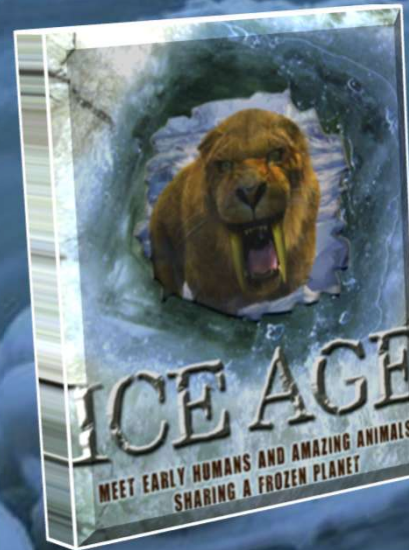


4. iklim Stratigrafisi



Temel birim **jeolojik-iklim birimidir.**

Kuvaterner, istifleri
Özellikle Orta Avrupa ve Kuzey Amerika'daki
buzul çökelleri sayesinde
iyi kurgulanmıştır

İklimsel deęişimlerin
aşınma ve sedimantasyon
üzerinde önemli etkisi vardır

Bu yaklaşım, öncelikle
karasal çökellere uyarlanmıştır

Buzul ve buzul olmayan
stratigrafik istifler şeklinde
sınıflamak uygundur

Farklı coğrafyalarda buzulların maksimum olduğu zamanlar

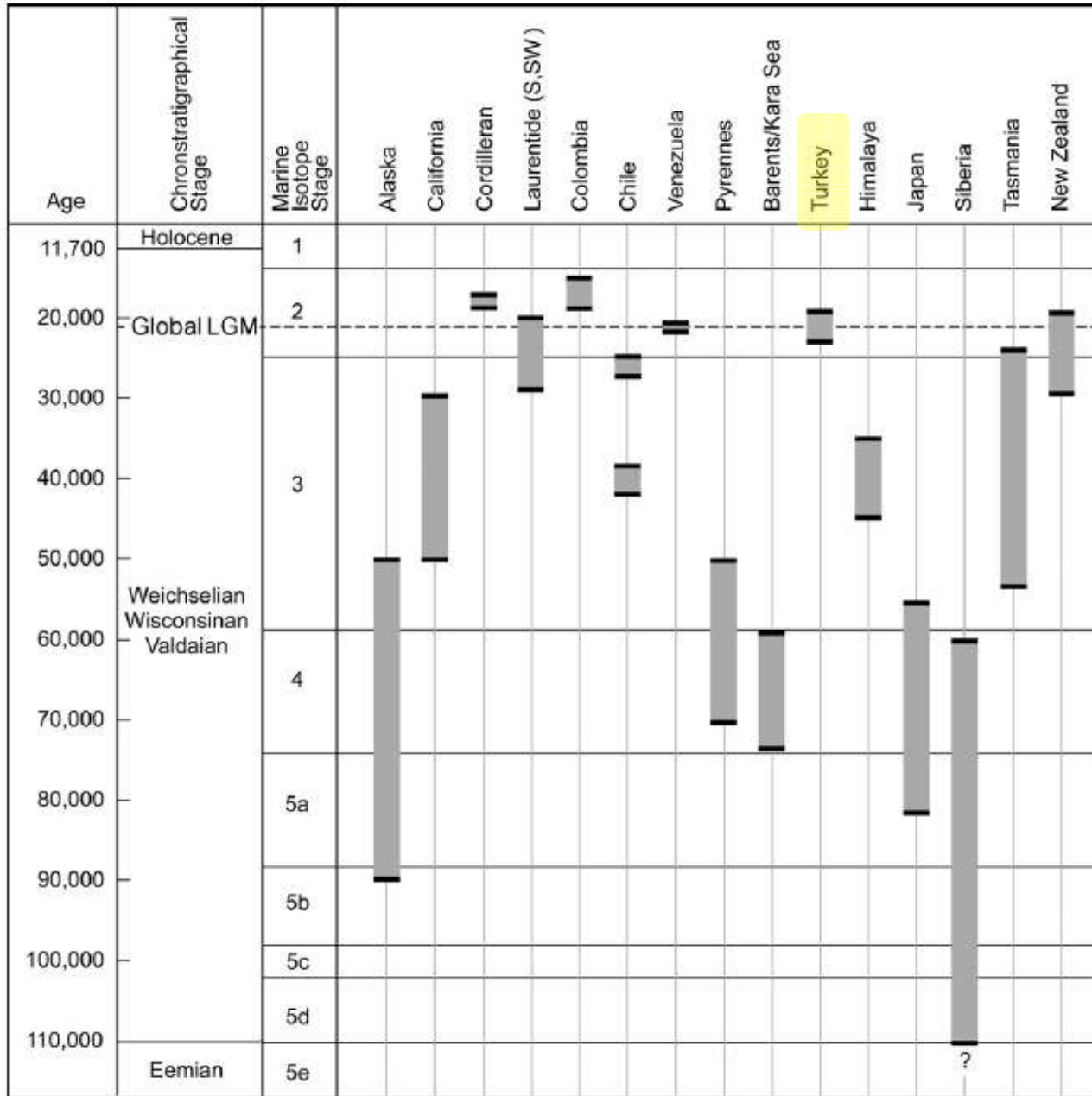


FIGURE 1.5 Timings of maximum extents of glaciers in different parts of the world. The global LGM in this diagram refers to the trough in the marine isotope record at (Martinson et al., 1987) and the associated global eustatic sea level low (Yokoyama et al., 2000) dated to ca. 21 ka cal. BP. This figure just represents a selection of records from around the world and illustrates the differing timing of glacier maxima in different places.

Dört büyük buzullaşma
olduğu yönünde evrensel bir kabul vardır.

	Alpler	Kuzey Avrupa	Kuzey Amerika	Avrupa Rusya
Yazarlar	Penck & Brückner (1909-11)	Woldstedt (1926)	Flint (1957)	Flint (1957)
Buzul <i>Buzul arası</i>	Würm <i>Riss/Würm</i>	Weichsel <i>Eem</i>	Wisconsin <i>Sangamon</i>	Valdai <i>Mikulino</i>
Buzul <i>Buzul arası</i>	Riss <i>Mindel/Riss</i>	Saale <i>Holstein</i>	Illinoian <i>Yarmouth</i>	Moscow/Dneipr <i>Lichvn</i>
Buzul <i>Buzul arası</i>	Mindel <i>Günz/Mindel</i>	Elster <i>Cromer</i>	Kansan <i>Aftonian</i>	Oka <i>Muchkap</i>
Buzul	Günz		Nebraskan	?

Tablo 7

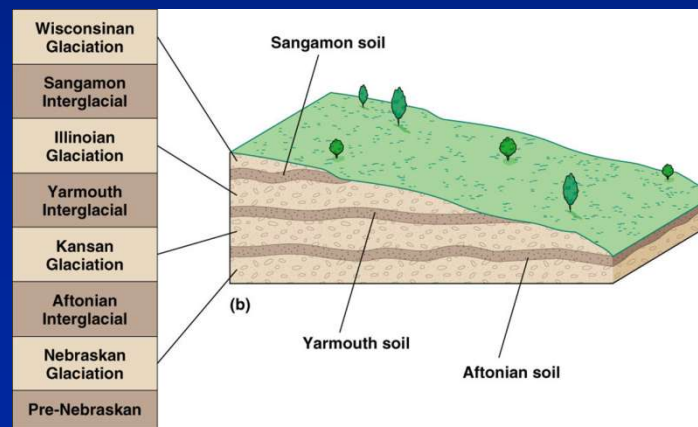
Alp bölgesindeki buzullaşma ve buzul arası dönemler ve Kuzey Yarım Küre'deki diğer bölgelerle karşılaştırılması

Alpin şeması (Tablo 7, 8) buzul-akarsu birikimlerine dayanmaktadır

Chronology of major glaciations (ice ages) and interglaciations (warmer periods) in North America, northern Europe, and the Alps

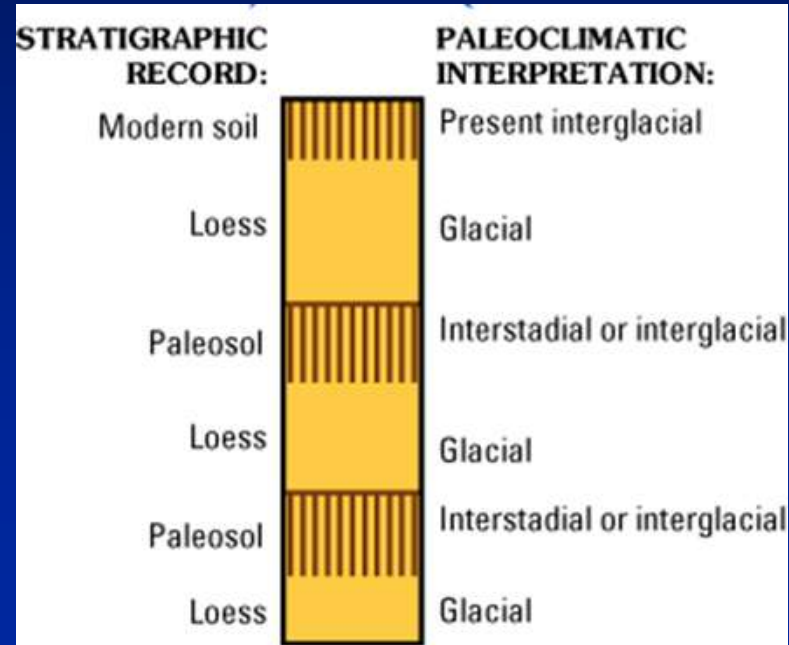
Thousand years ago*	North America		Northern Europe		Alps	
	glaciation	interglaciation	glaciation	interglaciation	glaciation	interglaciation
13–60	Wisconsin		Weichsel		Würm	
115–140		Sangamon		Eemian		Riss-Würm
140–350	Illinoian		Saale		Riss	
440–500		Yarmouth		Holstein		Mindel-Riss
500–640	Kansan		Elsterian		Mindel	
640–700		Aftonian		Cromerian		Günz-Mindel
780–900	Nebraskan		Menapian		Günz	
900–1,300				Waal		Donau-Günz
1,300–1,500			Eburon		Donau	

Tablo 8



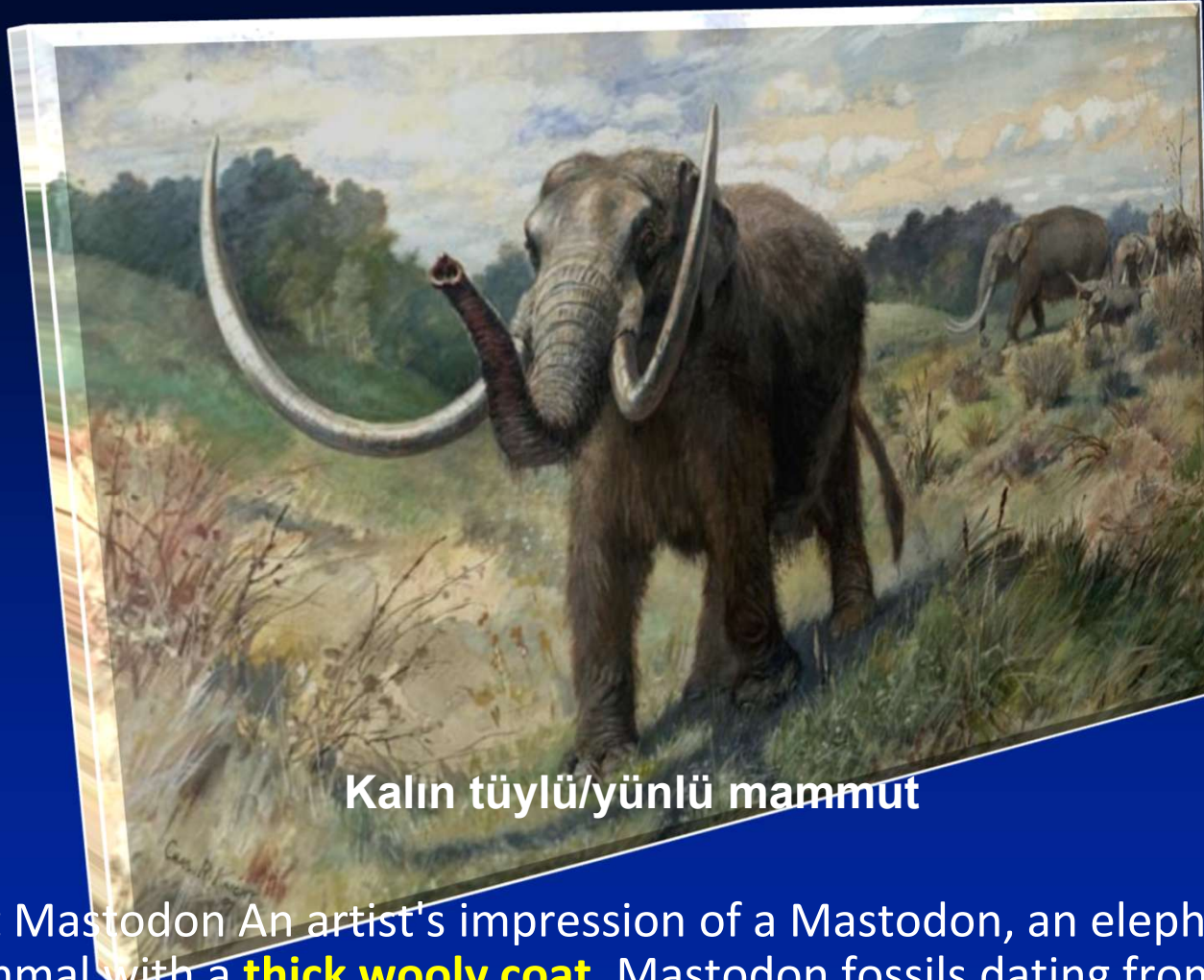
Topraklar **buzul arası ayrışmalar** ile ilişkilidir

Bu, **buzul** ve **buzul arası olaylar** için temel oluşturmuştur



Kuvaterner iklim salınımlarının,
İngiltere, Hollanda ve Amerika gibi
orta enlem ülkelerinde,
canlılar
topraklar
çökeller
üzerinde güçlü etkileri vardır

İklimdeki deęişimin Hayvanlar üzerinde etkisi

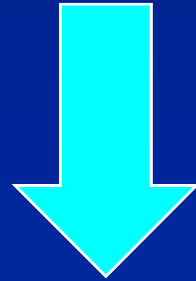


Kalın tüylü/yünlü mammut

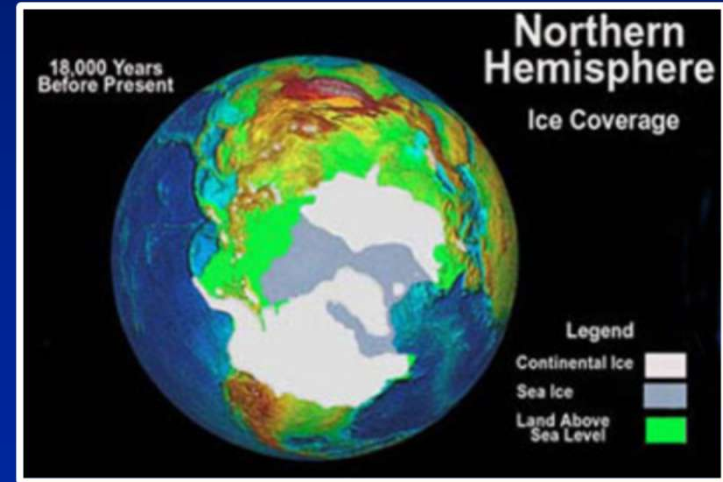
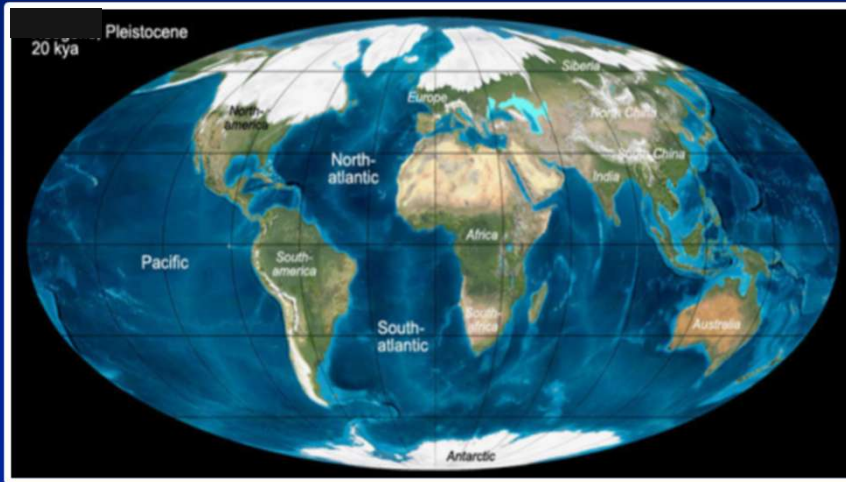
Knight Mastodon An artist's impression of a Mastodon, an elephant-like mammal with a **thick woolly coat**. Mastodon fossils dating from **past glacial periods** have been found across North America—from Florida to Alaska. Source: Charles R. Knight

Kuvaterner kayaçlarının sınıflaması için,
jeolojik-iklim birimi
önerilmiştir

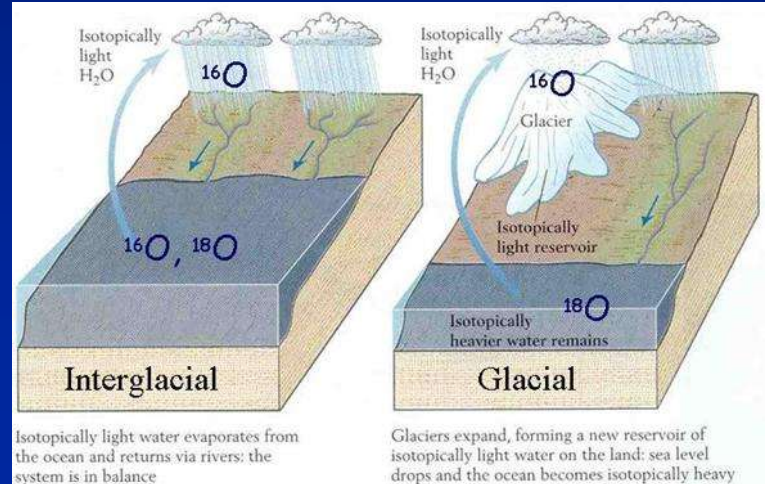
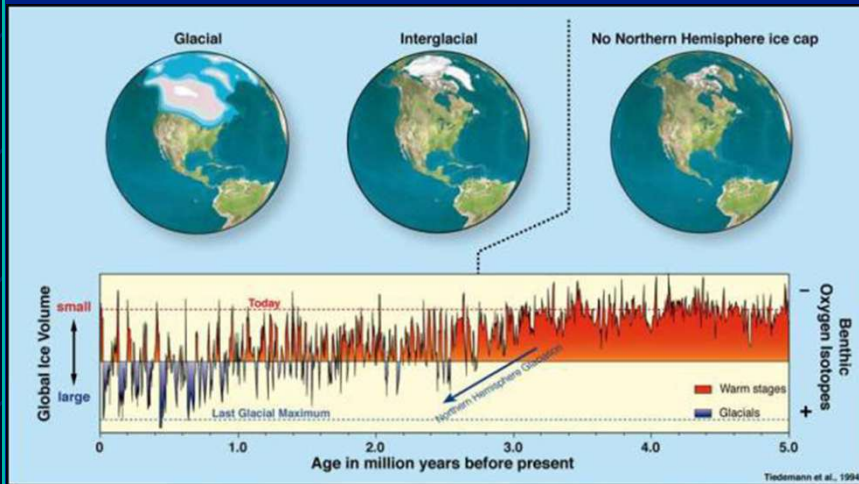
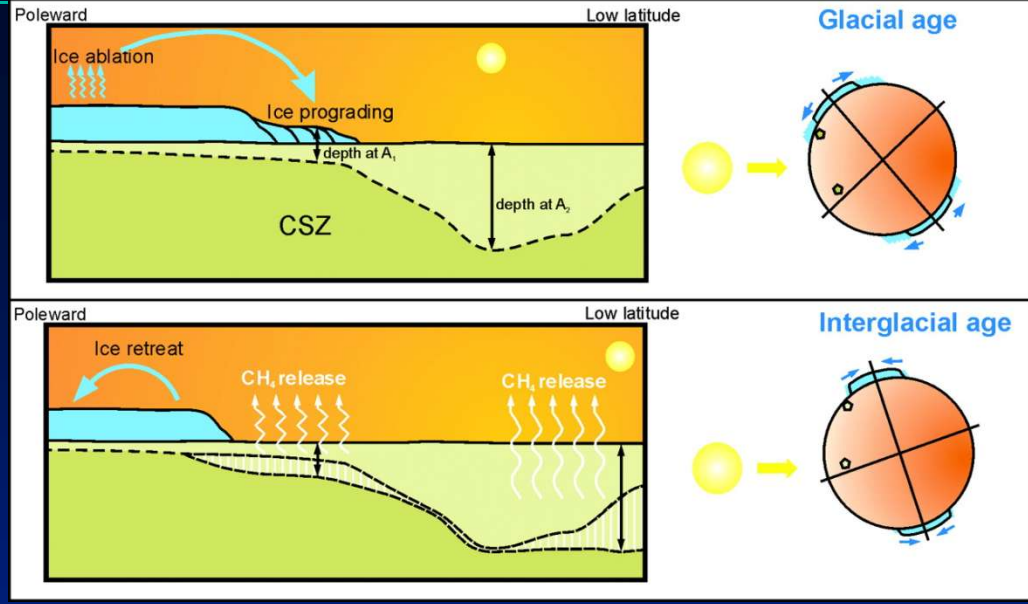
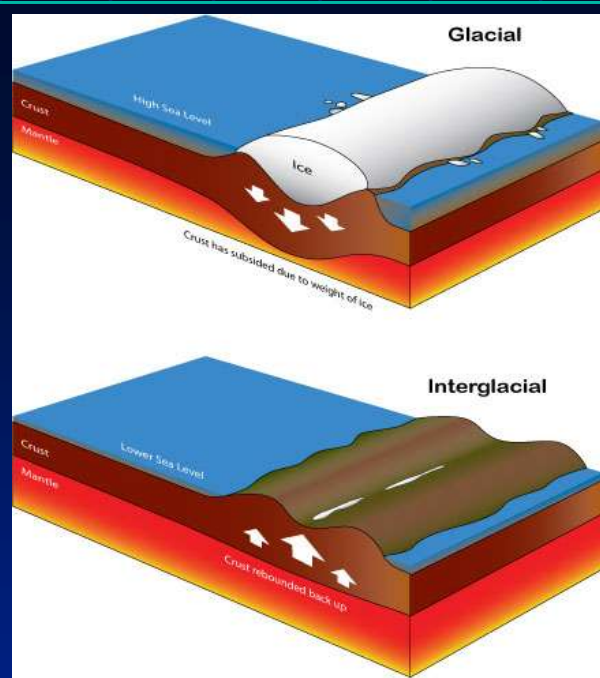
Temel birimlerşunlardır (ACSNC 1961)

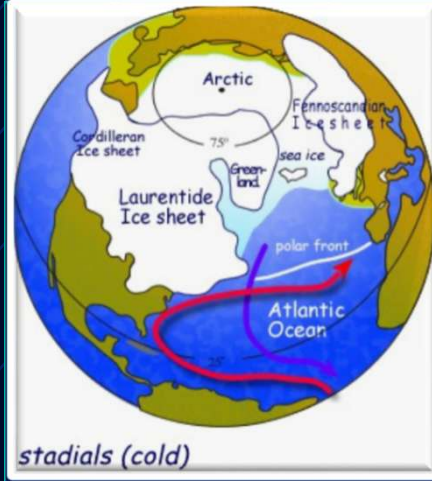


buzullaşma yaygın buzullaşmanın geliştiği iklimsel bir dönemdir
maksimuma ulaşmıştır ve gerilemiştir

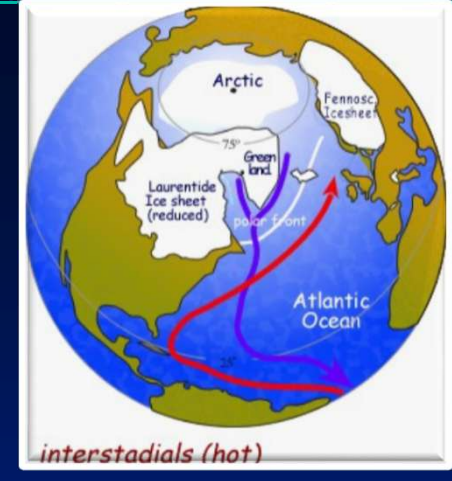


Buzullaşma

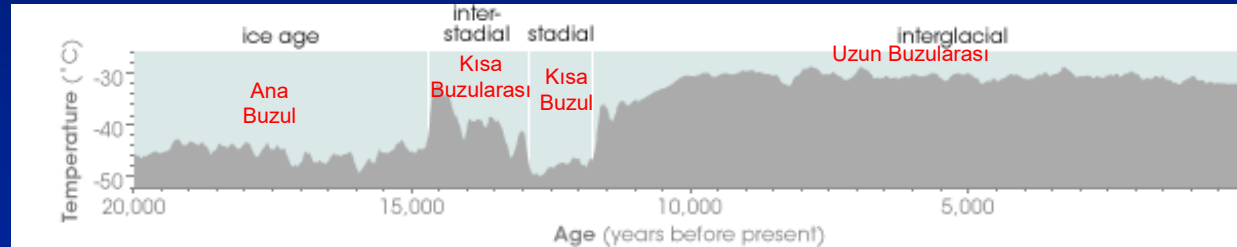




Buzulda durgunluk-küçülme



stad, buzulların ikincil bir ilerlemesinin gerçekleştiği iklim bölümüdür (**soğuk dönem**)



interstadyal ise, bir buzullaşma sürecinde buzulların durgunluk ya da bekleme sırasında yer aldığı iklim olayıdır (**sıcak dönem**)

Sınırlar genellikle **maksimum** ve **minimum** sıcaklık arasındaki orta noktaya yerleştirilmiştir

Rose 2010

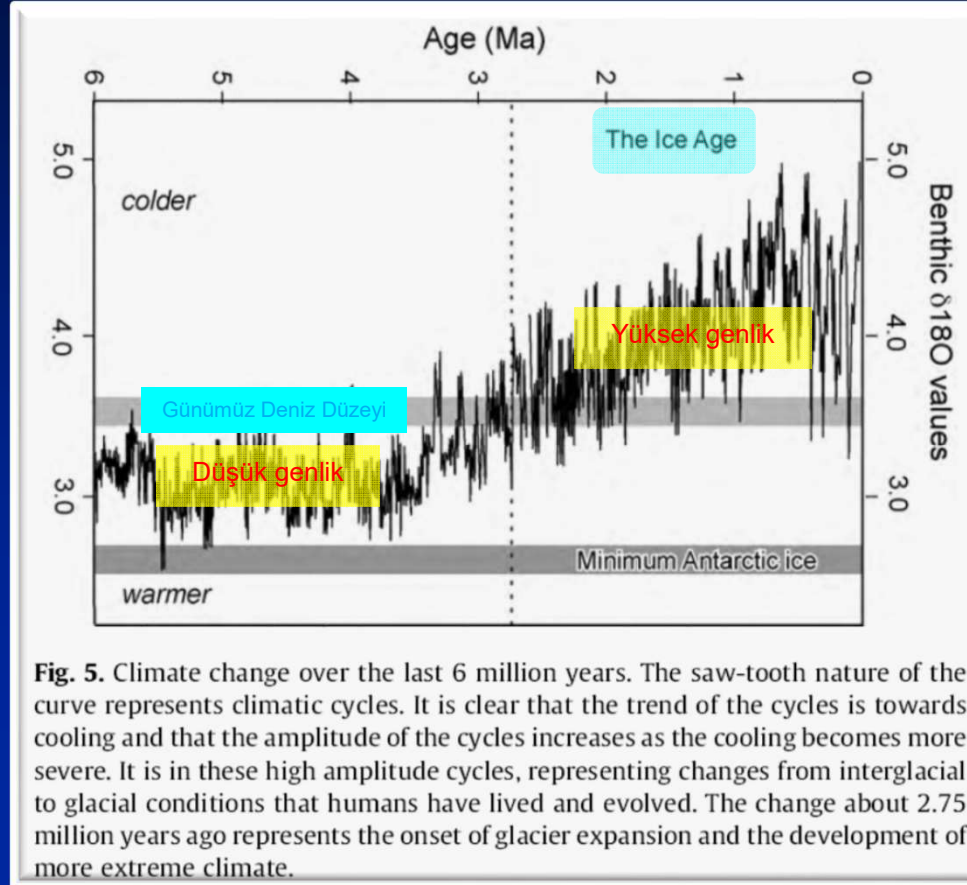


Fig. 5. Climate change over the last 6 million years. The saw-tooth nature of the curve represents climatic cycles. It is clear that the trend of the cycles is towards cooling and that the amplitude of the cycles increases as the cooling becomes more severe. It is in these high amplitude cycles, representing changes from interglacial to glacial conditions that humans have lived and evolved. The change about 2.75 million years ago represents the onset of glacier expansion and the development of more extreme climate.

Ilıman kuzeybatı Avrupa'da, buzul arası dönem tabanı hassas bir şekilde belirlenmiştir

iklim deęişim sınırı

Ot-egemen örtü



Orman



Geçmişteki 21.000 yıldan, önümüzdeki 2950 yılına bir projeksiyon



BlueMarble 3000

This visualization has been developed at the Zurich University of Applied Sciences by *Adrian Meyer* and *Karl Rege*

It shows the earth starting at the last glacial maximum 21'000 years ago and ends 1'000 years in the future. End summer sea ice is shown. The yellow line shows the actual shoreline. The future projection is based on the assumption of complete cessation of carbon dioxide emissions in 2100 (~IPCC A2). Because world population is rather uncertain we froze to its current value. For further information: info@zhaw.ch

Main data sources for the visualization are the following:

Historic

- Climate/Vegetation: *J.M. Adams (1997)*
- Glaciation: *Arthur S. Dyke, B.G. Andersen, J. Ehlers, Fuyuki Saito, Ayako Abe-Ouchi*

Future

- Climate/Vegetation: *Nathan P. Gillett et al. (2011)*
- Glaciation: *Philippe Huybrechts, Heiko Goelzer, Heinz Blatter*



<http://www.geol.umd.edu/~tholtz/G102/102ceno3.htm>

The end of the Last Glacial Maximum (at around 11-10 ka), which marks the beginning of the Holocene, is not the last glacial advance. During the Holocene there have been several more smaller fluctuations (Medieval Warm Period, Little Ice Age, etc.). In a sense, the Holocene is not a distinct Epoch, but only the latest major interglacial.



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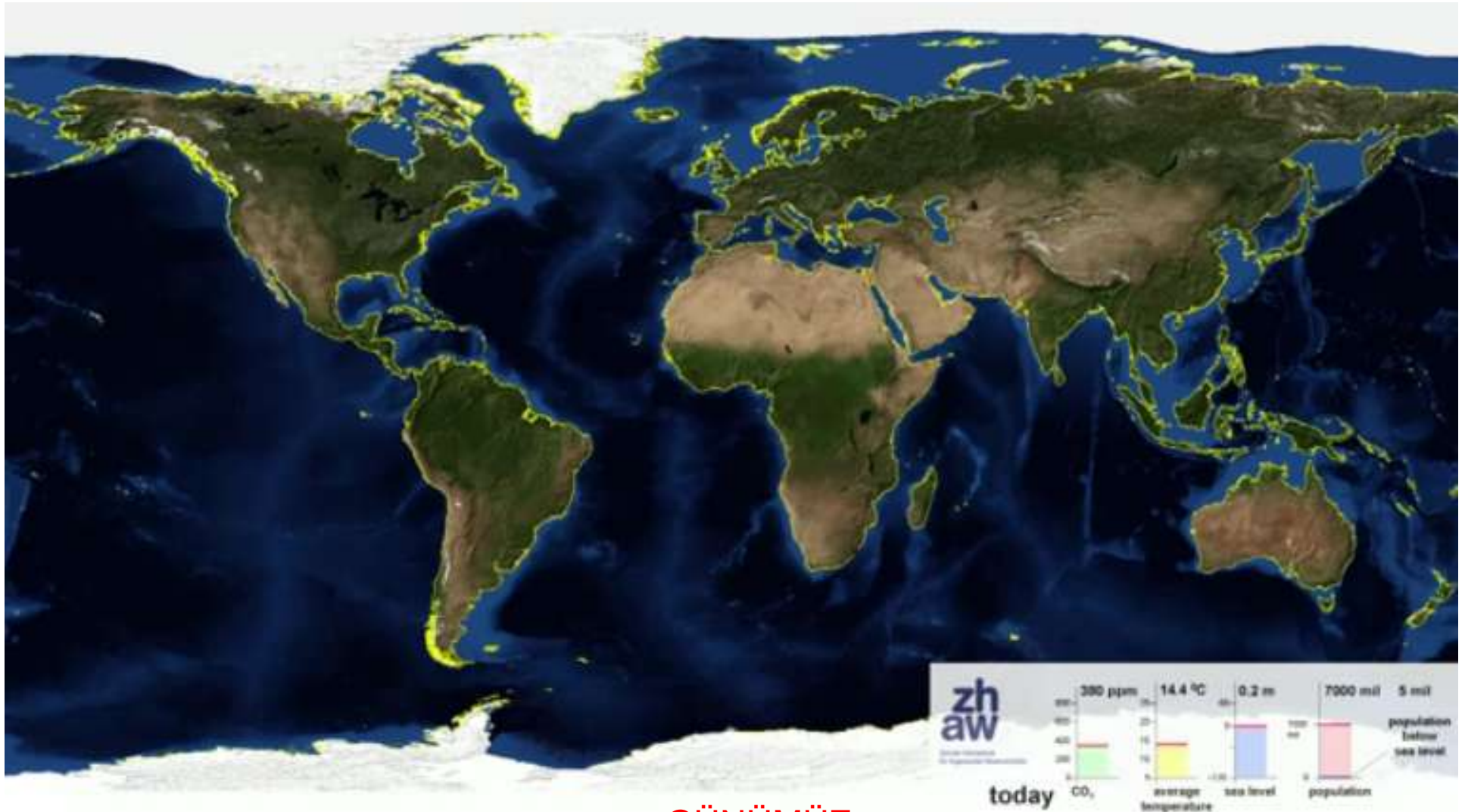
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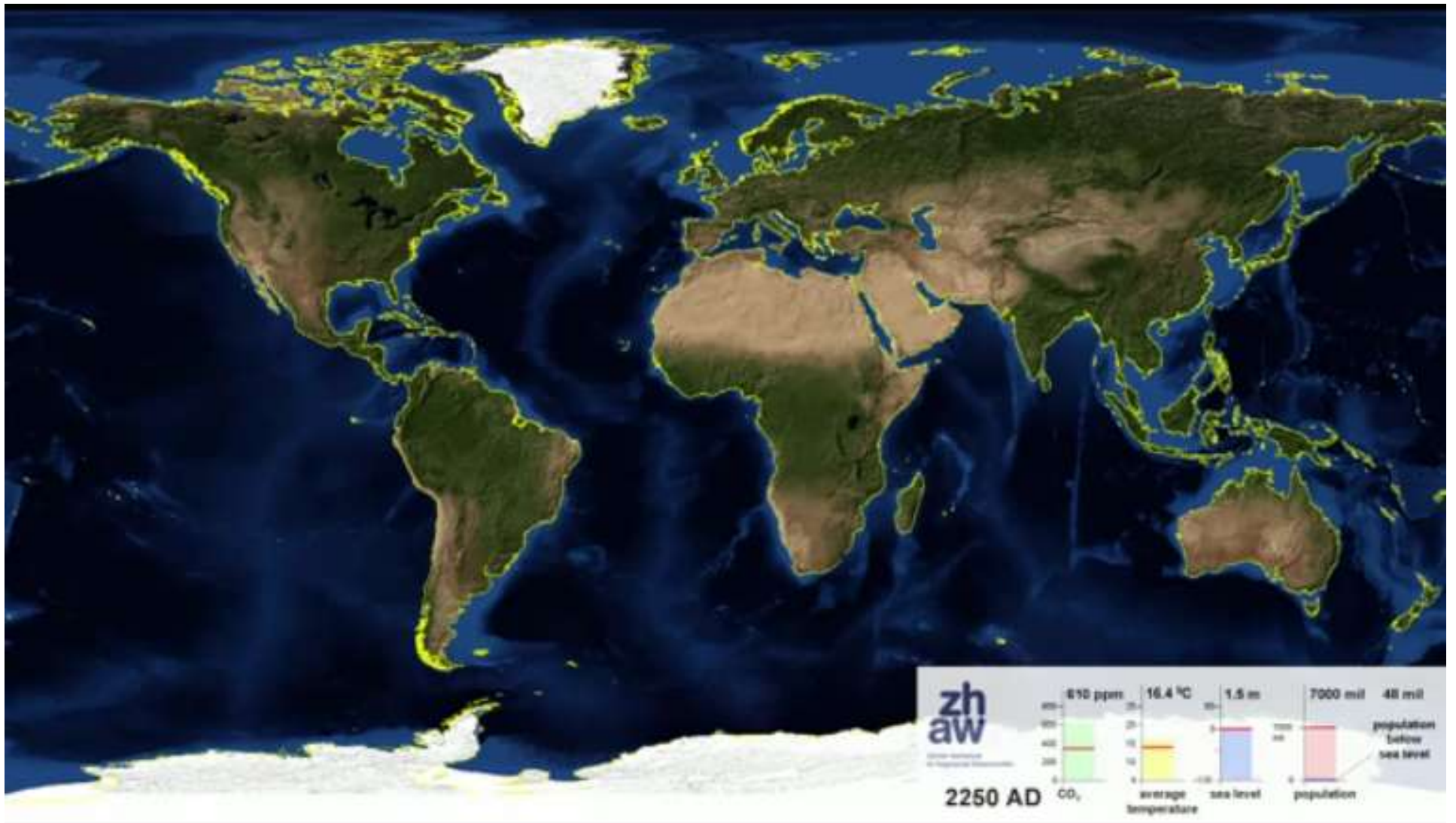


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GÜNÜMÜZ

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2250 yılı

The end of the Last Glacial Maximum (at around 11-10 ka), which marks the beginning of the Holocene, is not the last glacial advance. During the Holocene there have been several more smaller fluctuations (Medieval Warm Period, Little Ice Age, etc.). In a sense, the Holocene is not a distinct Epoch, but only the latest major interglacial.



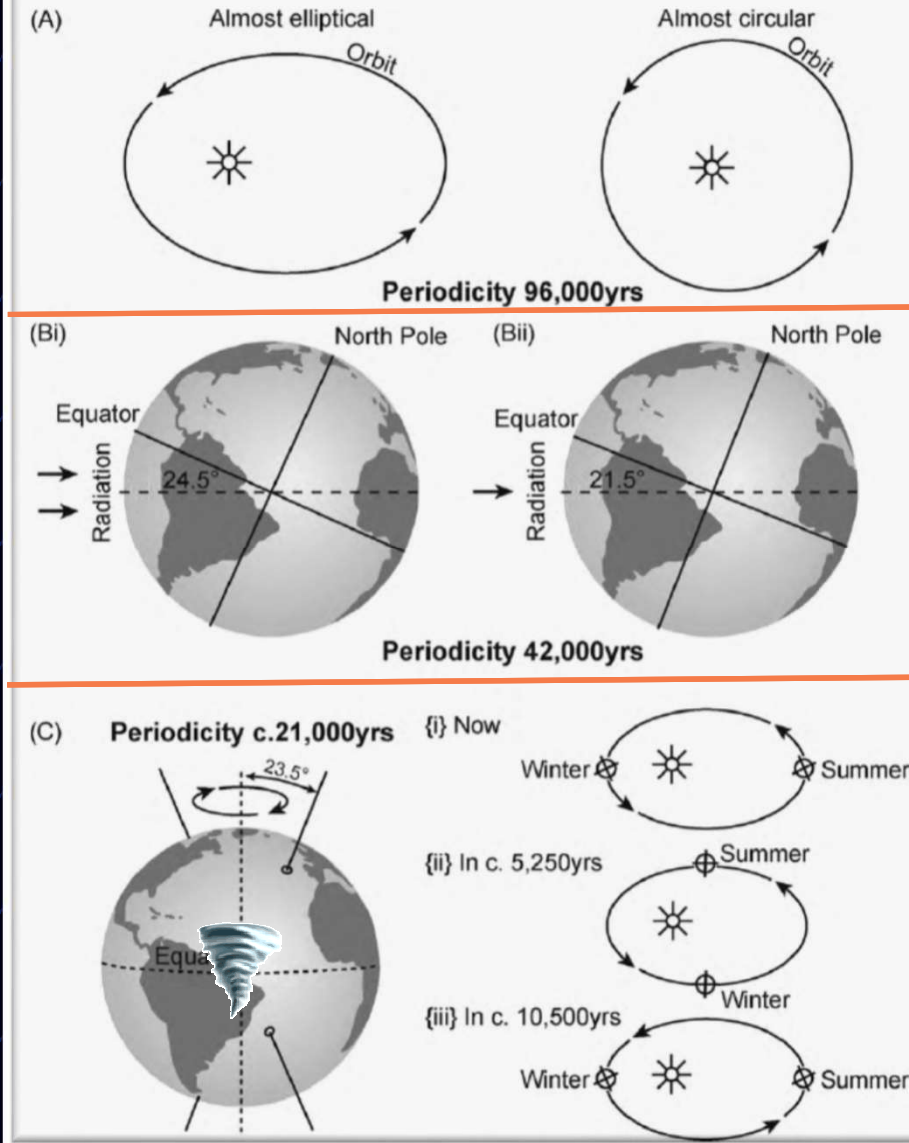
2600 yılı

The end of the Last Glacial Maximum (at around 11-10 ka), which marks the beginning of the Holocene, is not the last glacial advance. During the Holocene there have been several more smaller fluctuations (Medieval Warm Period, Little Ice Age, etc.). In a sense, the Holocene is not a distinct Epoch, but only the latest major interglacial.



2950 yılında

The end of the Last Glacial Maximum (at around 11-10 ka), which marks the beginning of the Holocene, is not the last glacial advance. During the Holocene there have been several more smaller fluctuations (Medieval Warm Period, Little Ice Age, etc.). In a sense, the Holocene is not a distinct Epoch, but only the latest major interglacial.



KUVATERNER İKLİM DEĞİŞİMLERİNİ MILANKOVITCH DÖNGÜLERİ BELİRLER

İklim değişimlerinde Milankovitch döngüsünün bileşenleri

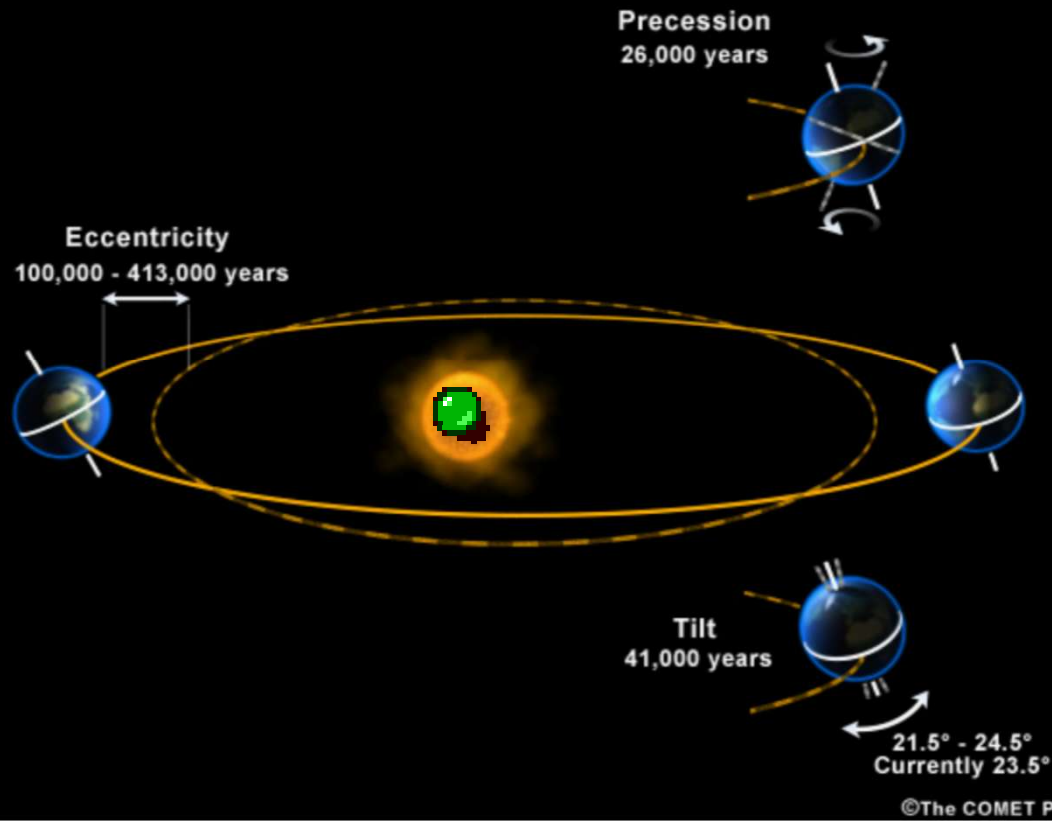
(A) Yörüngeden sapma

(B) Eksenin eğimi veya oblikliği

(C) Eksenin dingildemesi veya
ekinoksların devinimi

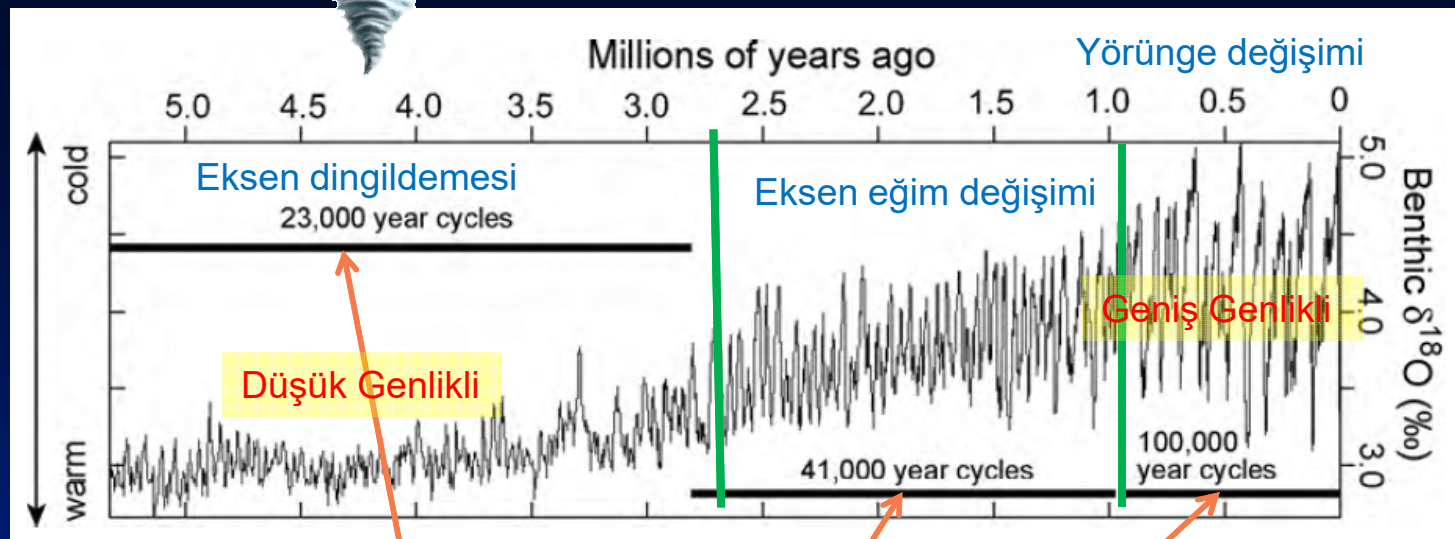


Milankovitch Cycles



Milankovitch Cycles Illustration of the three variables in Earth's orbit, with periods of variation marked. Source: COMET® at the University Corporation for Atmospheric Research (UCAR) pursuant to a Cooperative Agreements with the National Oceanic and Atmospheric Administration, U.S. Department of Commerce.

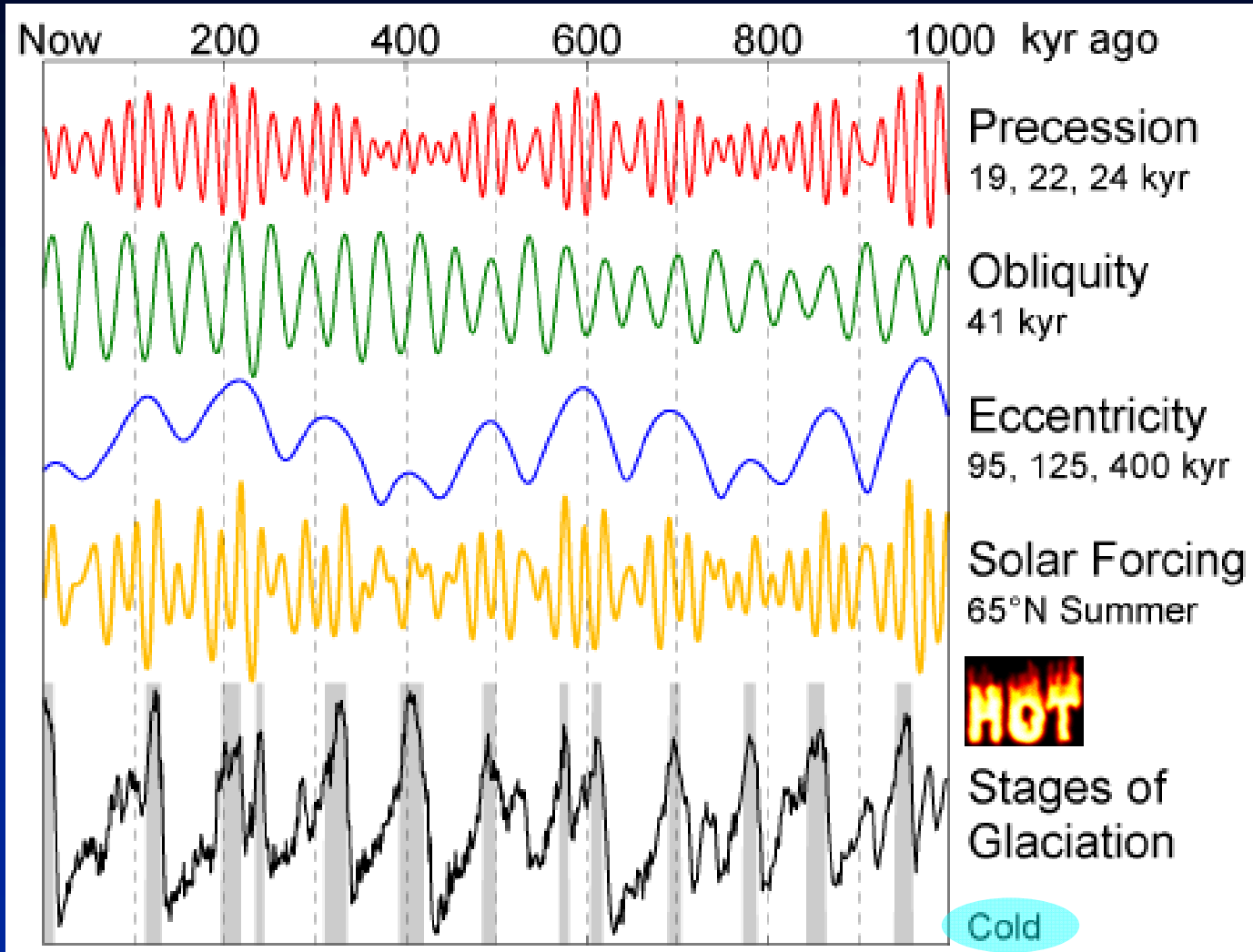
©1997-2009 University Corporation for Atmospheric Research. All Rights Reserved.



Highlights the nature of the Milankovitch cycles that dominate the Quaternary ice age. It is clear that prior to **2.75 million years ago** that the climate was characterised by small amplitude cycles with a **23,000 year** frequency – these are forced by changes in the **wobble** of the Earth around its axis, known as the precession of the equinoxes, and this is precession forcing.

Between 2.75 million years and **900,000 years ago** the amplitude of climate change increases and has a frequency of **41,000 years**. These are forced by the **tilt or obliquity of the Earth's axis** and this is obliquity forcing.

From 900,000 years ago until the present the climate has large amplitude changes of climate and the cycles occur **every 100,000 years**. This is forced by the eccentricity of the Earth's orbit around the Sun and is known as **eccentricity** forcing



Buzullaşma periyotları ile Dünya'nın yörüngesel ilişkileri



<http://www.sciencecourseware.org/eec/GlobalWarming/Tutorials/Milankovitch/MilankovitchCycles.swf>