High-Resolution Late Holocene Climatic Records of Lakes and Lagoons in Western Turkey

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Aim & Scope

- The main purpose: compare palaeoclimate records of ***Western Turkey*** with ***Europe***.

- We study: ***climatic*** and ***environmental*** sedimentary records of the last 6000 years at:

  1. Kucukcekmece Lagoon (Istanbul)
  2. Yenicaga (Bolu)
  3. Uludag glacial (Bursa)
  4. Bafa (Mugla) Lakes.

  a ***N–S transect*** of Western Turkey

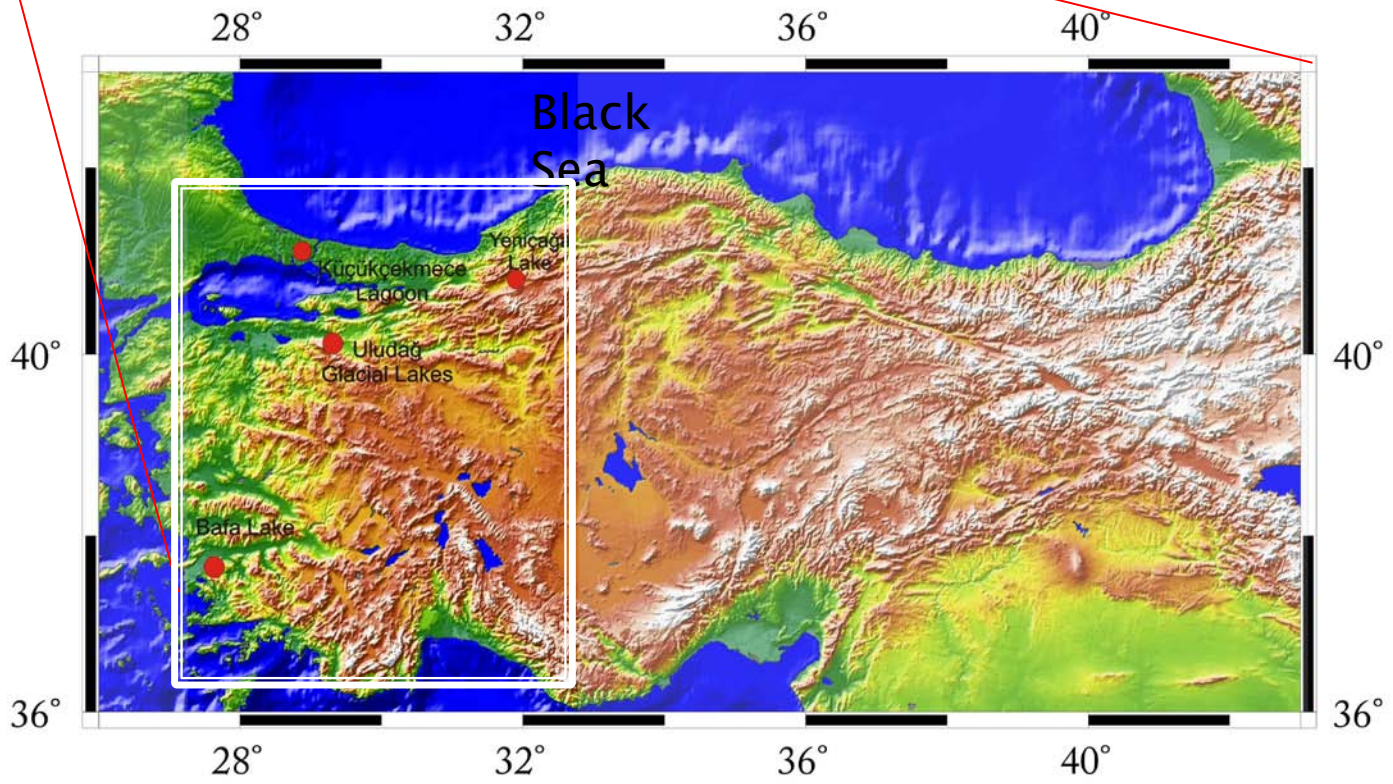
- Intersted period: ***Late Holocene***

Analytical & Sampling Methods

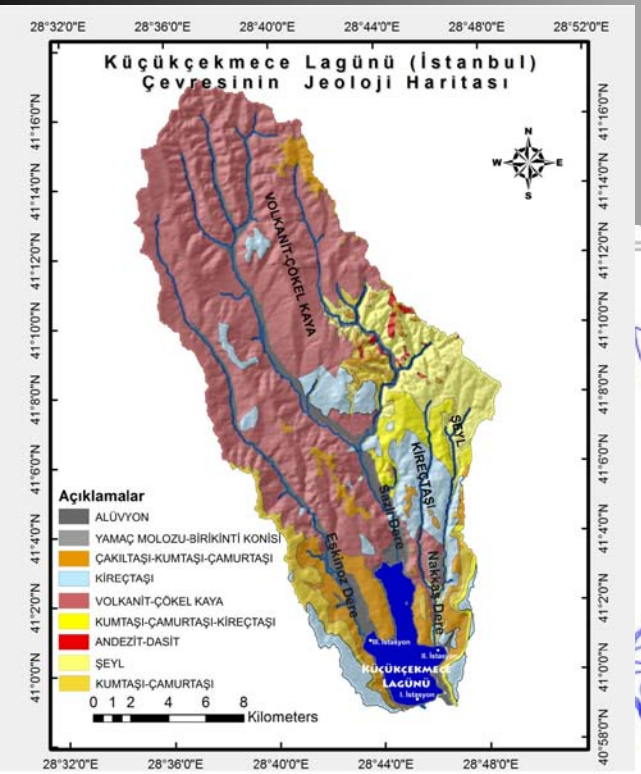
- **Piston** *(up to 5 m)* **and interface cores** *(up to 1 m)* by portable platform
- **Physical properties**
  - Core description ***(split cores)***
  - MSCL (Multi Sensor Core Logger); Magnetic Susceptibilty, P-wave velocity, Density, Rezistivity sensors ***(5 mm)***
- **Geochemical Properties**
  - XRF (X-Ray fluorescence) Core Scanner; up to 25 elements ***(0.2 mm)***
  - TOC/TIC Analysis ***(50 mm)***
- **Micropaleontological Properties**
  - Benthic Foraminifera (***50 mm)***
  - Ostracoda ***(50 mm)***
- **Isotopic Analysis**
  - Stable $\delta^{18}O$, $\delta^{13}C$ ***(50 mm)***
  - AMS and Conventional C-14 dating ***(bivalvia shells, organic carbon, plants)***, calibrated calender years by CALIB. 6 software

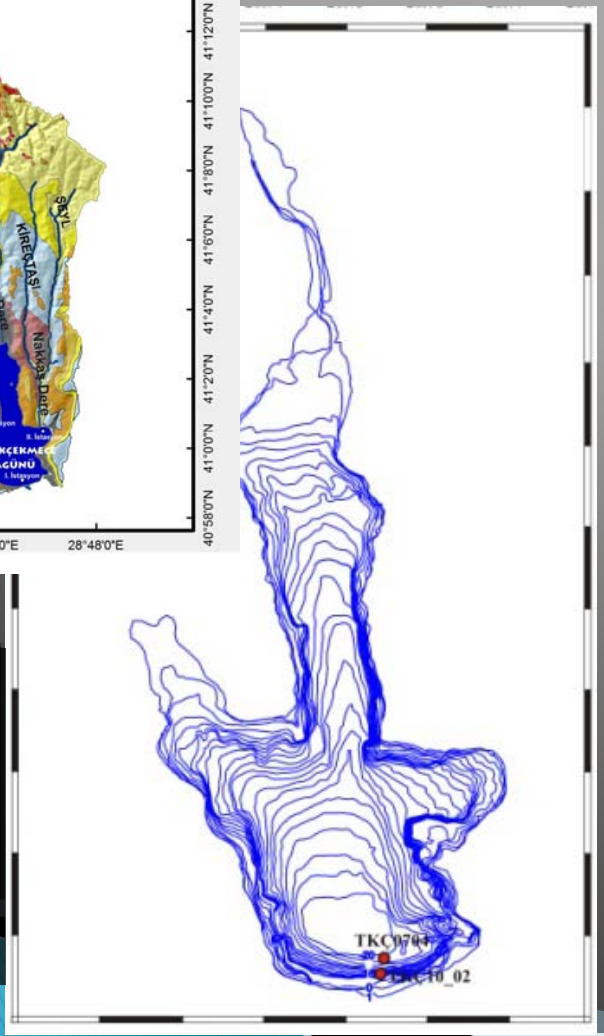
Study area

1. Kucukcekmece Lagoon (Istanbul)
2. Yenicaga Lake (Bolu)
3. Uludag Glacial Lakes (Bursa)
4. Lake Bafa (Mugla-Aydin)

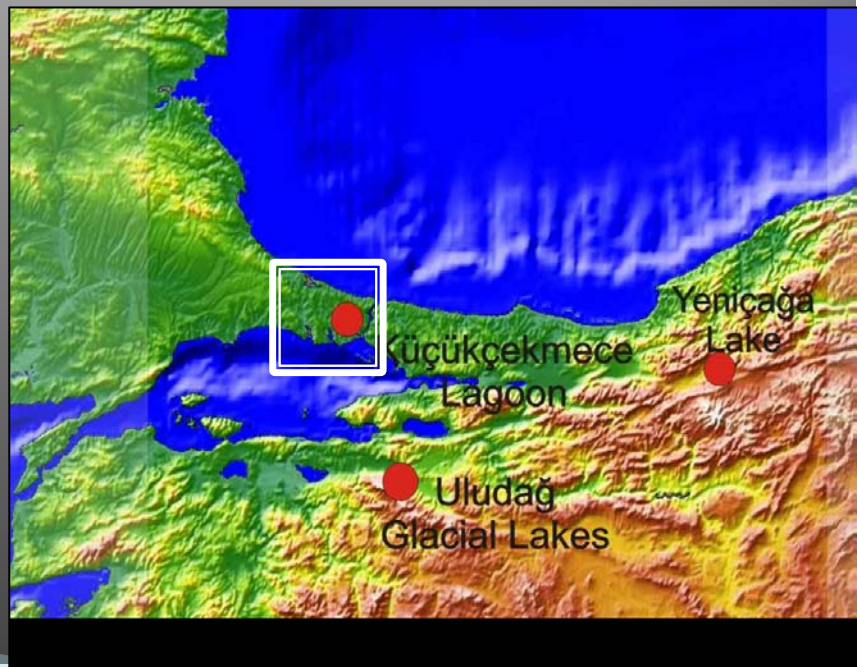


Kucukcekmece Lagoon





- Northern shoreline of **Sea of Marmara**
- Connected to SoM via a 2 km long natural narrow channel.
- Surface area; 15 km^2, max. Depth; 20 m, water volume; 145x10^6 m^3.
- Fed by small streams & groundwater springs.



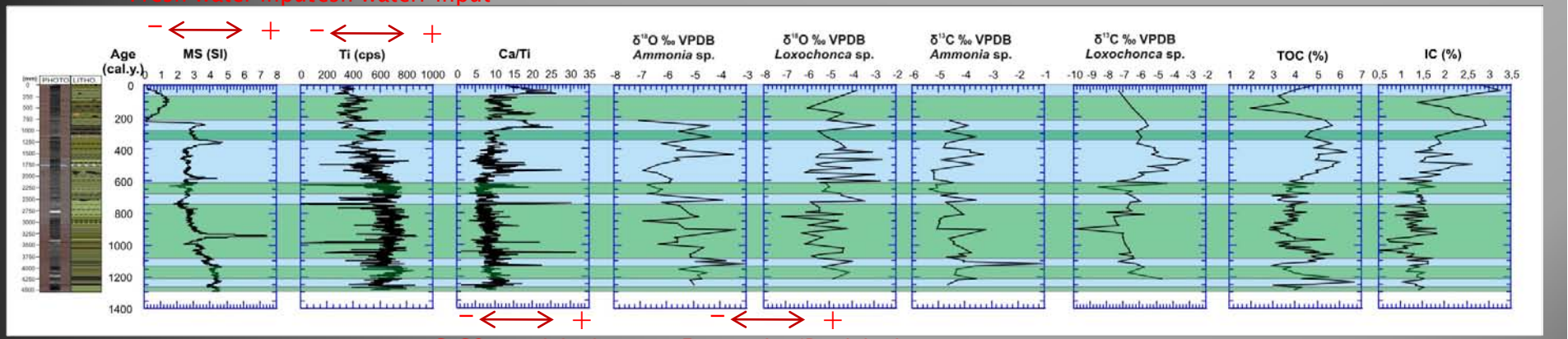
- **TKC10_02**
  - depth: 16 m
  - length:580 mm
- **TKC0704**
  - depth: 16 m
  - length: 4510 mm

Kucukcekmece Lagoo

Wet periods	Dry periods
⇧ High freshwater input	⇧ High Evaporation
⇧ High **MS, Ti , TOC** values	⇩Low **MS, Ti , TOC** values
⇩ Low $CaCo_3$ precipitation	⇧ High $CaCo_3$ precipitation
⇩low $\delta^{18}O$ values	⇧ High $\delta^{18}O$ values

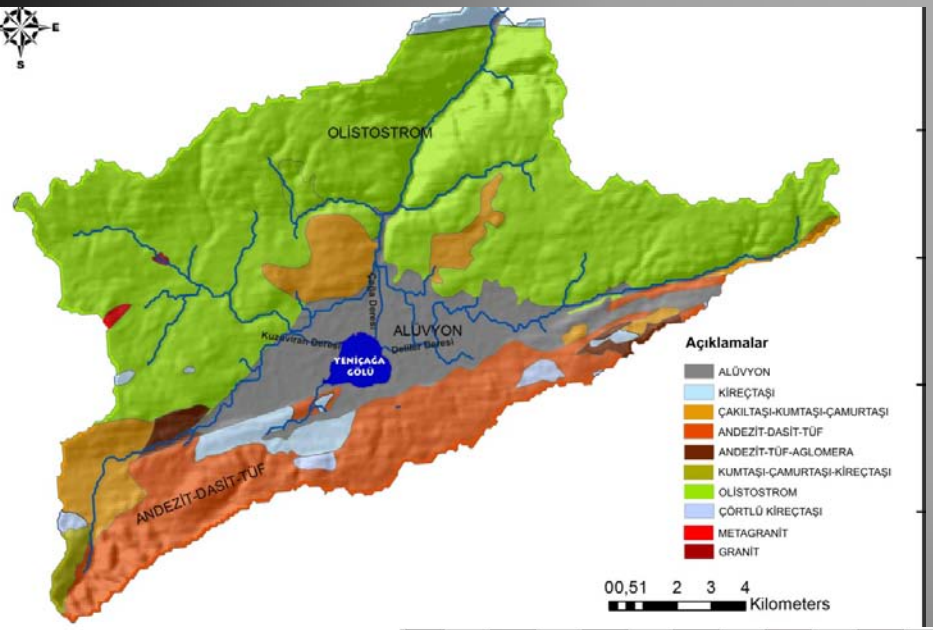
- The core covers **the last 1300** a (BP).

Fresh water input Fresh waterr input

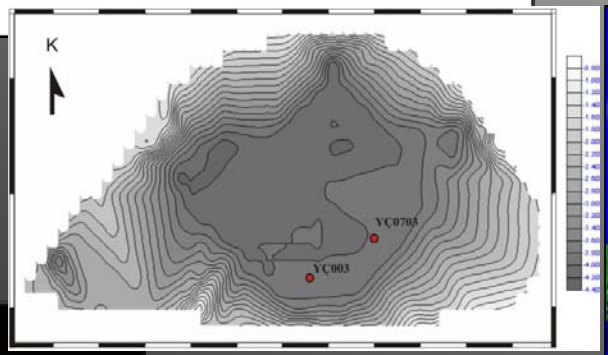


Main	Interval periods	Main	Dry periods
			0 - 70
70-200	**70 – 200**		
		200-750	**200 – 750**
750-1000	**750 – 1000**		
		1000 - 1250	*1000 – 1100*
	1100 – 1200		
			1200 - 1250
	1250 - 1300		

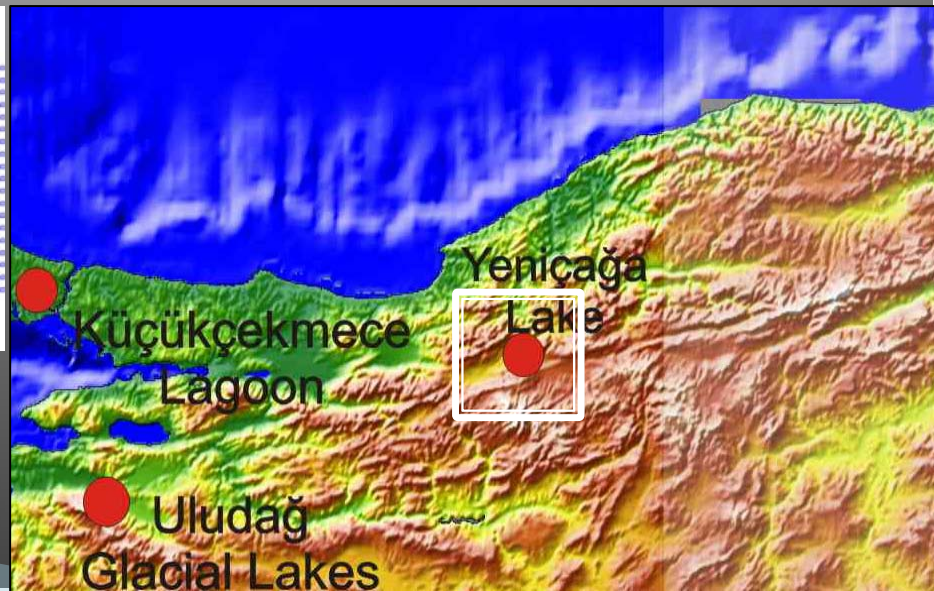
Yenicaga Lake



- Tectonic lake, 976 meters a.s.l. on **NAF**
- Freshwater lake, surface area; 2.9 km2, max. **depth; 4.5 m.**
- Formed during the Quaternary period with an initial surface area 3 times larger and max. depth of 10 m.
- Fed by ephemeral streams and overland flows, and has no surface outlet.



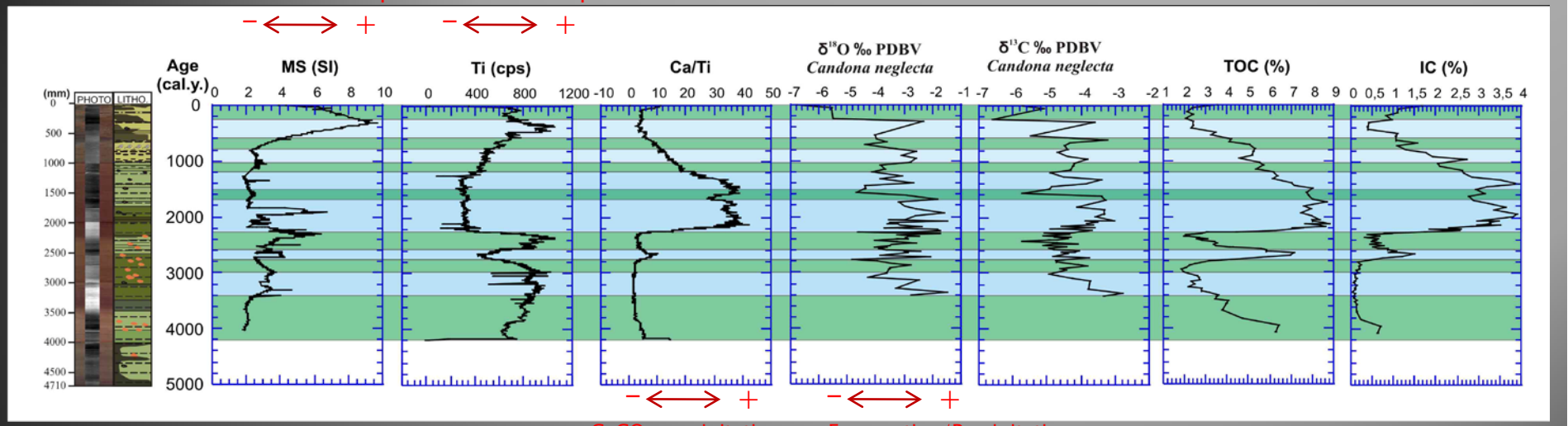
- **YC003**
  - depth: 4.2 m
  - length:890 mm
- **YC0703**
  - depth: 4.0 m
  - length: 4710 mm



Yenicaga Lake

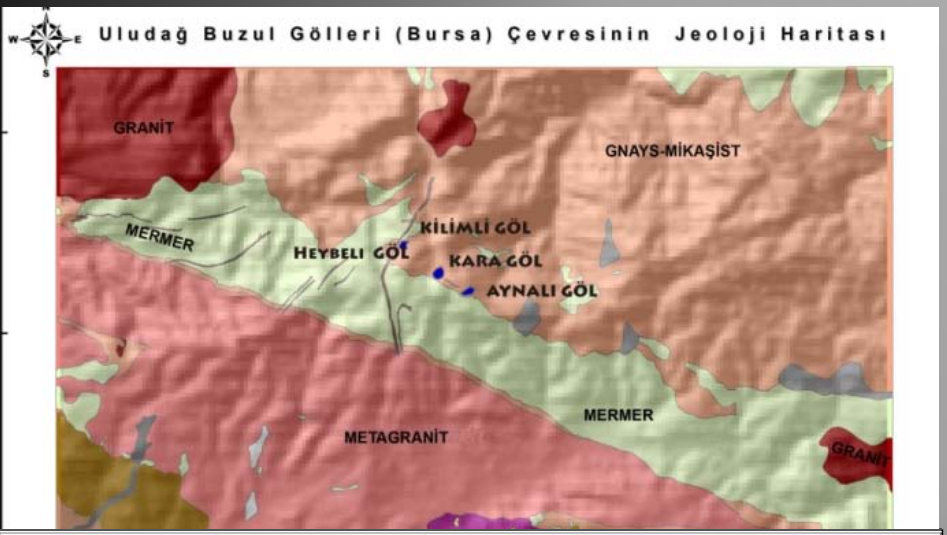
Wet periods	Dry periods
⇧ High freshwater input	⇧ High Evaporation
⇧ High **MS, Ti , TOC** values	⇩Low **MS, Ti , TOC** values
⇩ Low $CaCo_3$ precipitation	⇧ High $CaCo_3$ precipitation
⇩low $\delta^{18}O$ values	⇧ High $\delta^{18}O$ values

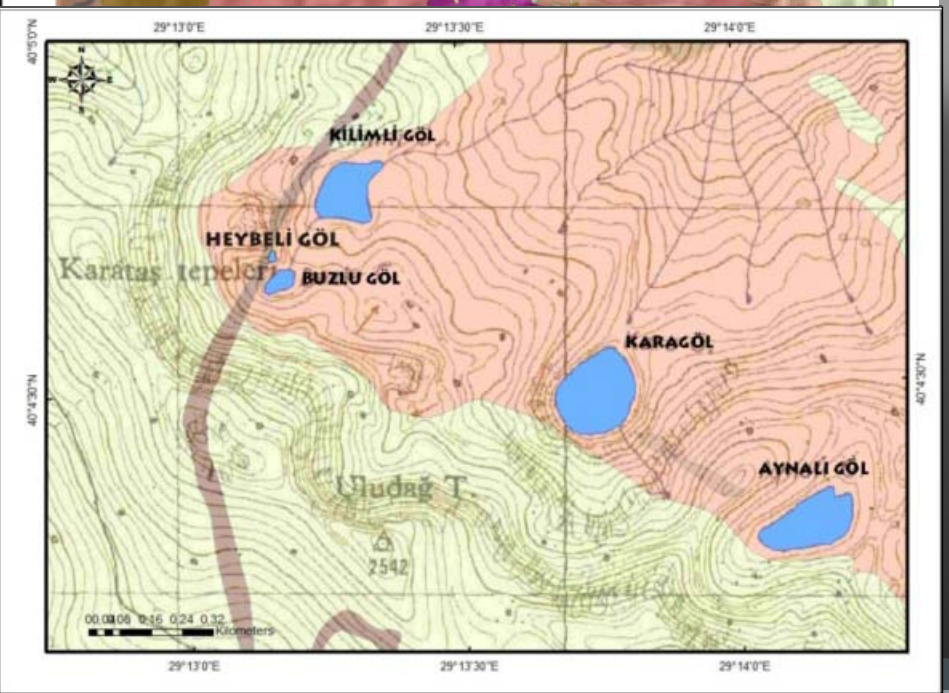
- The core provides the records of the last 4200 a (BP).



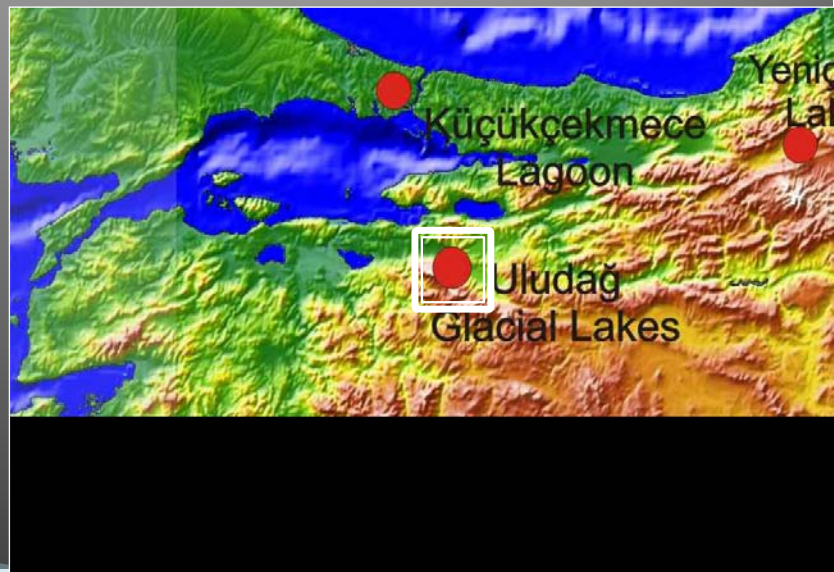
Main	Interval periods	Main	Dry periods
0-250	0 – 250		
		250-600	**250 – 600**
600 - 1700	**600** – 800		
			800 – 1000
	1000 – 1200		
			1200 – 1500
	1500 – **1700**		
		1700 - 3400	**1700** – 2200
	2200 – 2600		
			2600 – 2800
	2800 – 3000		
			3000 – **3400**
	3400 - 4200		

Uludag Glacial Lakes

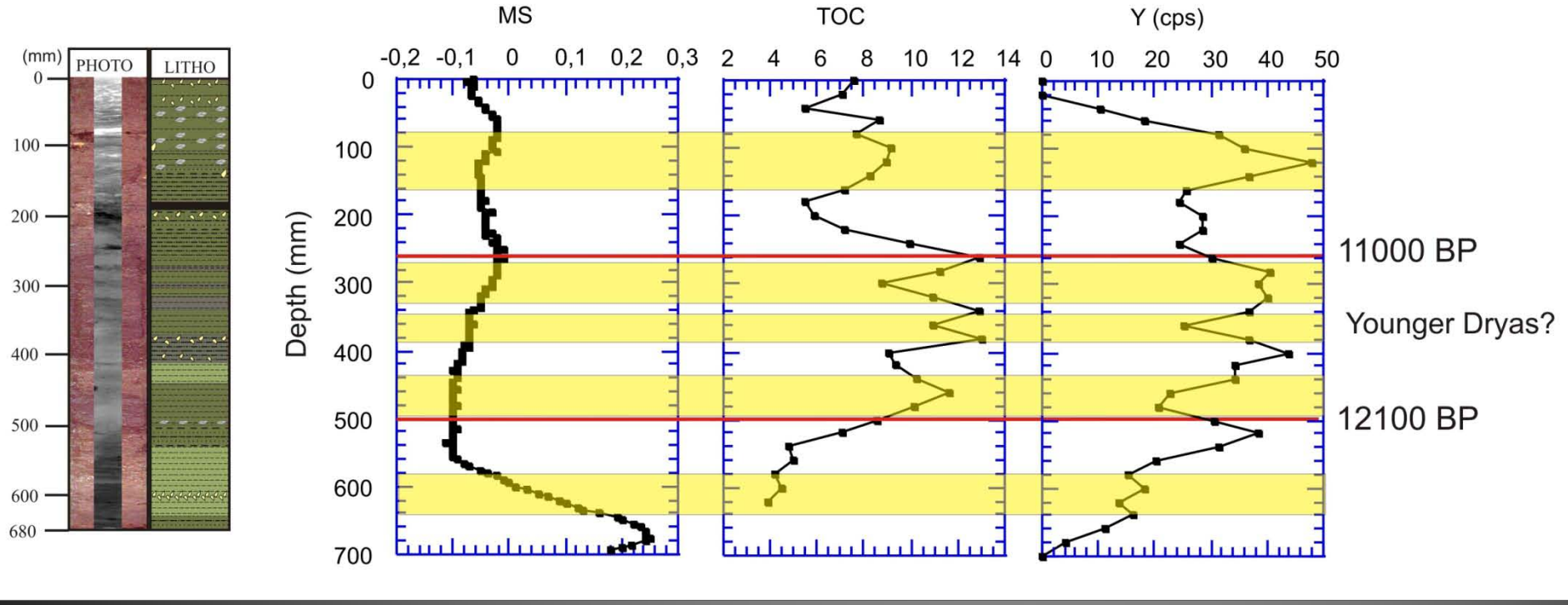




- Highest mountain in Marmara Region
- NW-SE-trending solitary mountain ridge located ca 100 km south of Istanbul
- Glacial lakes located at ~2500 km high
- Formed at Pleistocene
  - Kara Lake
  - Kilimli Lake
  - **Aynali Lake** depth: 0.1 m, L :650 mm
  - Heybeli Lake
  - Buzlu Lake (not studied)



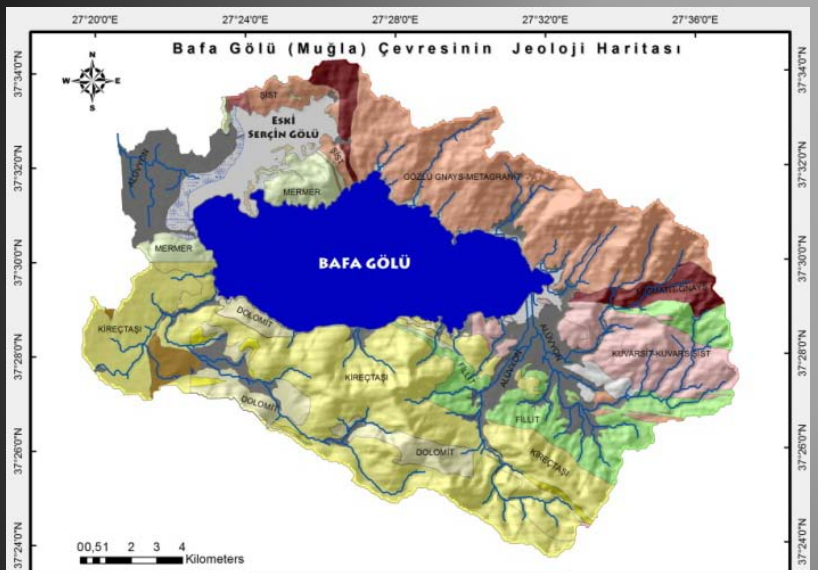
Aynali Lake (Uludag)

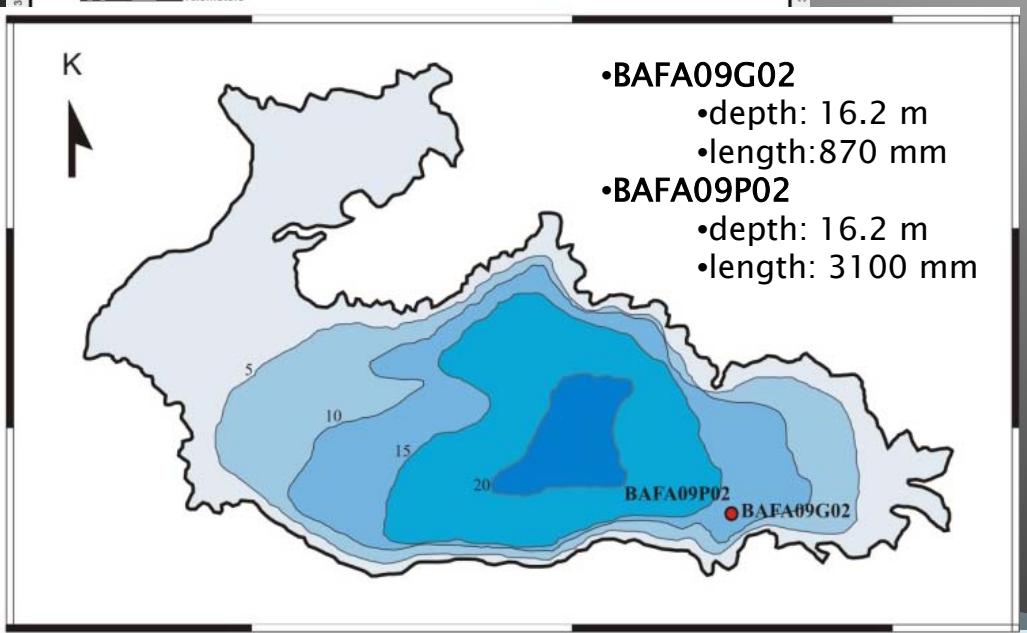


- Is the top of the core missing?
- Is there a problem with C-14 organic carbon ages?

Lake Bafa

- Largest coastal lake in Aegean coast of Turkey, surface area of 68.6 km2, max. depth; 21 m.,catchment area; 315 km2.
- 2 m a.s.l., 30 km southeast of Büyük Menderes Delta.
- Developed by the closure of the entrance of the Latimian Gulf in the southeast of the Büyük Menderes river estuary by delta progradation.

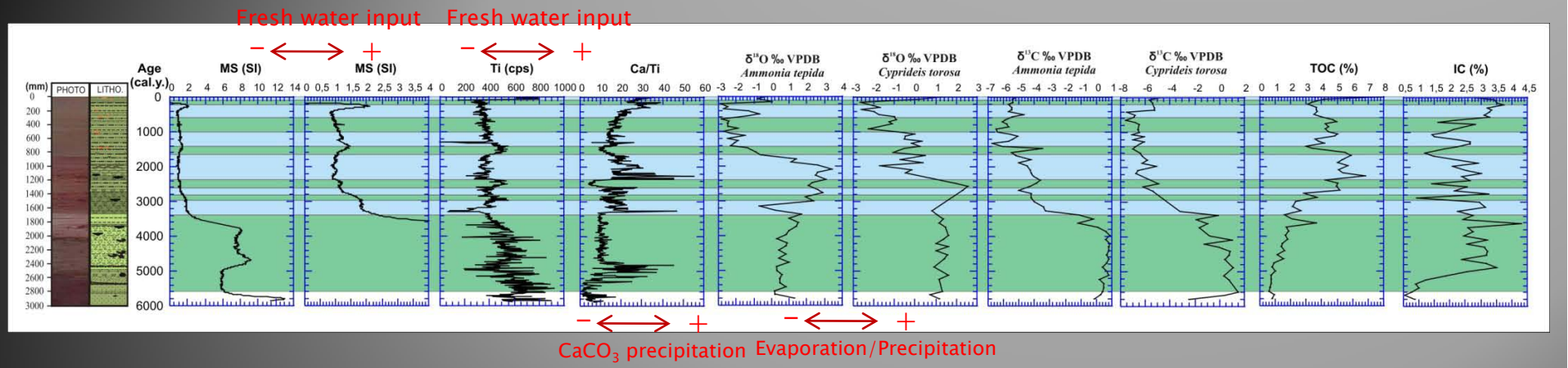




Lake Bafa

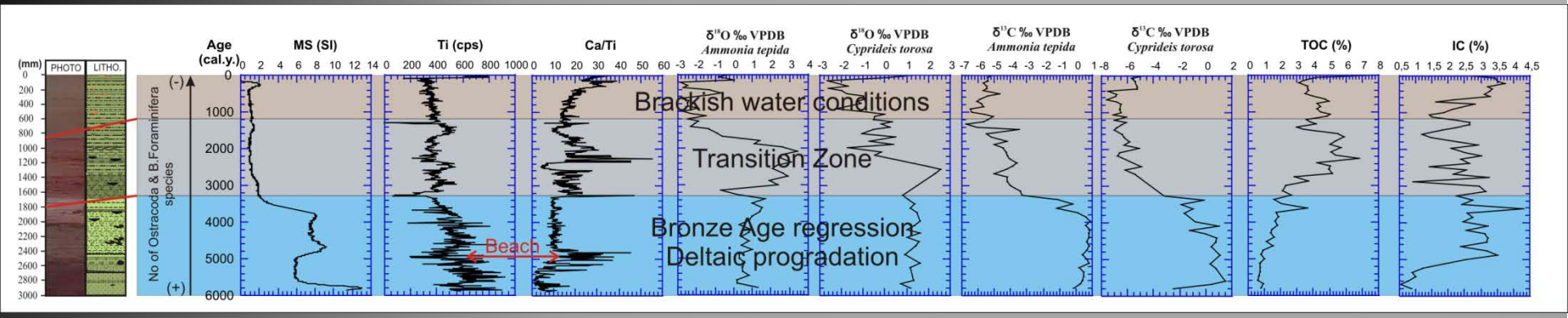
Wet periods	Dry periods
⇧ High freshwater input	⇧ High Evaporation
⇧ High **MS, Ti , TOC** values	⇩Low **MS, Ti , TOC** values
⇩ Low $CaCo_3$ precipitation	⇧ High $CaCo_3$ precipitation
⇩low $\delta^{18}O$ values	⇧ High $\delta^{18}O$ values

- The record of the last 6100 a. (BP)



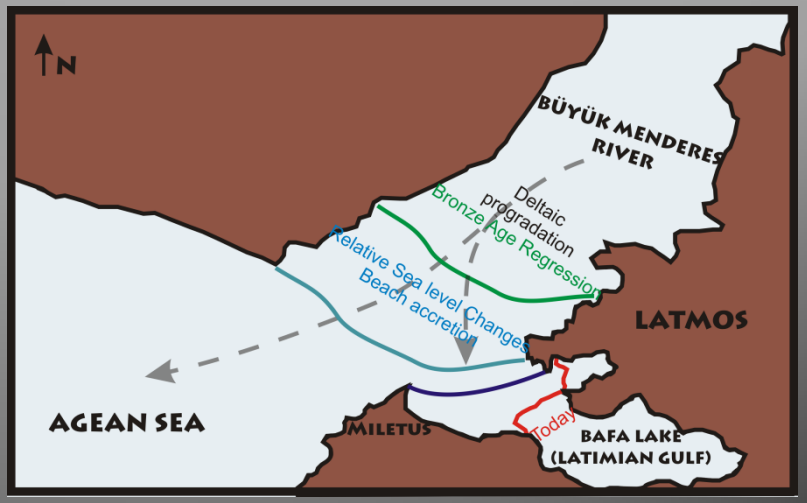
Main	Interval periods	Main	Dry periods
			0 – 80
	80 – 200		
		200-600	**200 – 600**
600 -1700	600 – 1000		
			1000 – 1400
	1400 – 1700		
		1700 - 3400	1700 – 2400
	2400 – 2600		
			2600 – 2800
	2800 – 3000		
			3000 - 3400
3400-5600	**3400 -5600**		

Lake Bafa

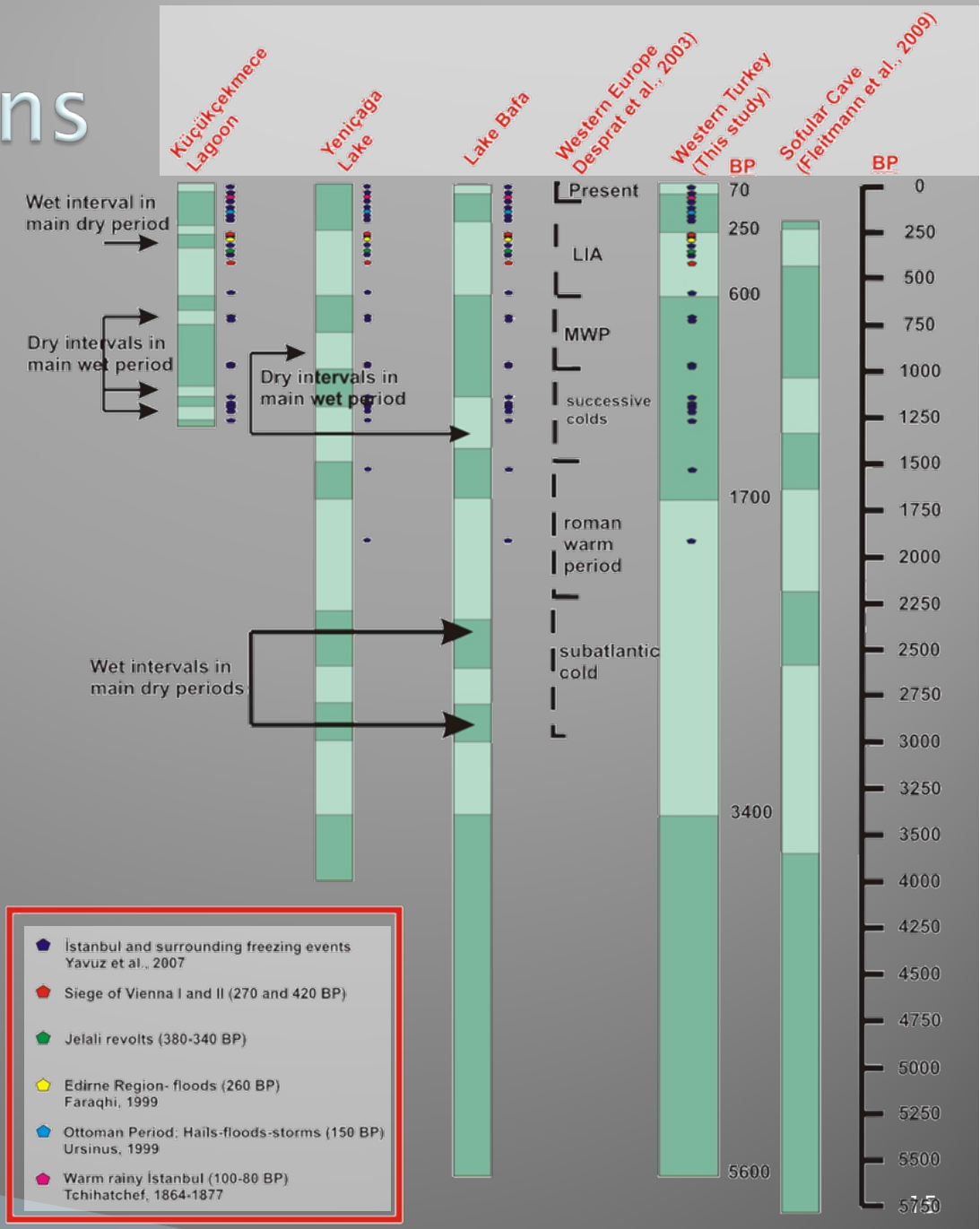


Present-1200 BP: Brackish water conditions
1200-3200 BP: Transition Zone
3200-6100 BP: Broze Age regression (deltaic progradation)

- Change in lithology from highly fossliferous sand to homogenous mud
- Decrease in the diversity of ostracoda and foraminifera species and $\delta^{18}O$ values of benthic foraminifera shells.



Main Conclusions



Main Conclusions

- Bafa Lake start to seperate at 3200 BP by delta progradation in the Büyük Menderes River estuary.
- Major dry periods are observed during ca 3400-1700, 600-250 and 70-0 a BP
- Major wet periods are observed during ca 5600-3400, 1700-600, 250- 70 a BP
- The Little Ice Age (LIA; 600-160 a BP) record is found in all studied locations. However, this period is represented by both wet and dry conditions in western Turkey.
- A major wet period observed during ca 1700-600 a BP in the study area correlates well with the Medieval Warm Period in Europe (1100-630 a BP; 900-1380 AD).

On the platform at Kucukcekmece lagoon

Thank you for your attention!

Referances

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