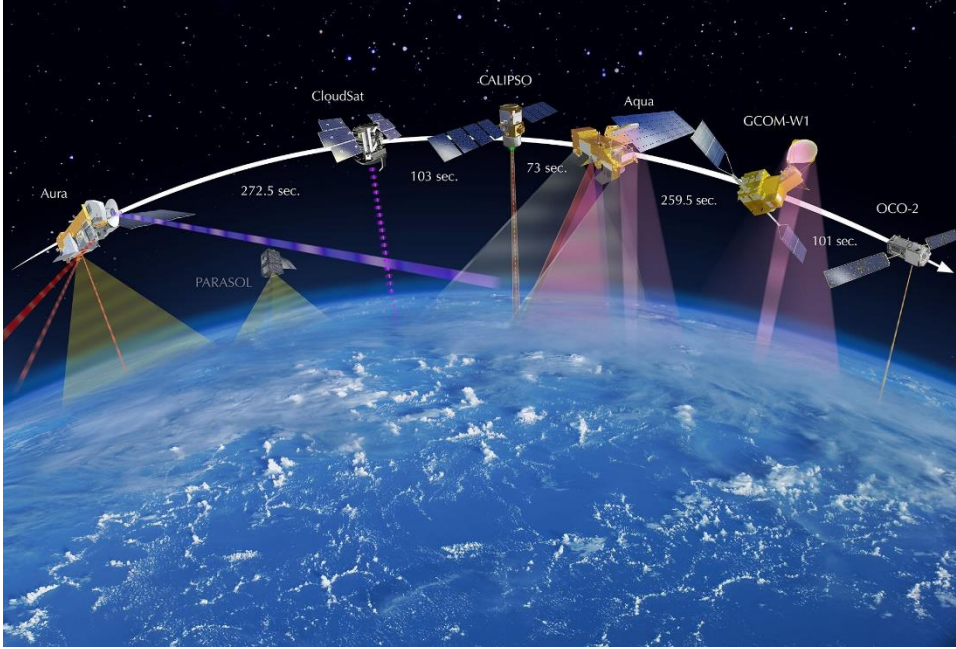


İklim Değişikliği ve Hayvancılık Faaliyetleri

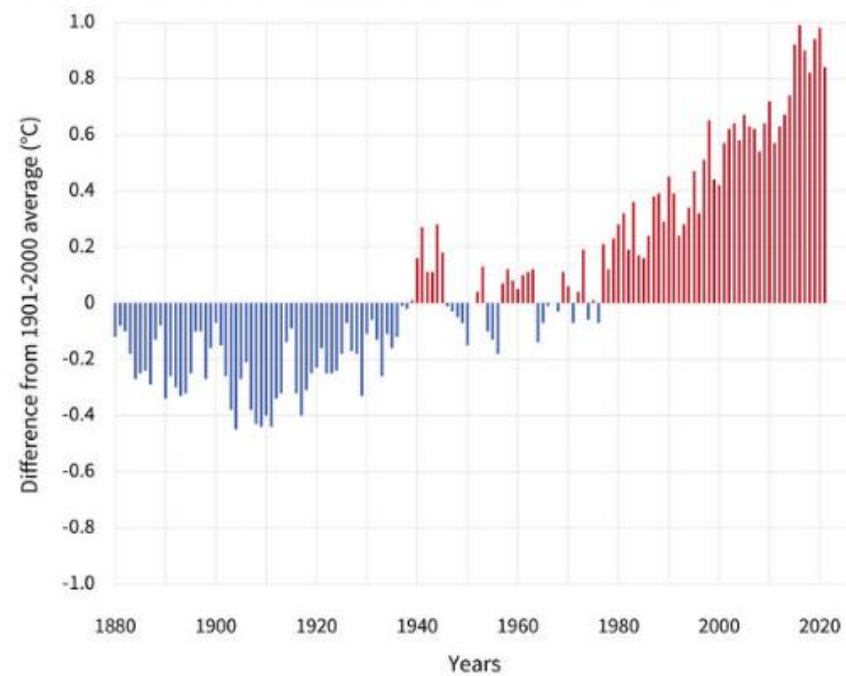
**Prof. Dr. Nusret KARAKAYA, Prof. Dr.
Kadir YILDIZ, Çevre Müh.**

5-6 Ocak 2023-Bolu

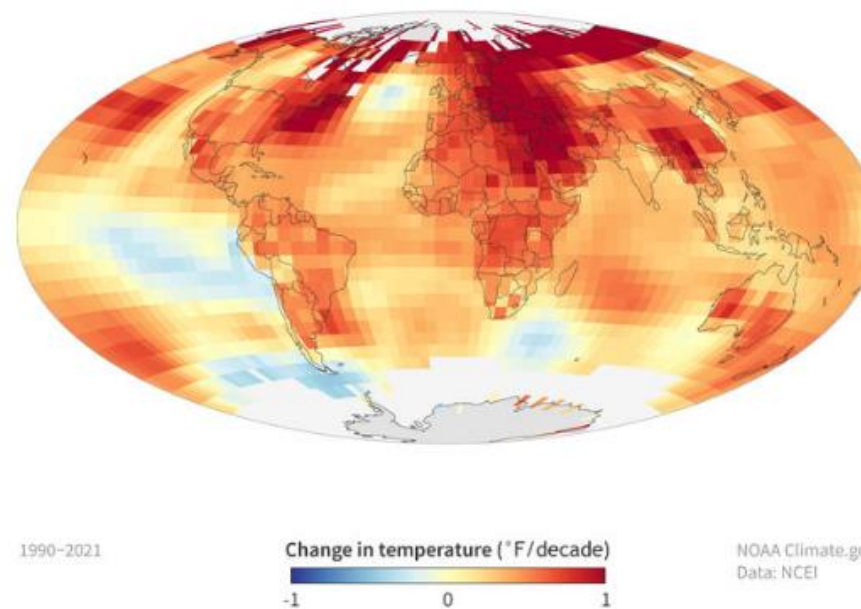
1. İklim Değişikliği/Krizi



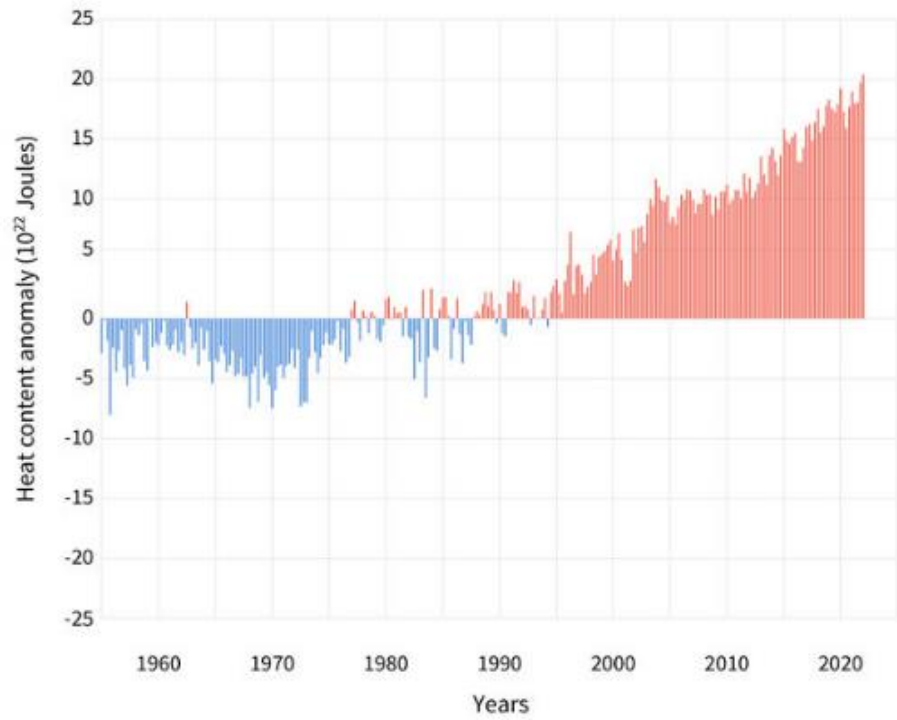
GLOBAL AVERAGE SURFACE TEMPERATURE



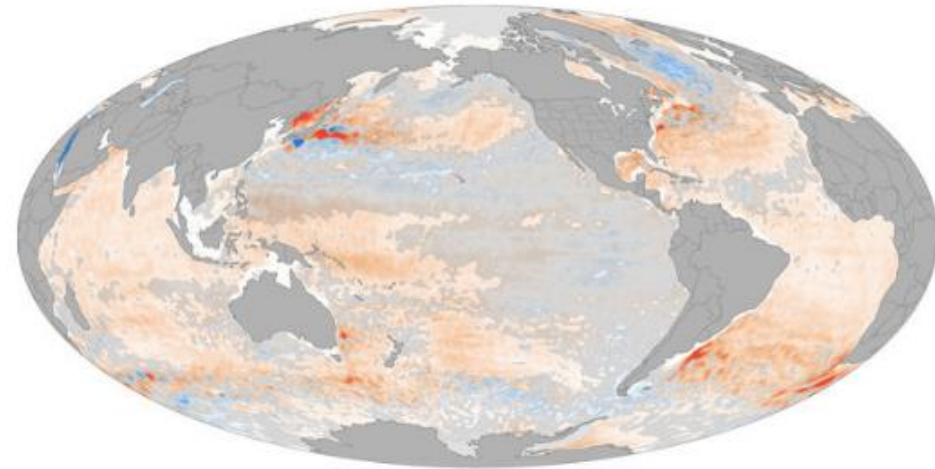
RECENT TEMPERATURE TRENDS (1990-2021)



OCEAN HEAT COMPARED TO AVERAGE



OCEAN HEAT TRENDS (1993-2021)

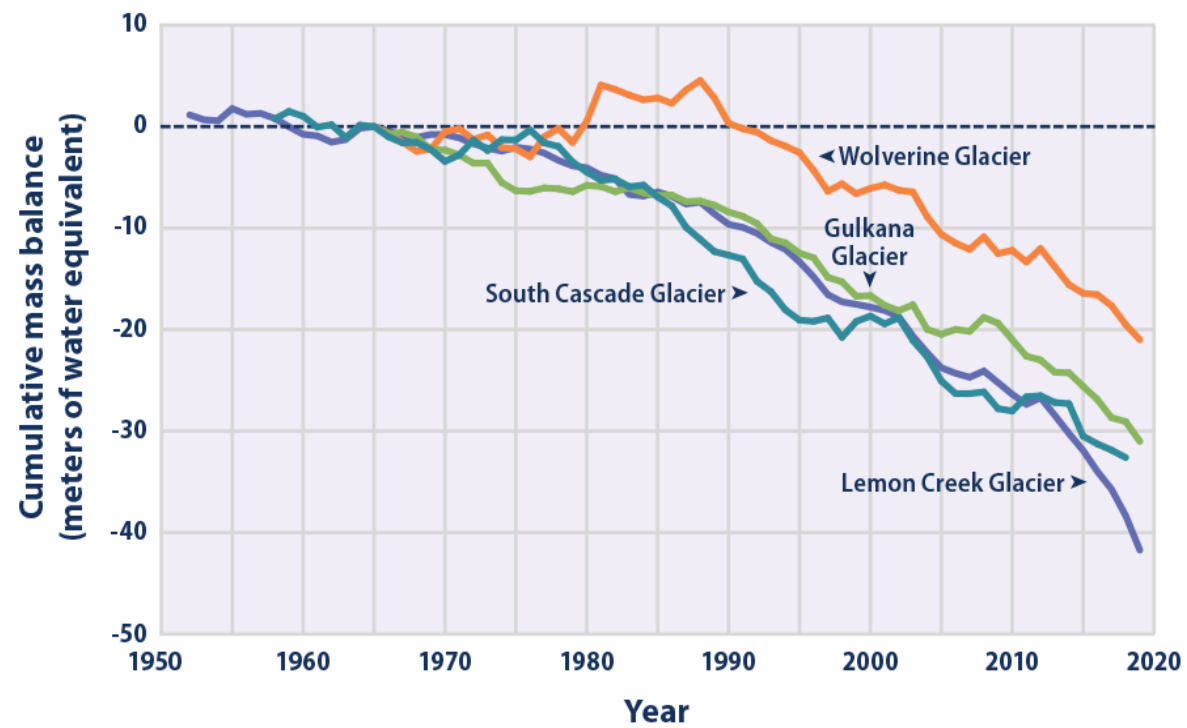


1993-2021

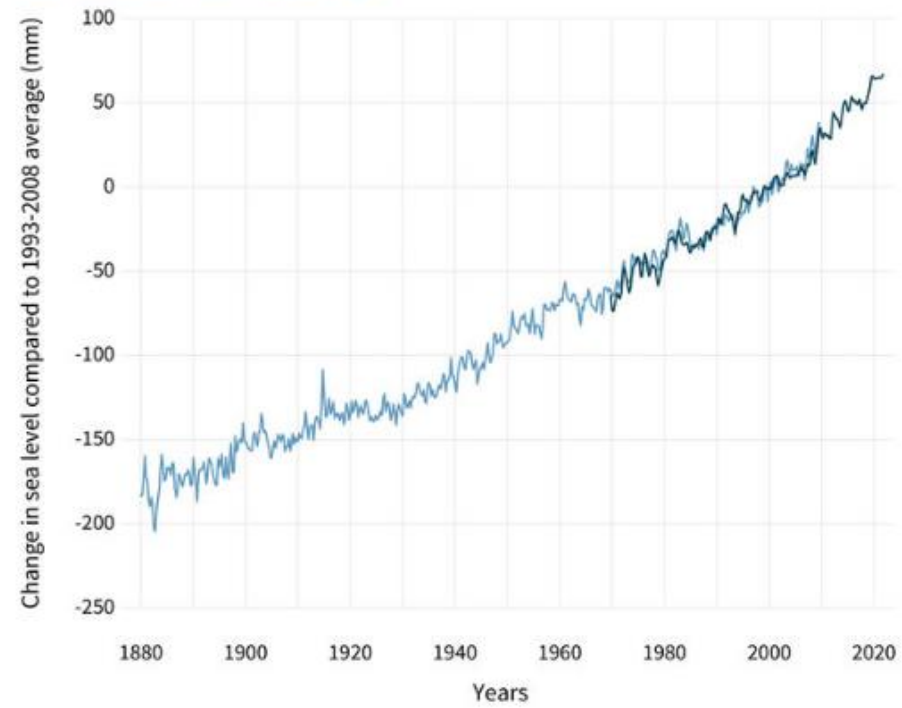
Change in ocean heat content (W/m^2)

-6 0 6

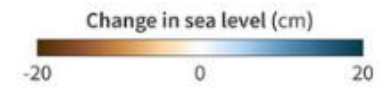
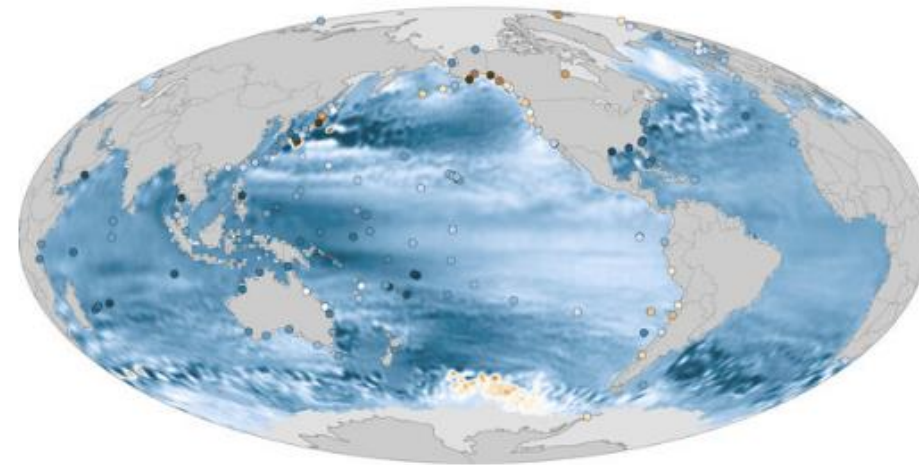
NOAA Climate.gov
Data: PMEL



GLOBAL SEA LEVEL



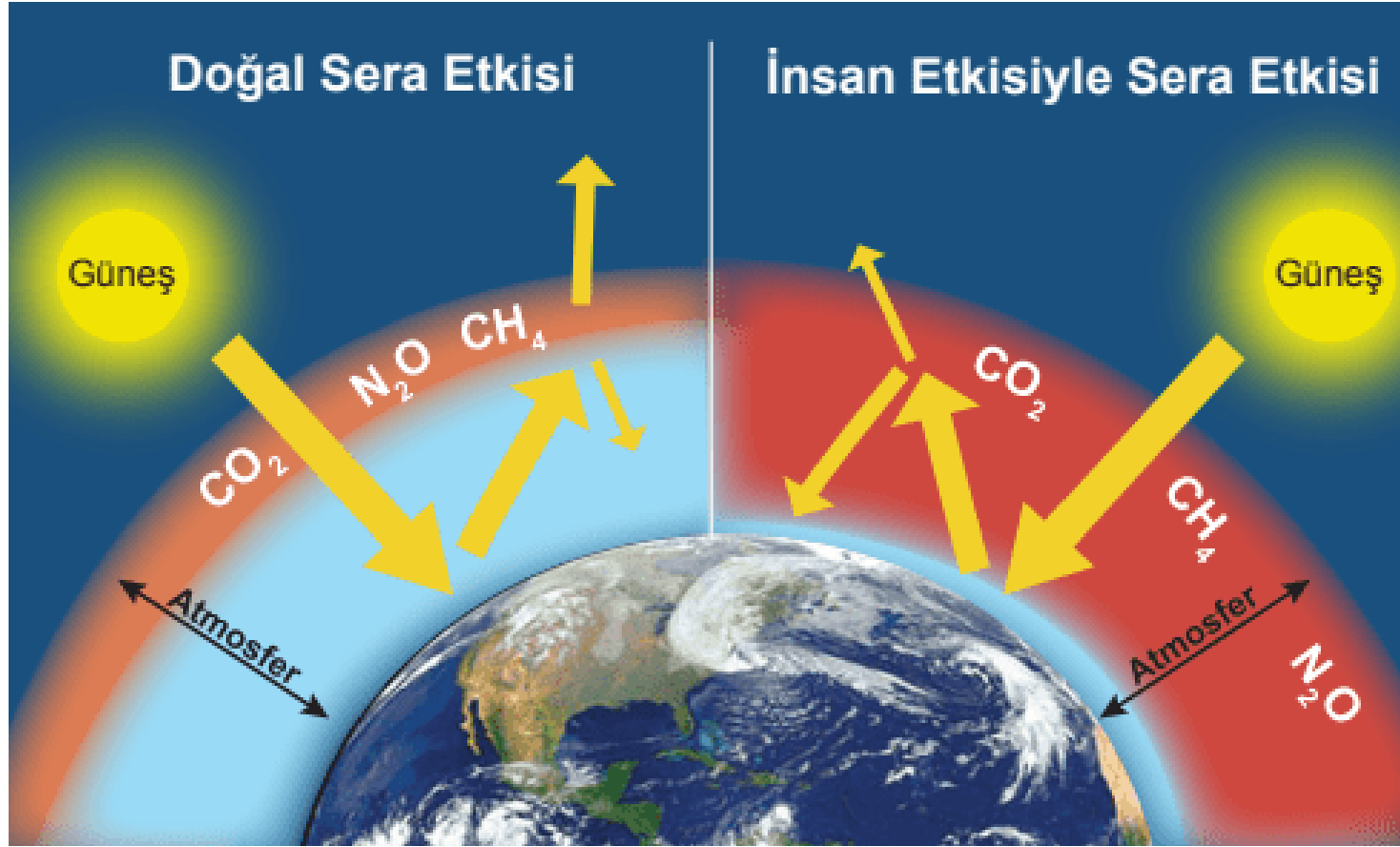
SEA LEVEL CHANGE (1993-2021)



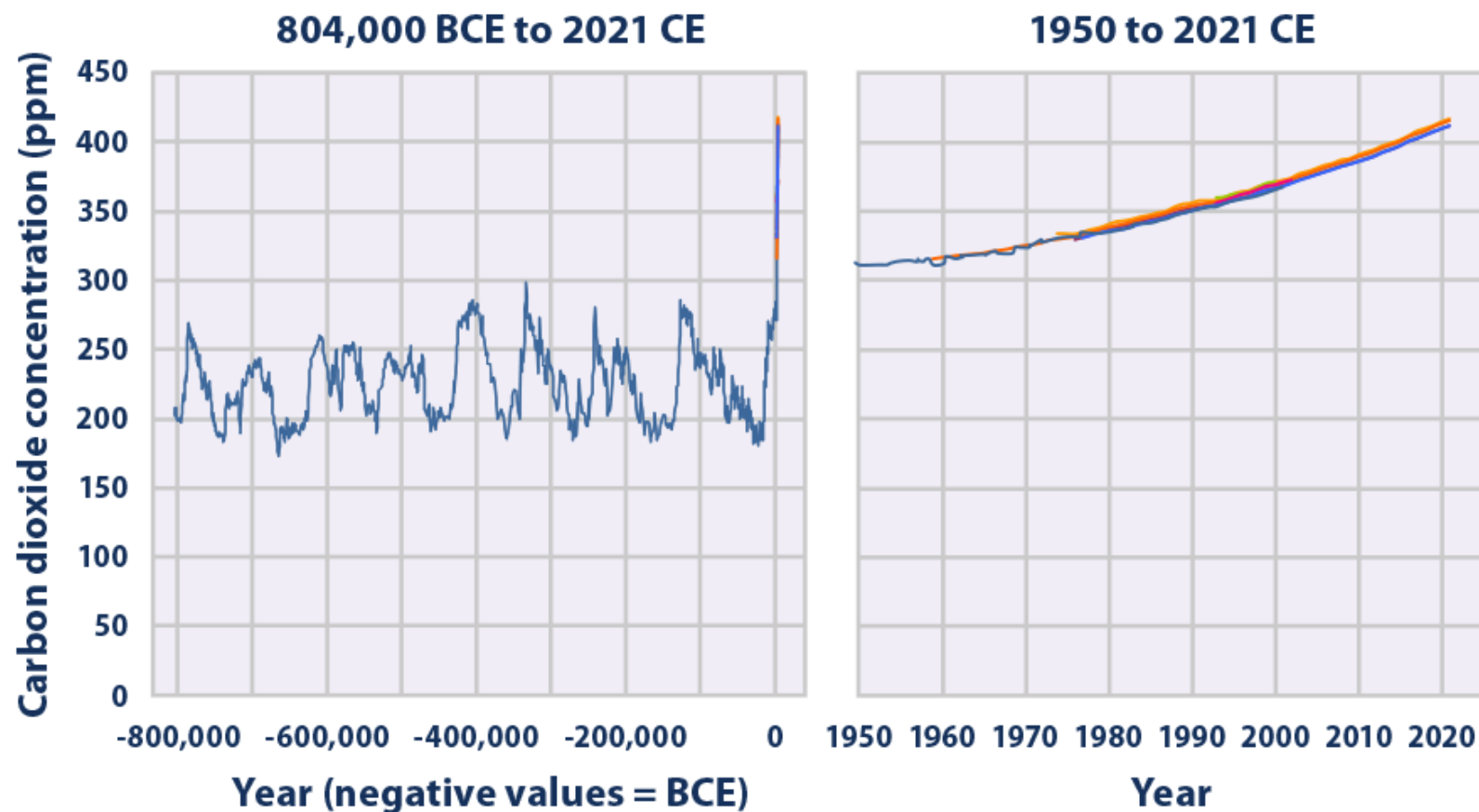
NOAA Climate.gov
Data: UHSLC



Birleşmiş Milletler İklim Değişikliği Sözleşmesi'ne göre doğrudan ya da dolaylı olarak insan faaliyetleriyle atmosferdeki doğal yapının ve iklim çeşitliliğinin bozulması iklim değişikliği olarak tanımlanmaktadır.



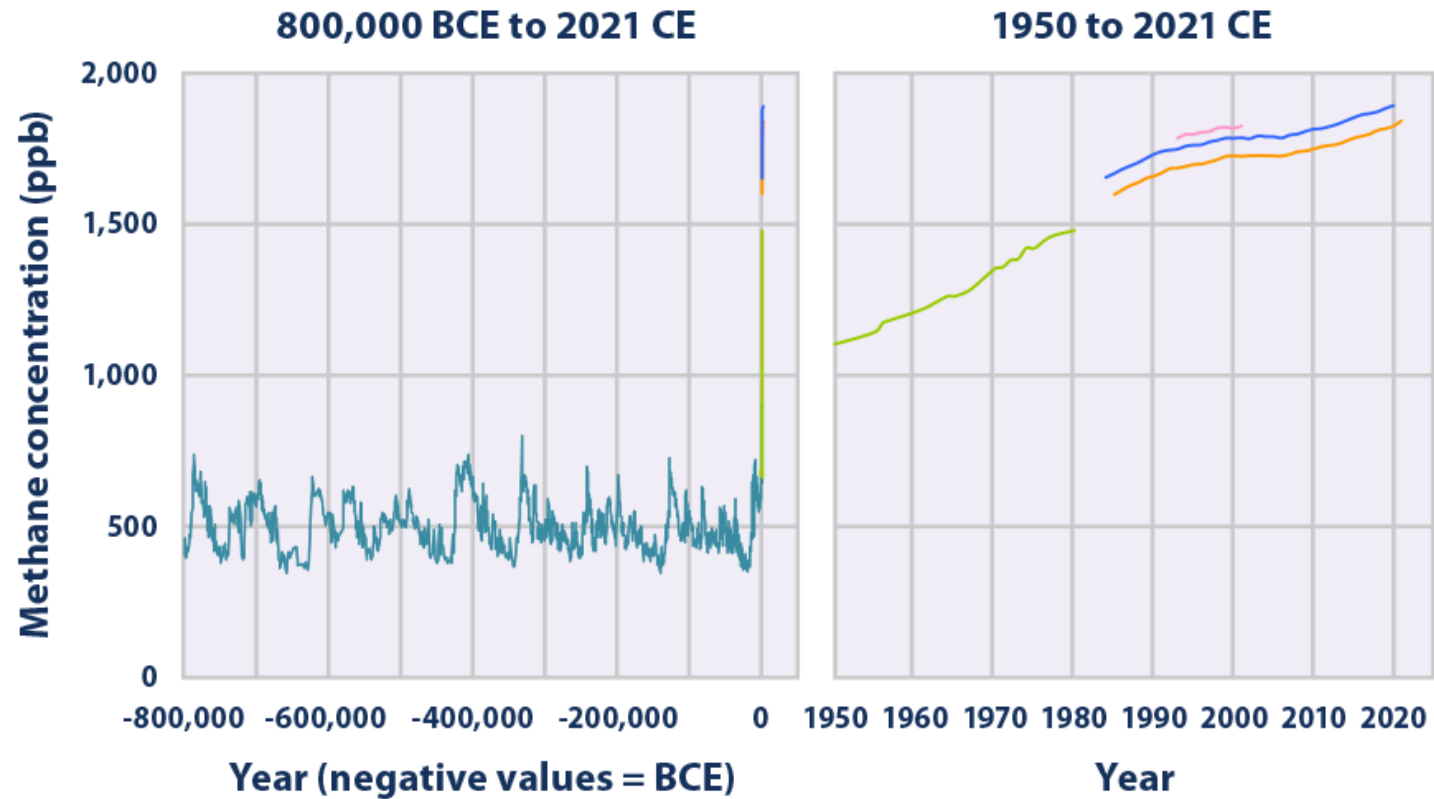
Global Atmospheric Concentrations of Carbon Dioxide Over Time



Data source: Compilation of eight underlying datasets. See www.epa.gov/climate-indicators for specific information.

For more information, visit U.S. EPA's "Climate Change Indicators in the United States" at www.epa.gov/climate-indicators.

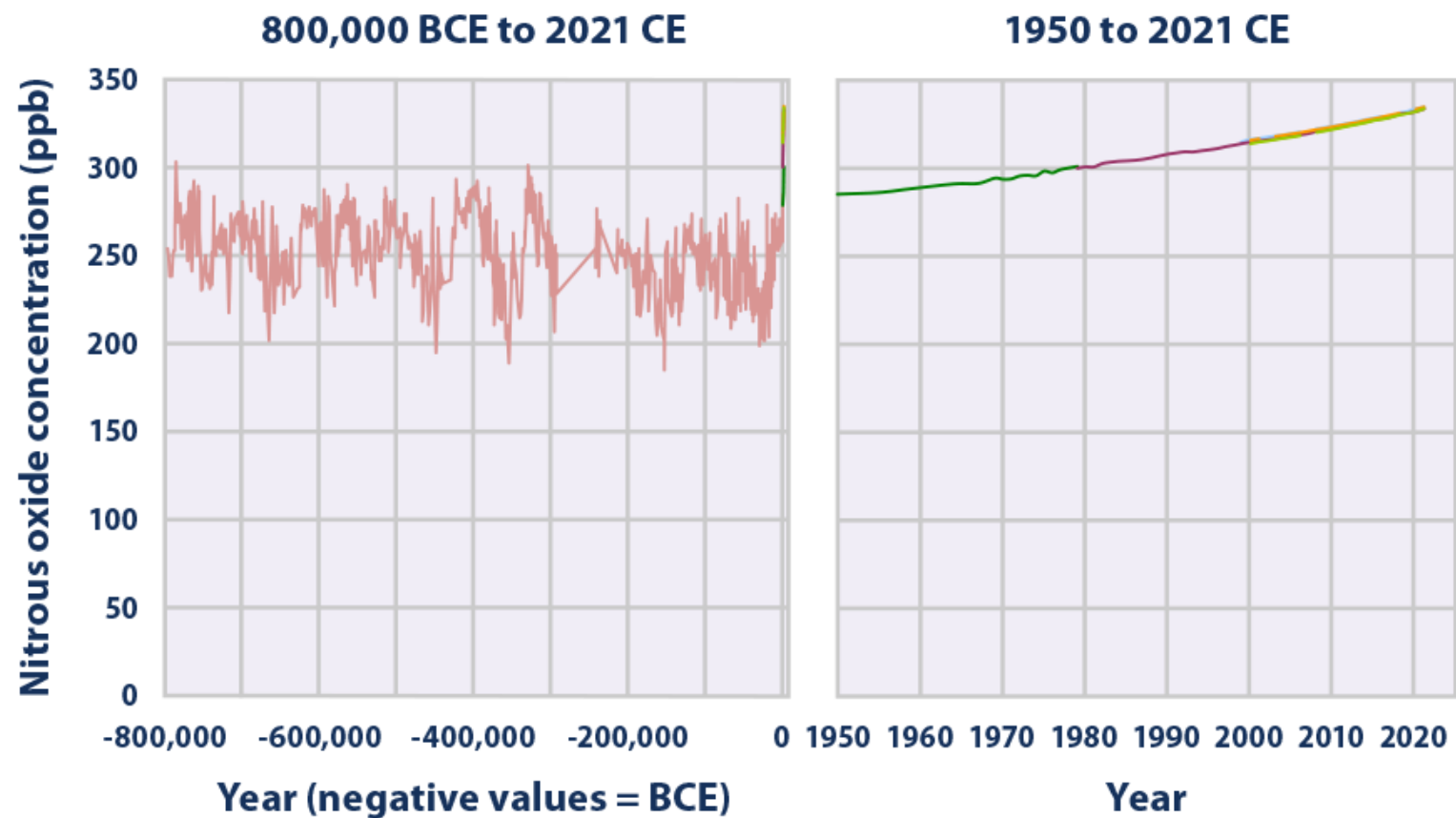
Global Atmospheric Concentrations of Methane Over Time



Data source: Compilation of five underlying datasets. See www.epa.gov/climate-indicators for specific information.

For more information, visit U.S. EPA's "Climate Change Indicators in the United States" at www.epa.gov/climate-indicators.

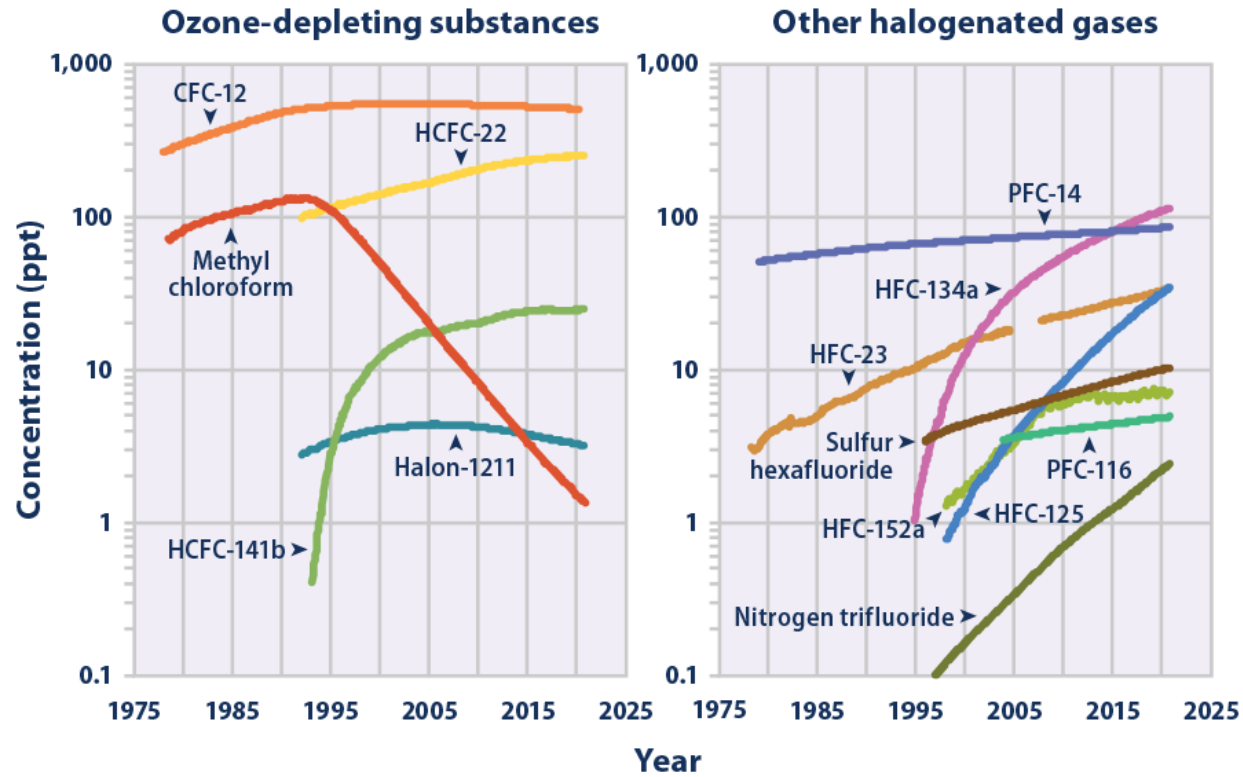
Global Atmospheric Concentrations of Nitrous Oxide Over Time



Data source: Compilation of six underlying datasets. See www.epa.gov/climate-indicators for specific information.

For more information, visit U.S. EPA's "Climate Change Indicators in the United States" at www.epa.gov/climate-indicators.

Global Atmospheric Concentrations of Selected Halogenated Gases, 1978–2021



Data sources:

- AGAGE (Advanced Global Atmospheric Gases Experiment). 2022. ALE/GAGE/AGAGE database. Updated June 14, 2022. Accessed July 2022. https://agage2.eas.gatech.edu/data_archive/global_mean.
- NOAA (National Oceanic and Atmospheric Administration). 2019. Halocarbons and Other Atmospheric Trace Species group (HATS). Updated October 2019. Accessed January 2021. https://gml.noaa.gov/aftp/data/hats/Total_Cl_Br.
- Rigby, M. 2017 update to data originally published in: Arnold, T., C.M. Harth, J. Mühle, A.J. Manning, P.K. Salameh, J. Kim, D.J. Ivy, L.P. Steele, V.V. Petrenko, J.P. Severinghaus, D. Baggenstos, and R.F. Weiss. 2013. Nitrogen trifluoride global emissions estimated from updated atmospheric measurements. P. Natl. Acad. Sci. USA 110(6):2029–2034. Data updated December 2017.

For more information, visit U.S. EPA's "Climate Change Indicators in the United States" at www.epa.gov/climate-indicators.

2. Nedenler ve Sonular





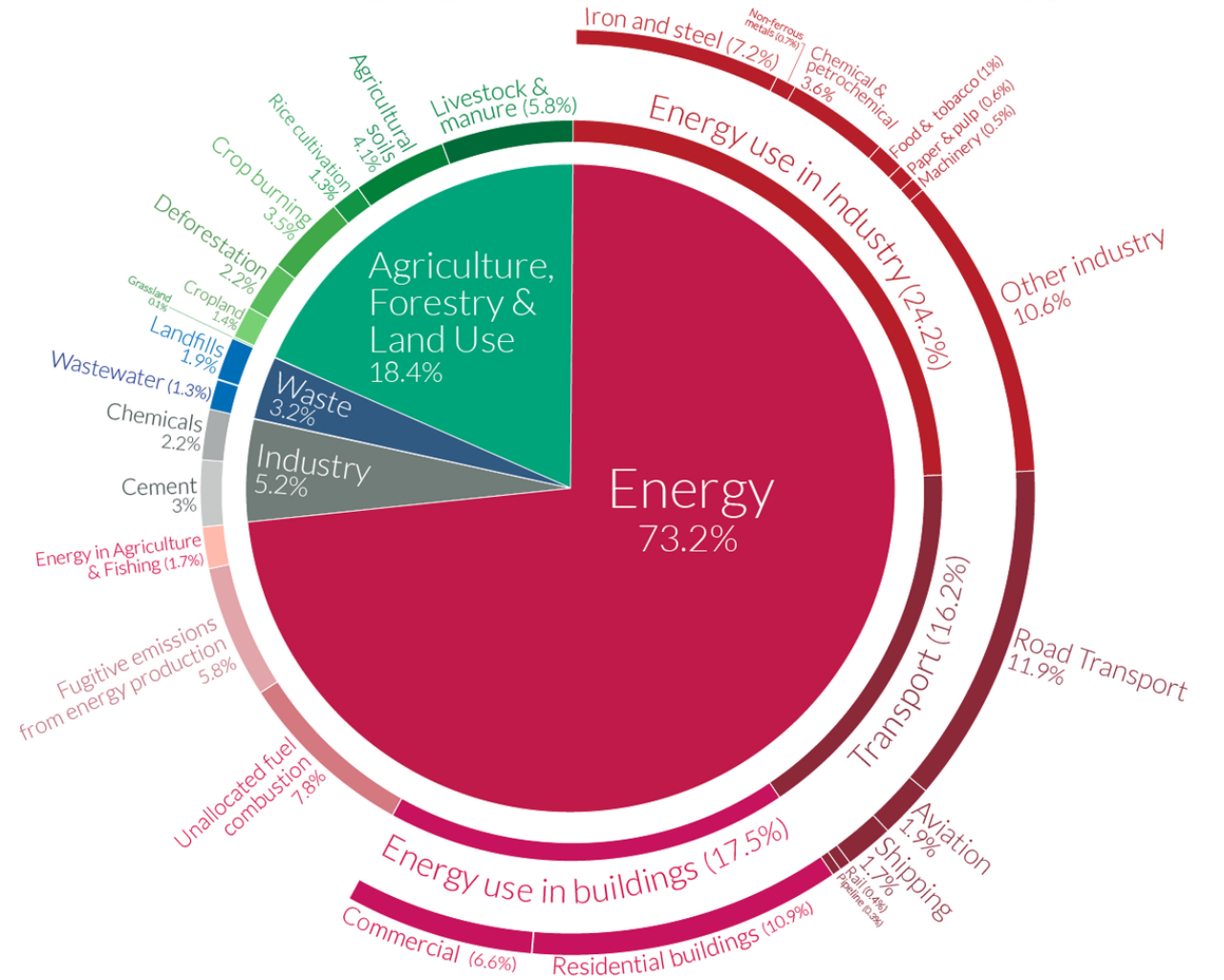
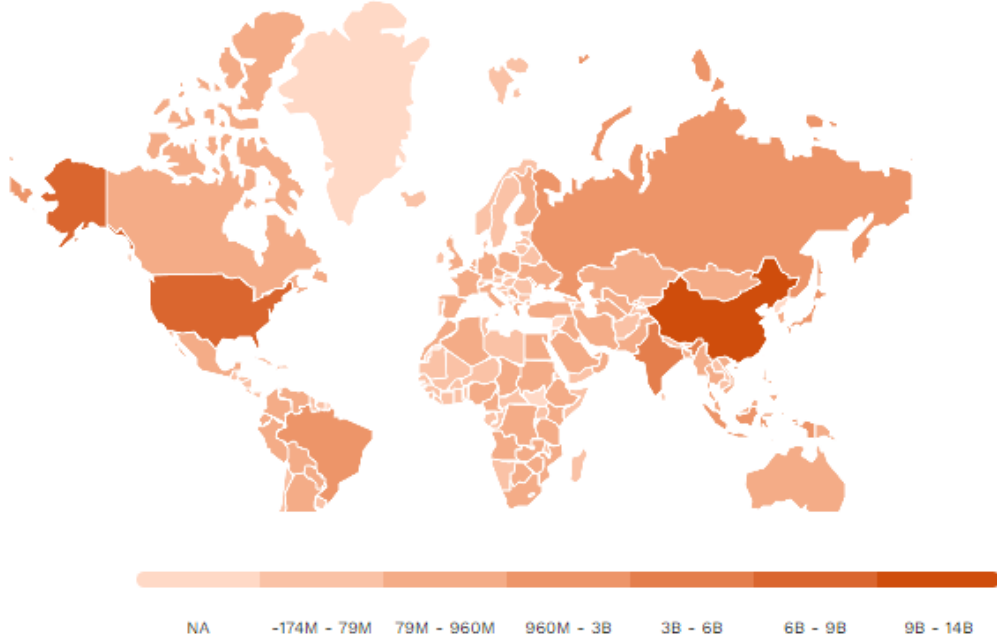








3. İklim Değişikliği ve Hayvancılık Faaliyetleri



OurWorldinData.org – Research and data to make progress against the world's largest problems.
Source: Climate Watch, the World Resources Institute (2020).

Licensed under CC-BY by the author Hannah Ritchie. (2020).

Türkiye: Toplam emisyonun yaklaşık %1; Tarım sektörünün yaklaşık %1.4

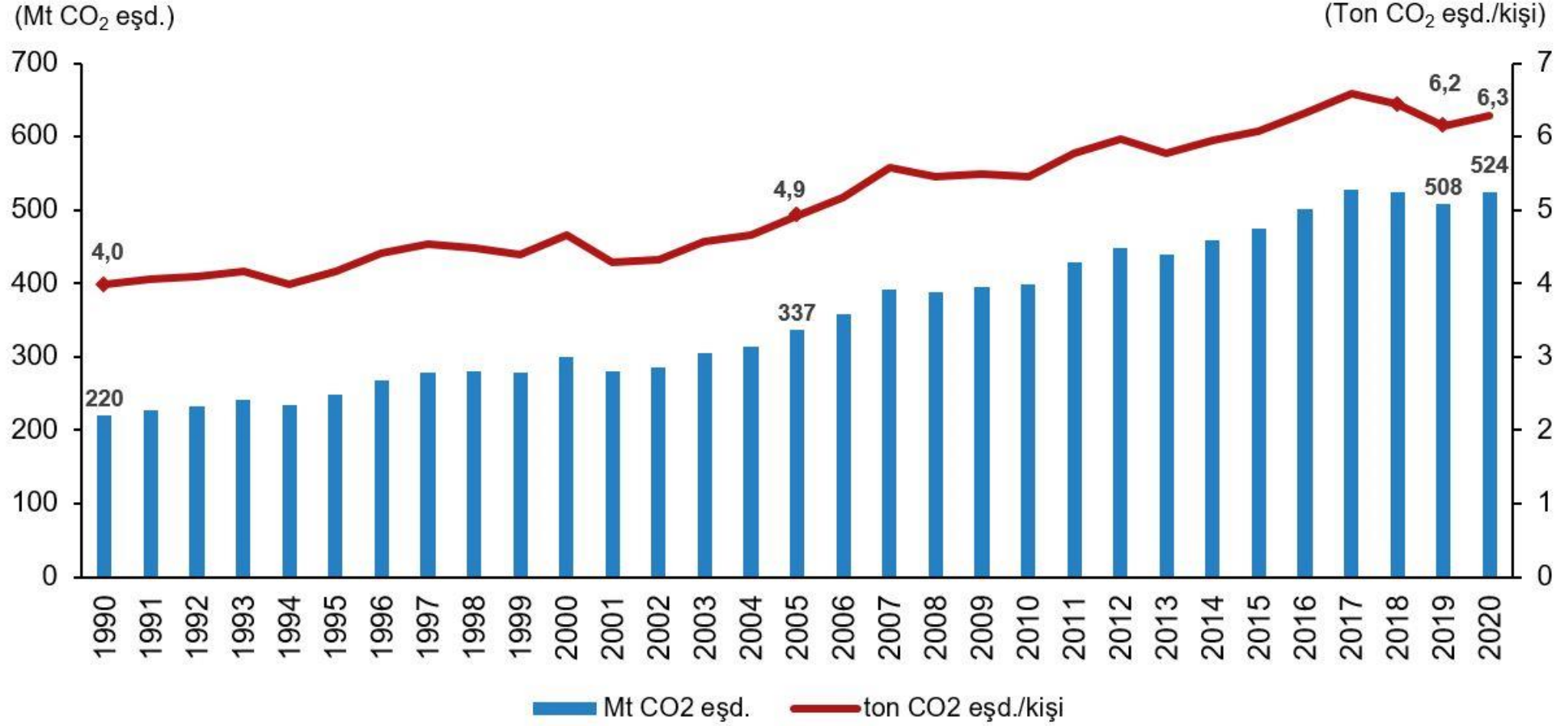
Hayvancılık sektöründen kaynaklanan emisyonların kaynakları:



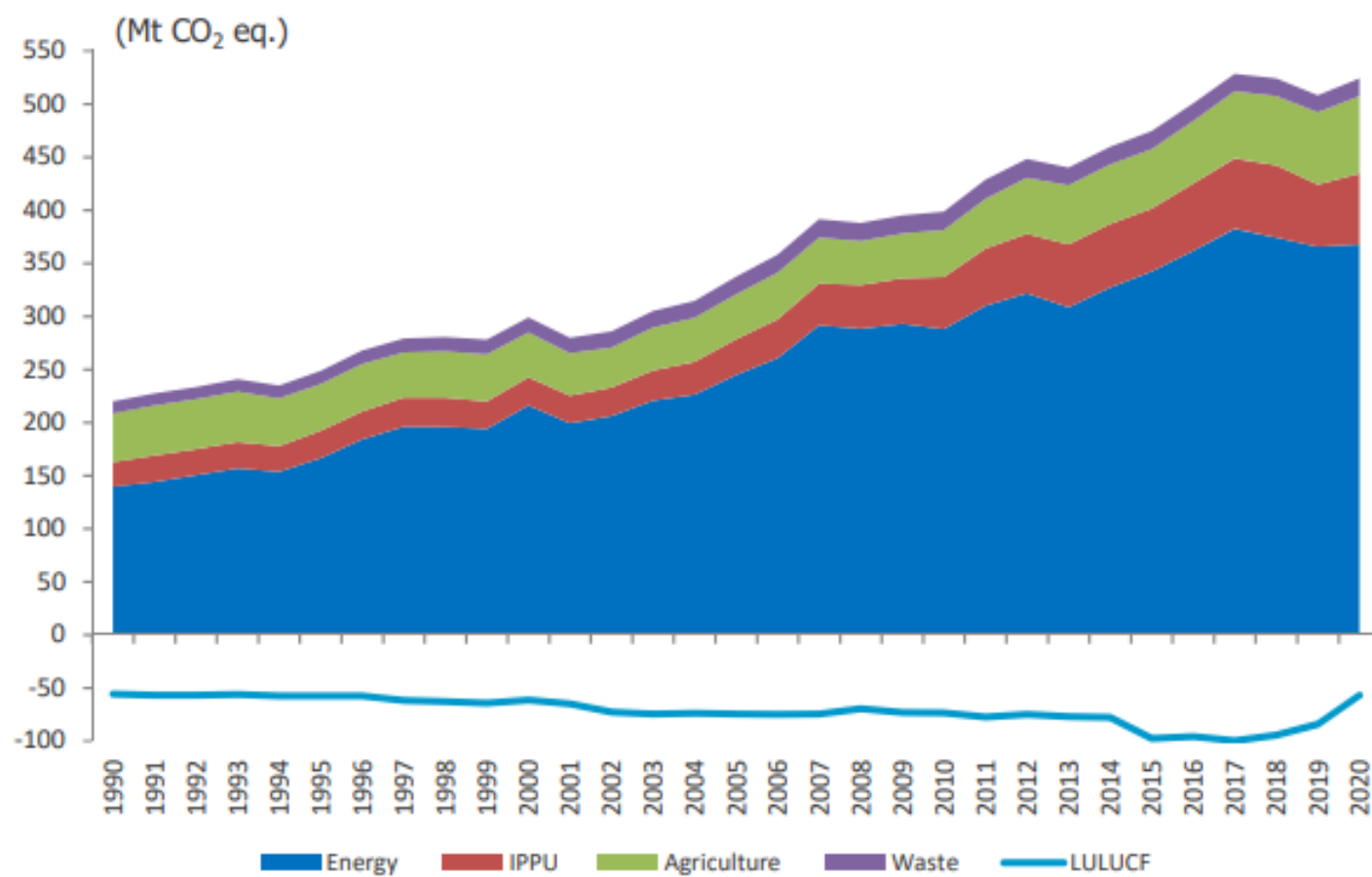
- **Doğrudan**
 - 1. Enterik fermentasyon
 - 2. Solunum
 - 3. Gübre
- **Dolaylı**
 - 1. Yem bitkileri üretimi
 - 2. Gübre uygulamaları
 - 3. Çiftlik operasyonları
 - 4. İşleme
 - 5. Nakliye
 - 6. Arazi kullanımı

CO_2
 CH_4
 N_2O

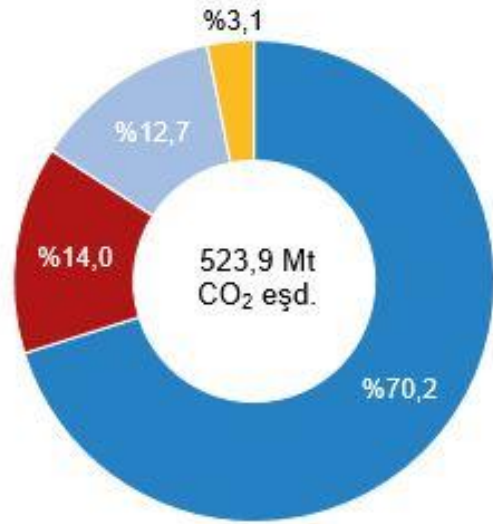
Toplam ve kiři baři sera gazı emisyonu, 1990-2020



GHG Emissions and sinks by sector, 1990-2020

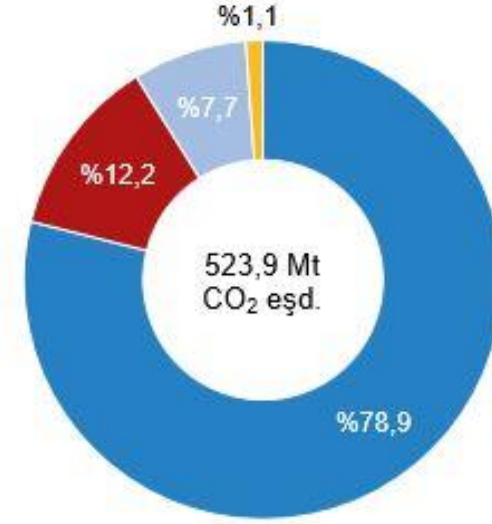


Sektörlere göre sera gazı emisyon oranları, 2020



■ Enerji ■ Tarım ■ Endüstriyel İşlemler ve Ürün Kullanımı ■ Atık

Gazlara göre sera gazı emisyon oranları, 2020⁽¹⁾

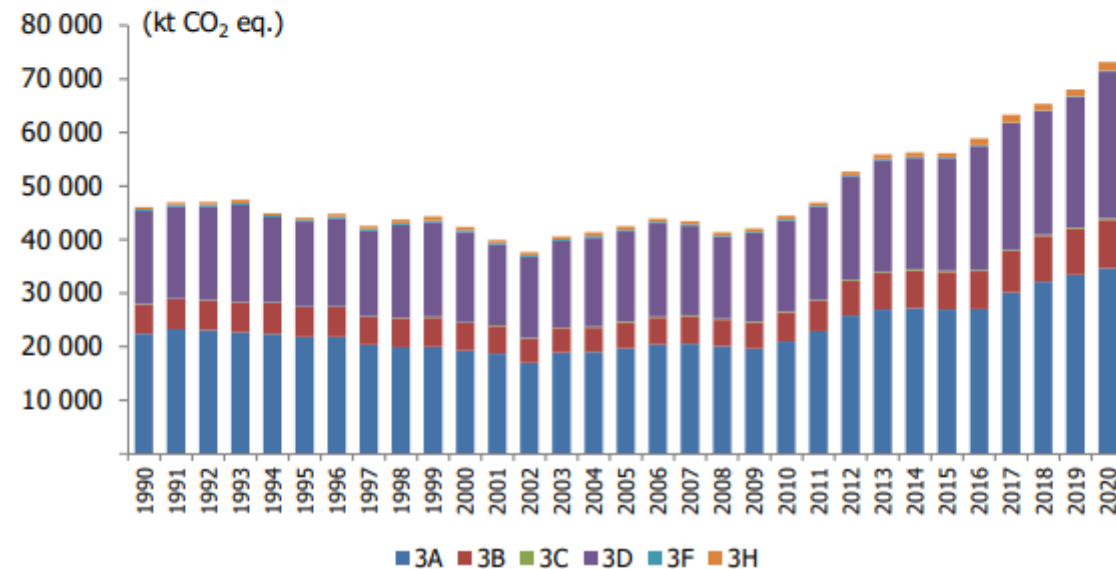


■ CO₂ ■ CH₄ ■ N₂O ■ F-gazlar

Total emissions from the agriculture sector by source

	(kt CO ₂ eq.)									
	1990	2000	2005	2010	2015	2016	2017	2018	2019	2020
Total	46 054	42 332	42 439	44 409	56 133	58 894	63 262	65 338	68 023	73 155
3.A Enteric fermentation	22 397	19 234	19 680	20 946	26 947	26 984	30 110	32 136	33 368	34 615
3.B Manure management	5 436	5 142	4 781	5 391	6 956	7 060	7 697	8 508	8 597	9 060
3.C Rice cultivation	100	128	183	202	240	243	234	252	263	262
3.D Agricultural soils	17 314	16 870	16 880	17 006	21 006	23 147	23 607	23 022	24 342	27 389
3.F Field burning of agricultural residues	347	340	302	219	174	164	165	163	165	173
3.H Urea application	460	617	613	645	811	1 295	1 450	1 257	1 288	1 657

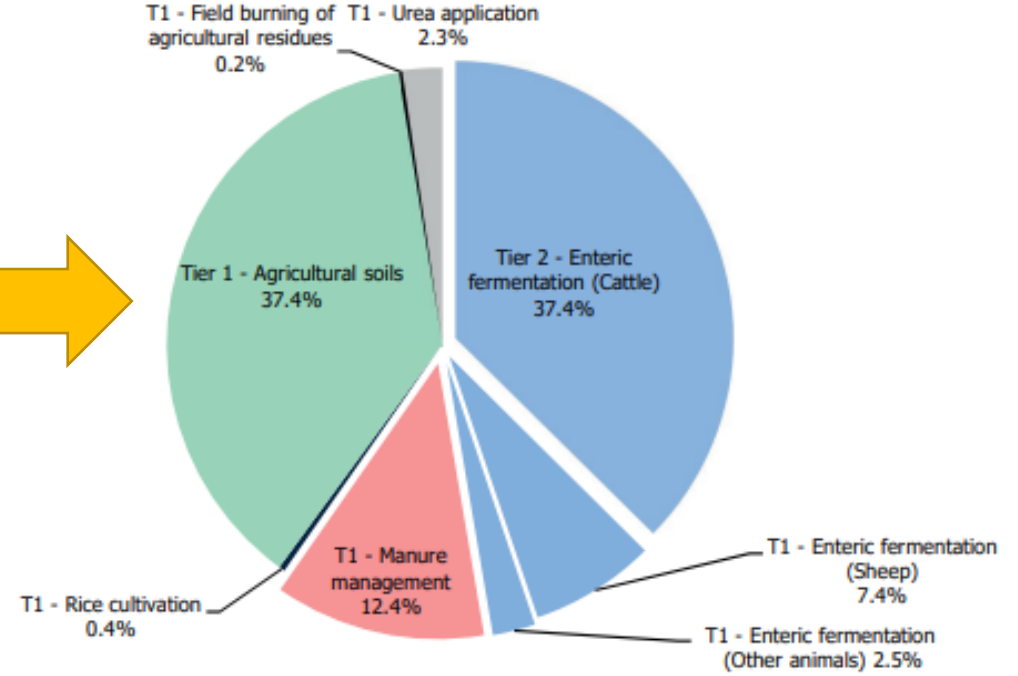
Trend of total emissions from agriculture sector, 1990-2020



- % 47.3 Enterik fermantasyon
- % 12.4 Gübre yönetimi

Hayvancılık faaliyetleri (doğrudan):
Tarım sektörünün: %59.7 (43 675 kt CO₂ eq.)
Toplam emisyonun: %8

Category shares and methods used in the agriculture sector, 2020

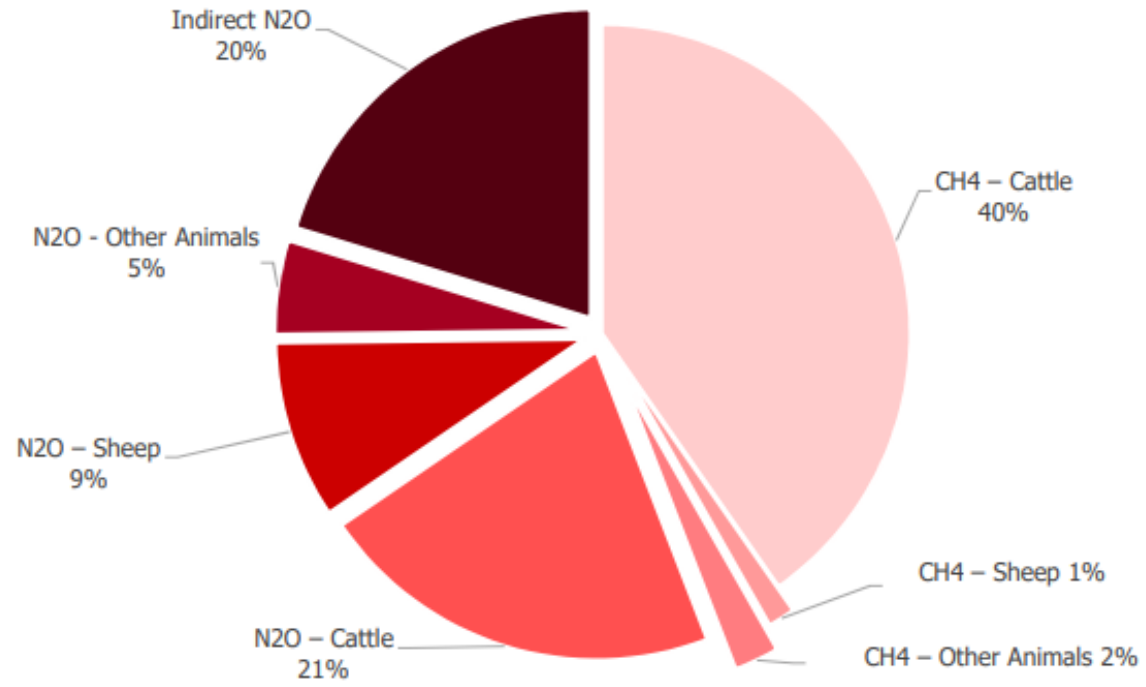


Bolu'nun katkısı:

Büyükbaş (Enterik fermantasyon): % 0.77
Küçükbaş (Enterik fermantasyon): % 0.28

Büyükbaş (Enterik fermantasyon): 12 946 kt CO₂ eq.
Küçükbaş (Enterik fermantasyon): 2 561 kt CO₂ eq.

Manure Management Emission Sources, 2020



İklim Değişikliğinin Hayvancılık Sektörüne Olası Etkileri:

- Üretim ve verimde azalma,
- Yem bitkisi üretiminde sorunlar,
- Hayvanların bakım, besleme ve yetiştirme şartlarında zorluklar,
- Hayvanların hastalıklara karşı direncinde ve yaşama gücünde azalmalar,
- İlk buzağılama yaşı ve buzağılama aralığında uzama,
- Gebelik başına tohumlama sayısında artış,
- Salgın hastalıklarda artış,
- Erken embriyonik ölümler ve buzağı mortalite oranında artış,
- Aşırı sıcaklık artışı nedeniyle: sıcaklık stresi, hayvan refahı, bağışıklık sistemi

4. Tedbirler



- Yemlerin verimli kullanılması ve yem katkı maddelerinin uygulanması
- Yoğun besi yemi uygulamaları
- Bazı yağlar veya yağ çekirdeklerinin besine eklenmesi
- Otlatma koşullarının iyileştirilmesi
- Protein alımının düzenlenmesi
- Özel katkı maddeleri, probiyotikler



- Biyogaz üretimi
- Kompostlaştırma
- Sıvı gübre üretimi

Yapay et





Teşekkür ederim....