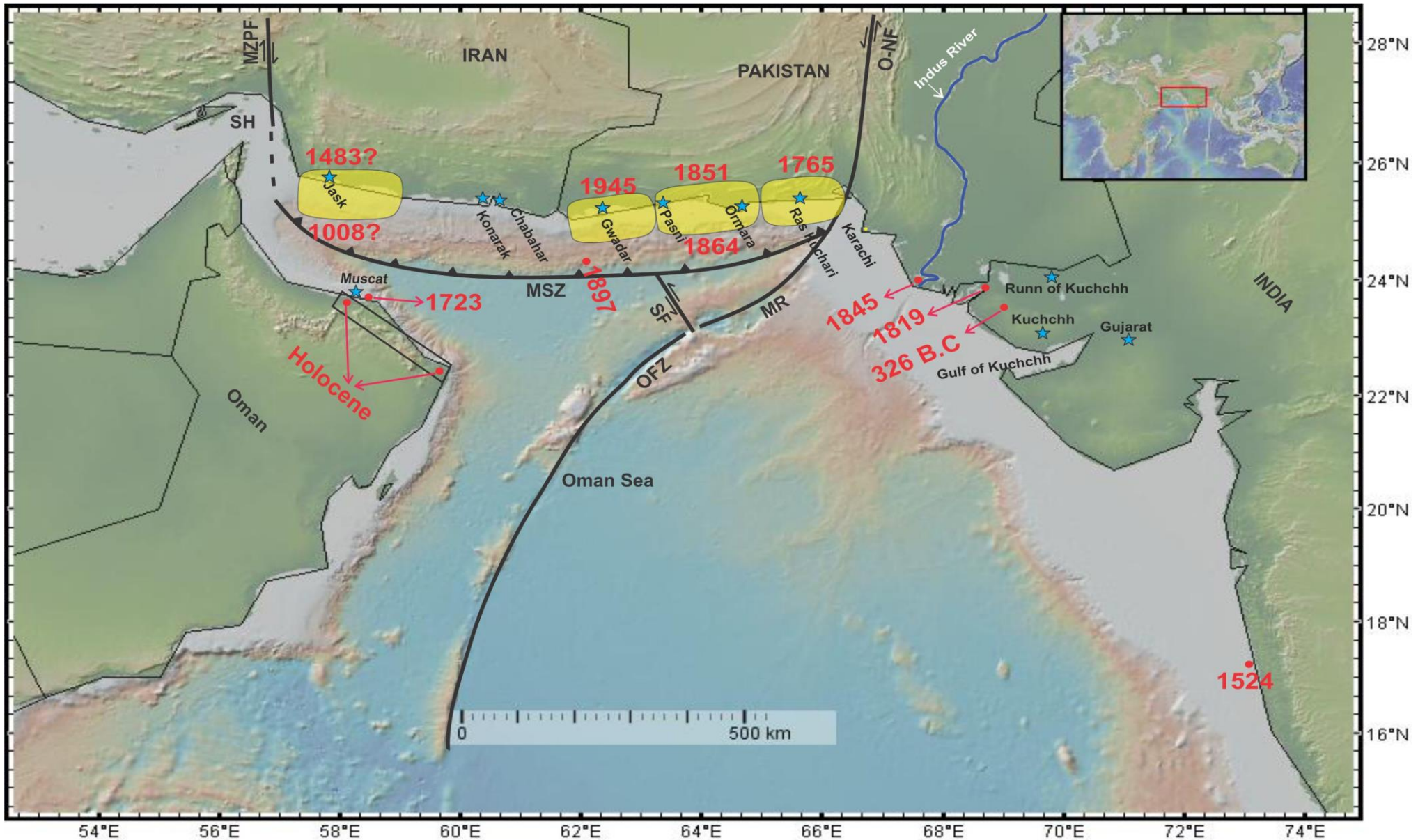
All these will be the key elements for:

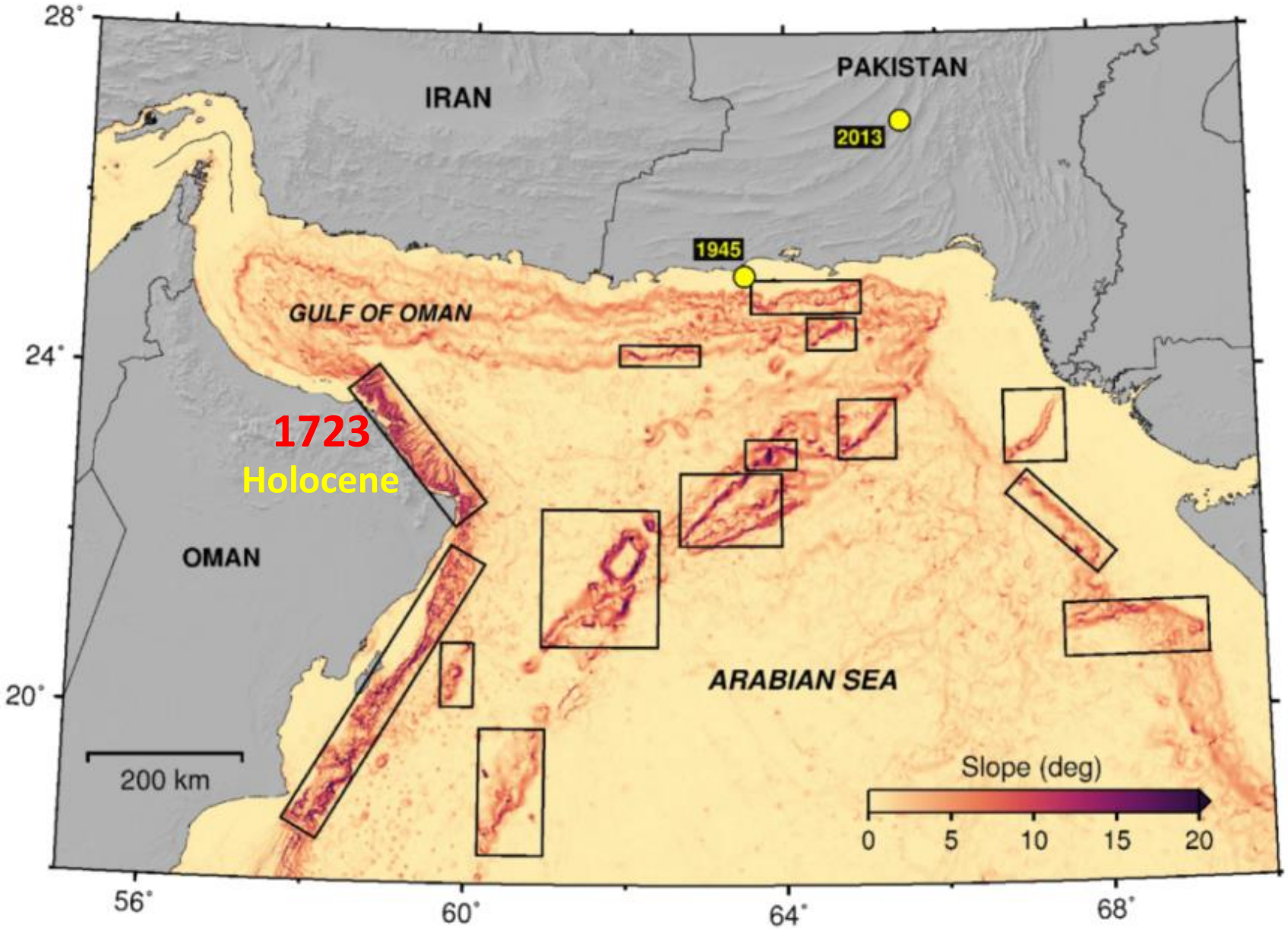
- ✓ Develop a refined understanding of the tsunami hazard assessment.
- ✓ Develop a regional vulnerability model considering the regional/ national needs.
- ✓ To find the best configuration for monitoring earthquake tsunami in the region of MSZ.
- ✓ To improve the tsunami early warning system capabilities to detect and warn about near-field tsunamis.

General flowchart for Paleo-tsunami studies (based on previous studies)



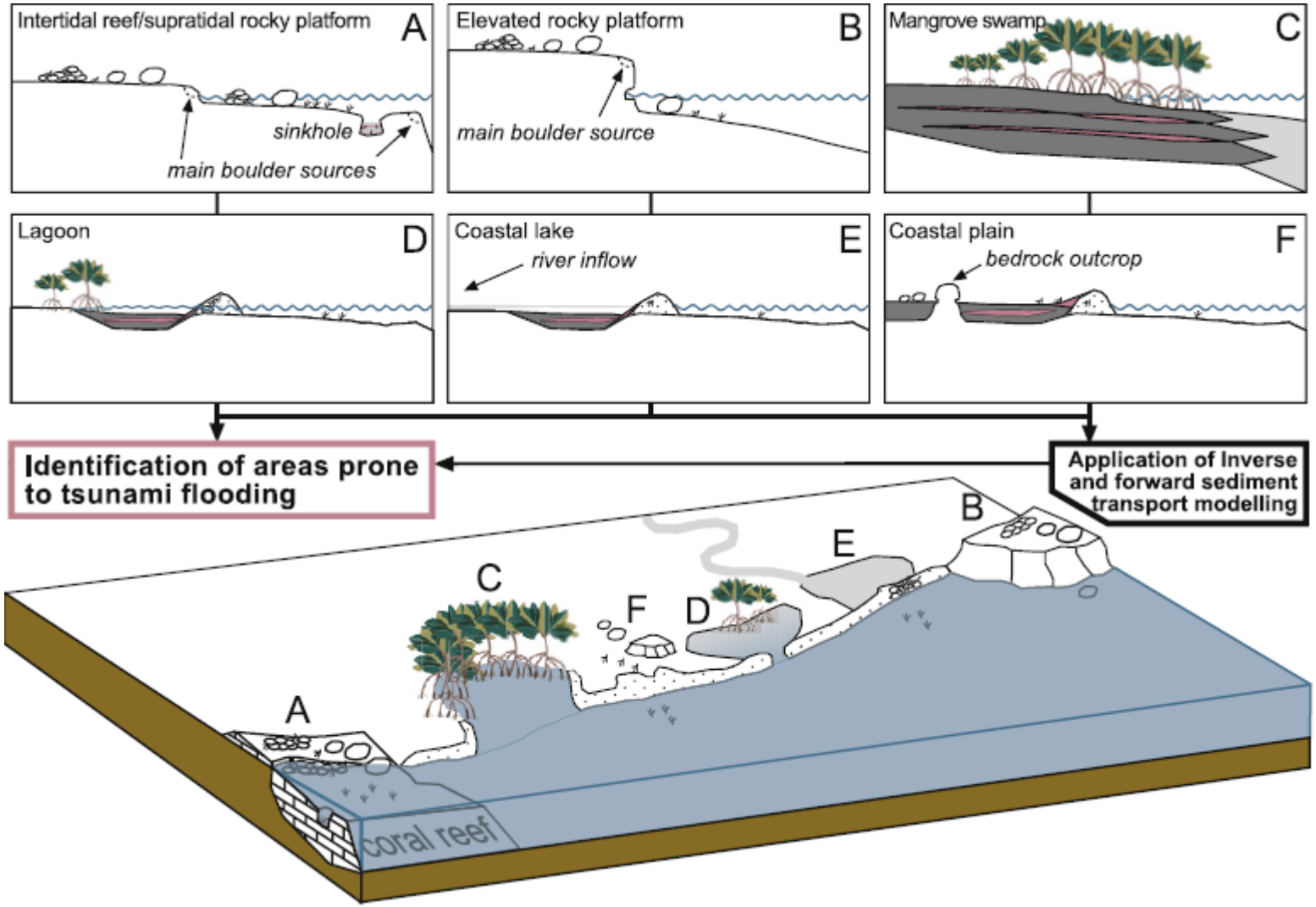
Historical Tsunami in the Makran Subduction Zone.




28°
24°
20°
56°
60°
64°
68°
IRAN
PAKISTAN
2013
1945
GULF OF OMAN
1723
Holocene
OMAN
ARABIAN SEA
200 km
Slope (deg)
0
5
10
15
20

Onshore sedimentary environments of paleotsunami deposits:

- ✓ Low-lying coastal plains.
- ✓ Marshes and estuaries.
- ✓ Swales within beach-ridge plains.
- ✓ Lagoons.
- ✓ Coastal lakes.
- ✓ Coastal sediment sections.
- ✓ Beaches (back-beach environments).
- ✓ Caves.



➢ Which one is found in the western onshore Makran??

Selected sites on the western onshore Makran for detail investigations

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- ✓ Tsunamis
- ✓ Paleo-tsunami studies: importance & limitation
- ✓ Why Makran Subduction Zone?
- ✓ Project IGCP UNESCO 740

No.	Description of Stage	Duration (Day)	1st Year	2nd Year	3rd Year	4th Year
Phase-1						
1	Literature review (published papers and local reports)	60				
2	Revision of the methodology and final methodology selection	20				
Phase-2						
3	Kickoff meeting	2				
4	Preliminary field visit & sites selection for trenching	30				
5	Final sites selection for trenching/training	30				
6	Trenching in 5 selected sites (20 trenches)/ training	30				
7	Trench mapping & sampling/ training	120				
8	Sediment & Stratigraphy analysis in the trenches/ training	200				
9	Reporting and samples preparation	40				
Phase-3						
10	Dating & geochemical analysis	210				
11	Data integration/ knowledge transfer	30				
12	Interpretation/ knowledge transfer	60				
13	Final report	40				
14	Technical meeting and decision making for extension of the project in Pakistan or Oman/ knowledge transfer in regional sense.	327				

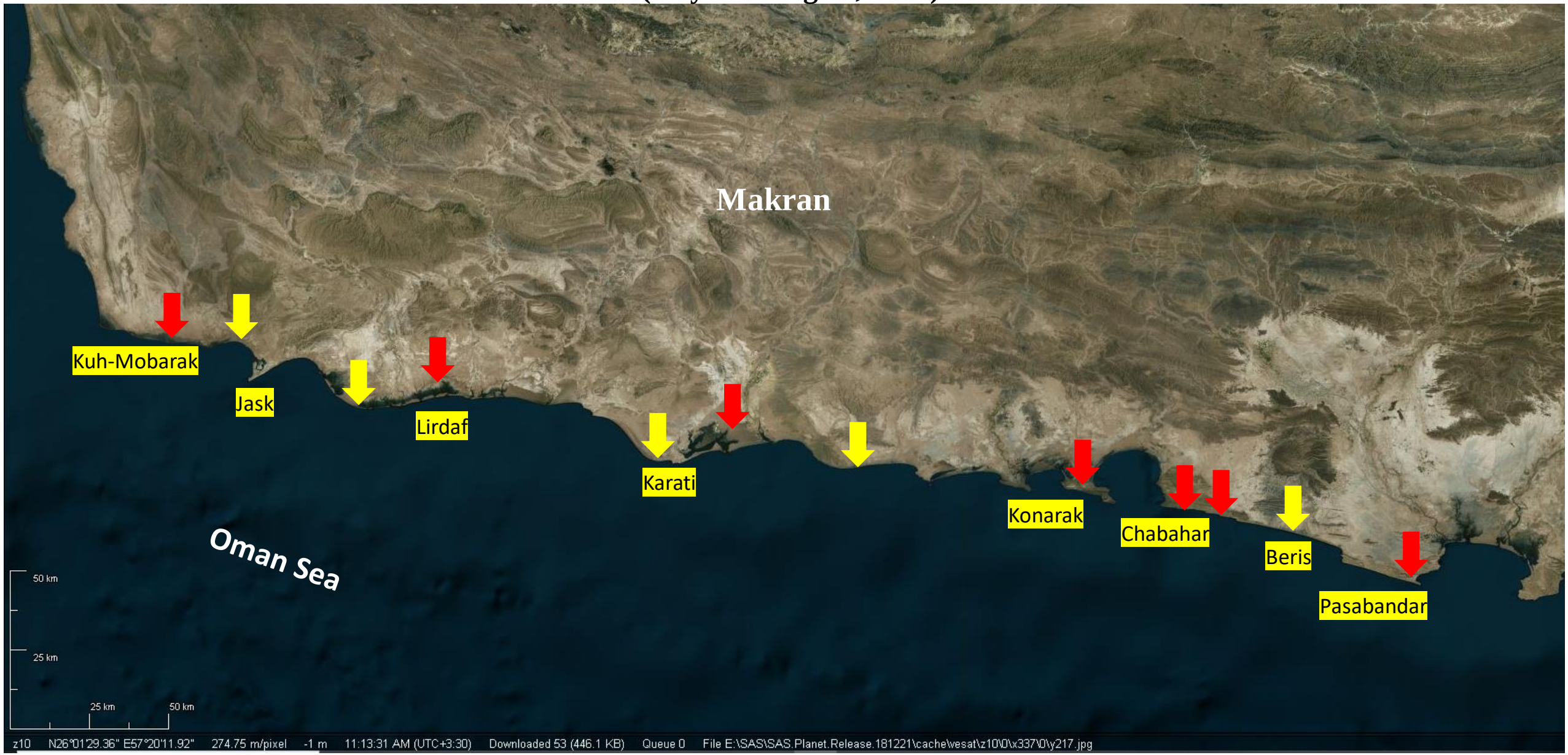
Conclusions:

- ✓ Field visit in June 2023 finalizing the 5 preliminary defines and trenching these sites. This organized such that Junior scientist and students will take part during the field trips.
- ✓ The samples will be shipped to India for analysis and dating. If financing allows Junior scientist will be invited to participate during the data analysis.

- ✓ More investigations of onshore sedimentary environments on the western onshore Makran is required depending on the result of the first analyzed samples.

- ✓ We are considering western offshore Makran for further paleotsunami sediments.

Preliminary field visit for identification of potential locations effected by past tsunami on the western onshore Makran (July and August, 2021)



Visited sites

Selected sites for further work (trenching, sampling, Boulder …)