ORDINE DEGLI INGEGNERI
DELLA PROVINCIA DI PALERMO

Università degli Studi di Palermo

dipartimento di ingegneria unipa

Seminario tecnico

"Il riuso irriguo delle acque reflue depurate: applicazione in Sicilia del Regolamento EU n.741/2020"

Palermo, 23 Settembre 2022

CAMBIAMENTI CLIMATICI E NUOVE STRATEGIE IN AGRICOLTURA

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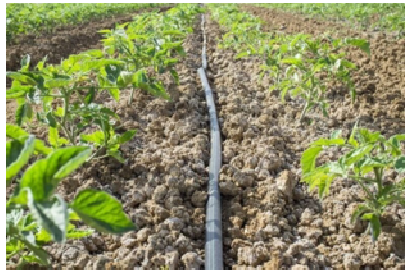
Dipartimento regionale Agricoltura

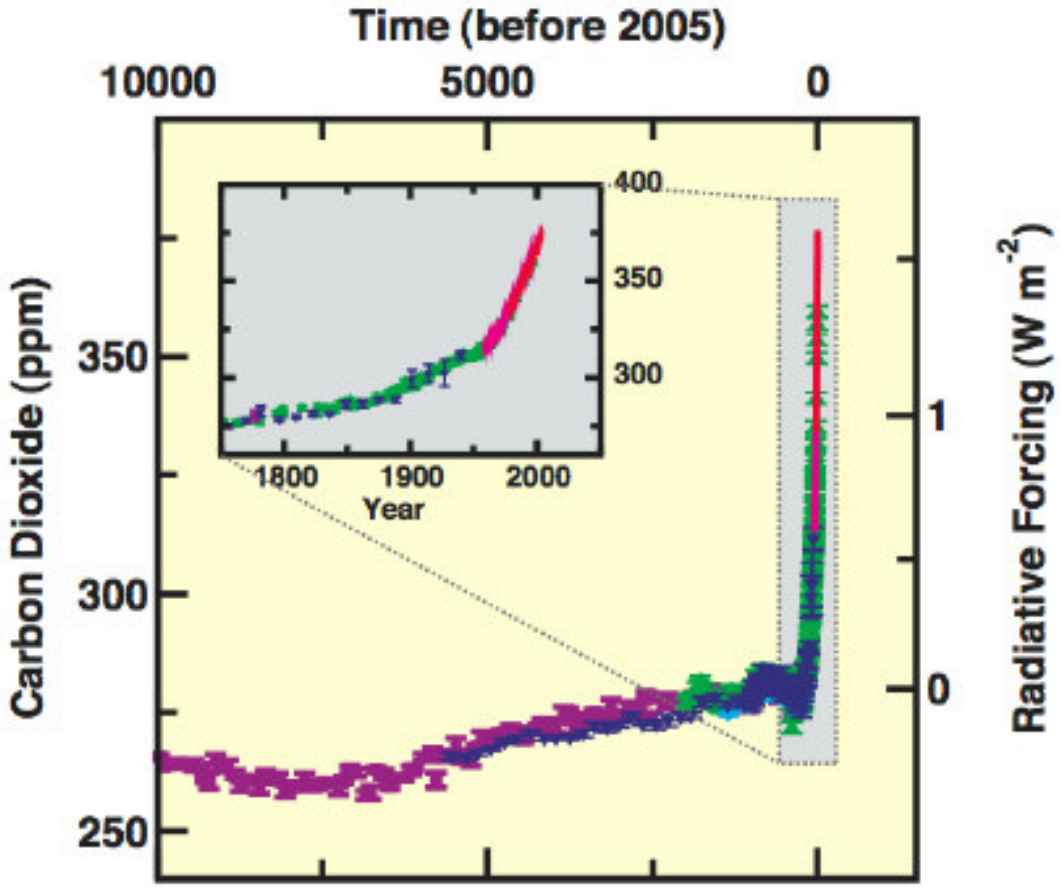
SIAS

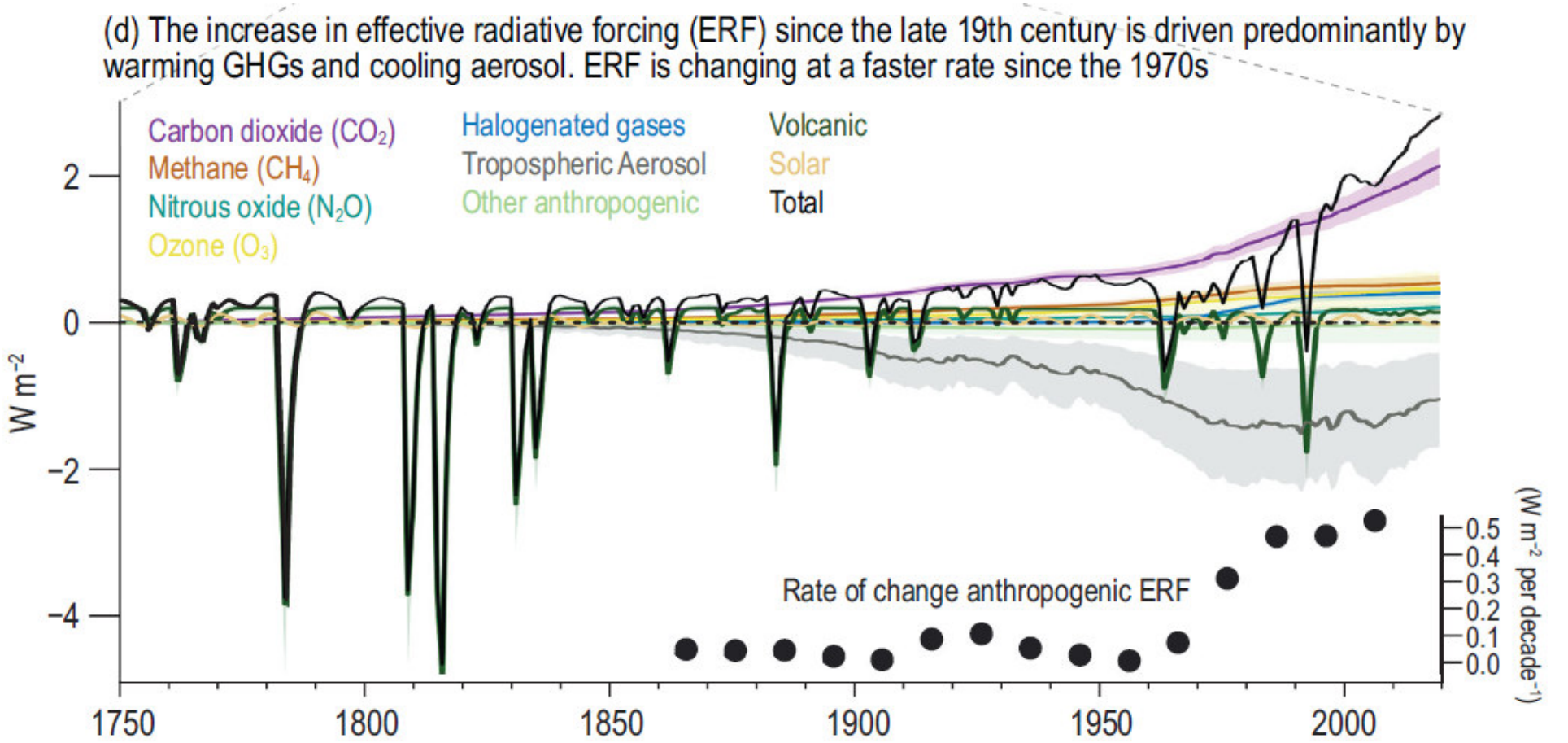


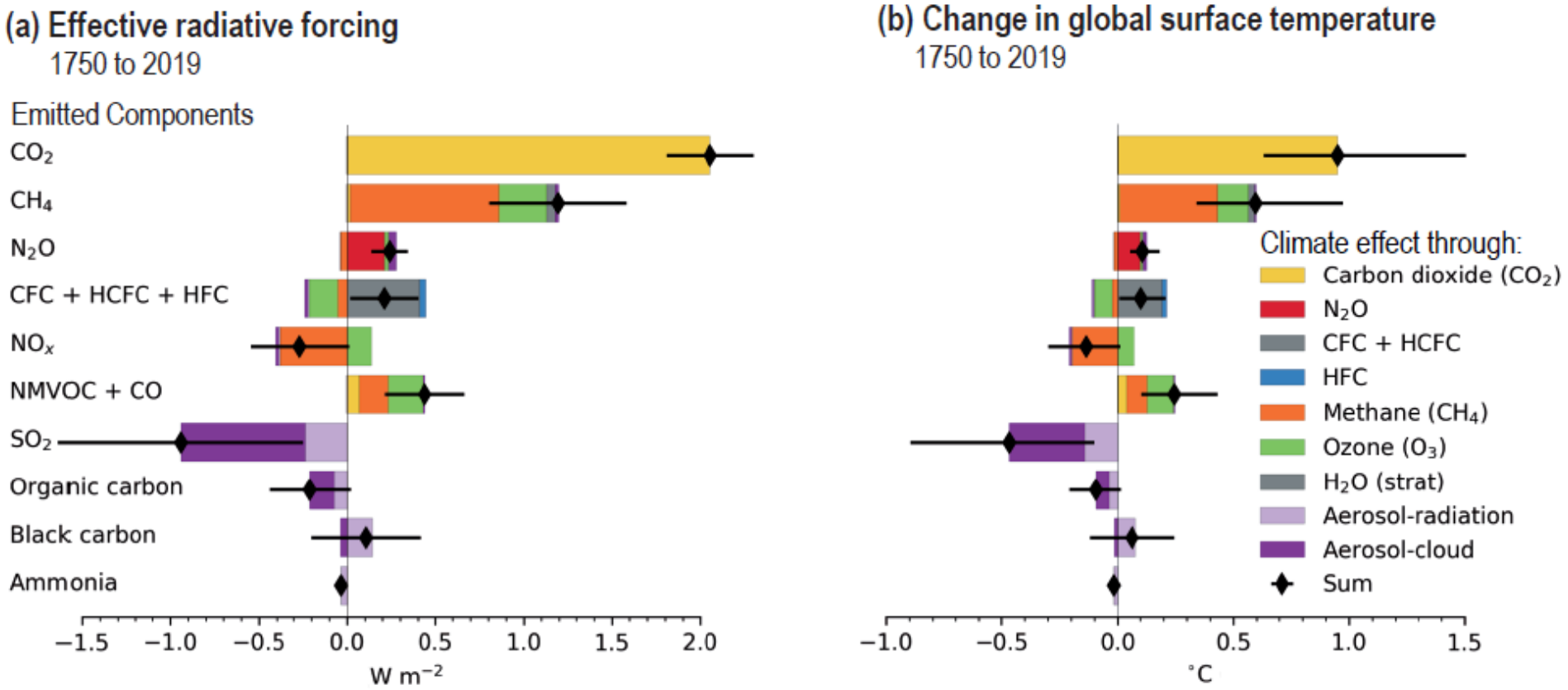


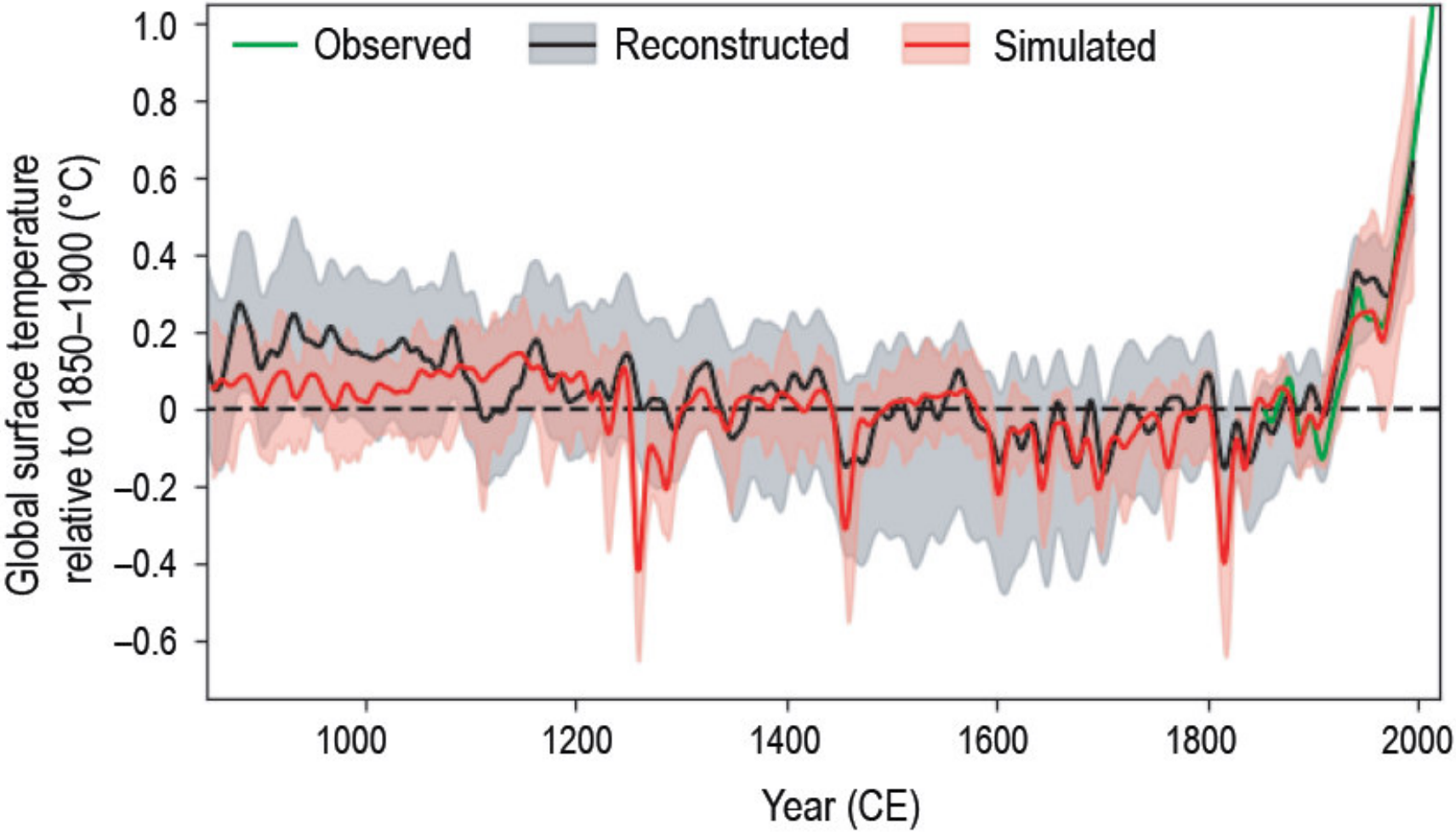


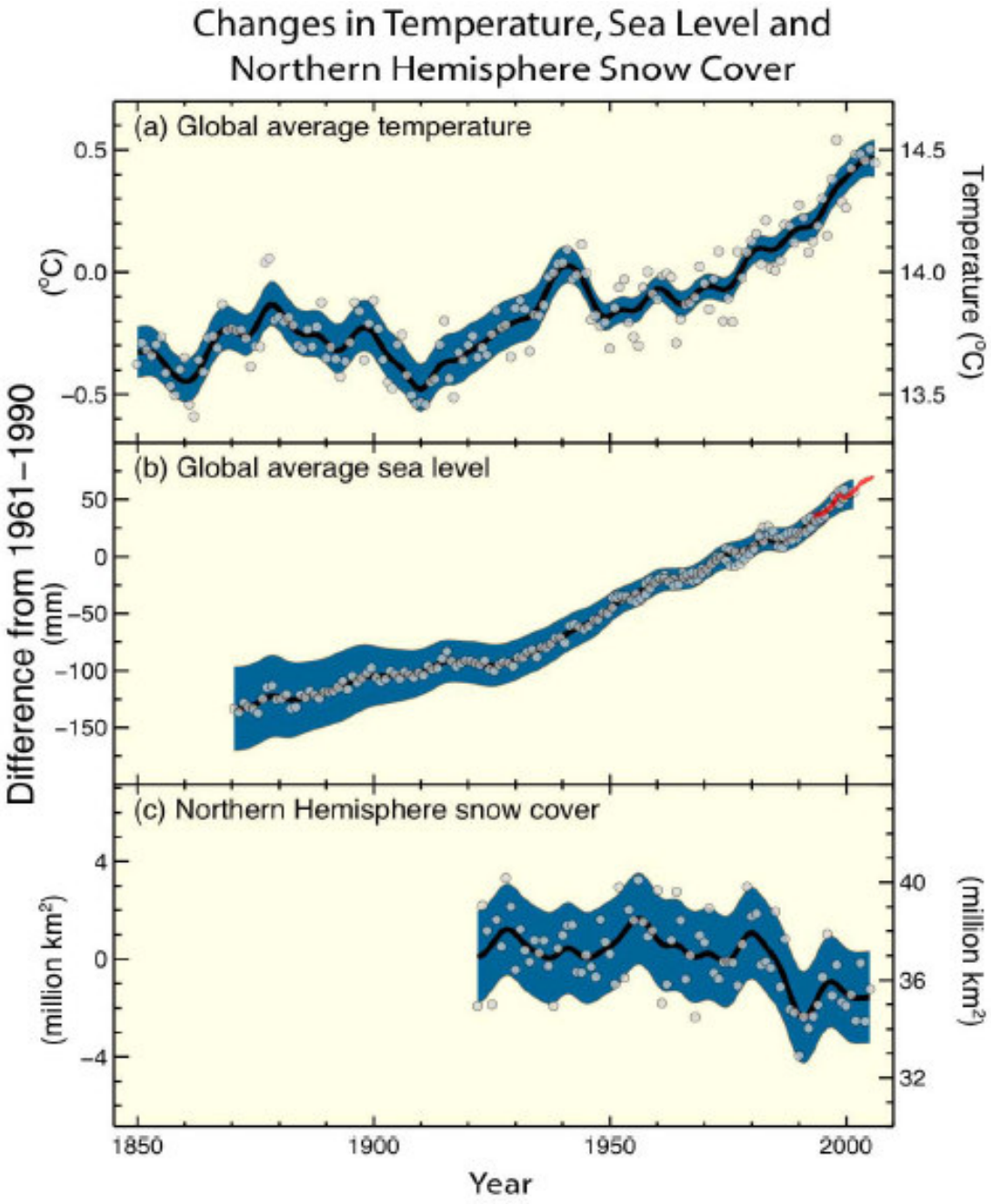
Changes in Greenhouse Gases from ice-Core and Modern Data



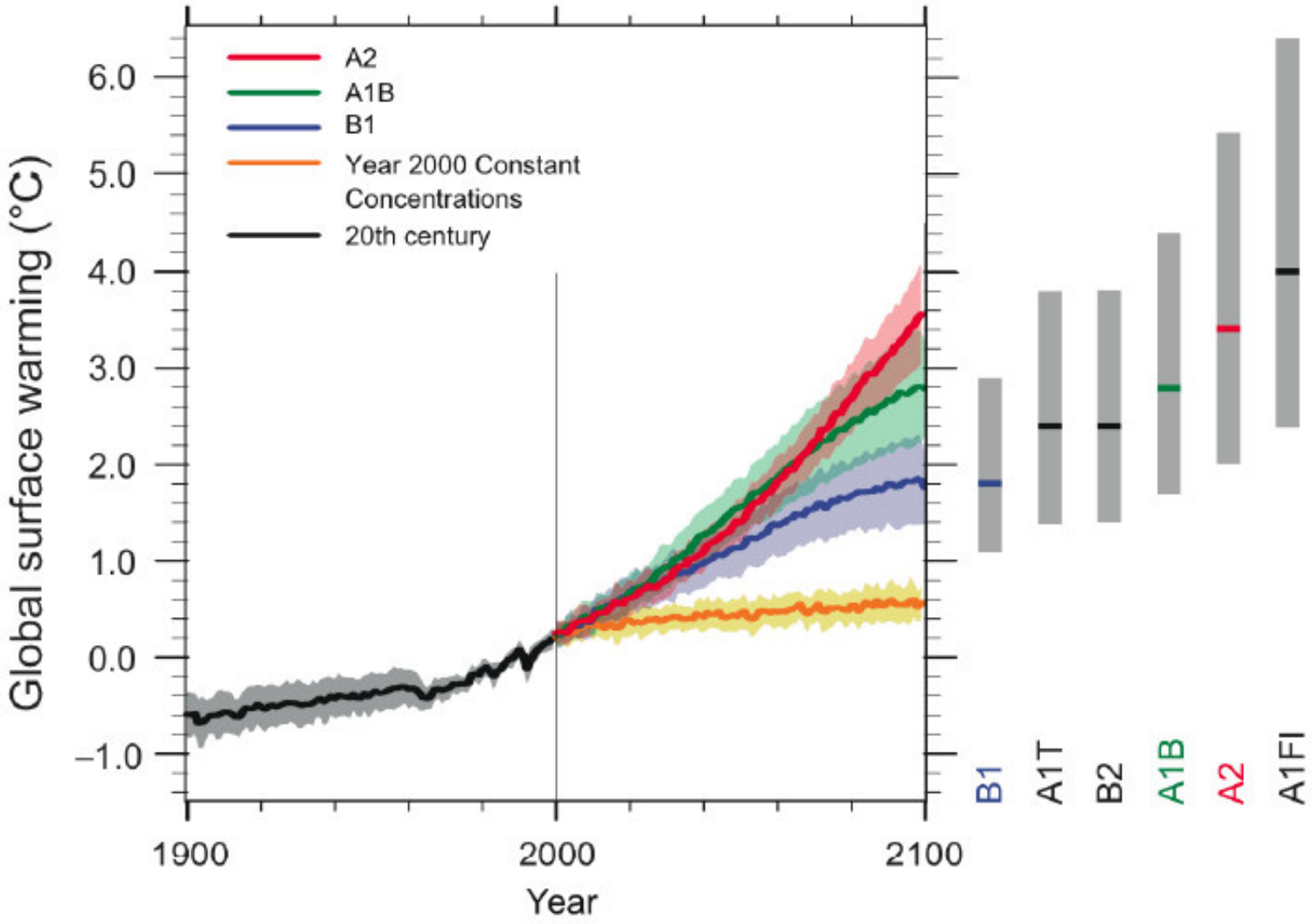

(d) The increase in effective radiative forcing (ERF) since the late 19th century is driven predominantly by warming GHGs and cooling aerosol. ERF is changing at a faster rate since the 1970s
Carbon dioxide (CO_2)
Methane (CH_4)
Nitrous oxide (N_2O)
Ozone (O_3)
Halogenated gases
Tropospheric Aerosol
Other anthropogenic
Volcanic
Solar
Total
W m^{-2}
2
0
−2
−4
Rate of change anthropogenic ERF
(W m^{-2} per decade^{-1})
0.5
0.4
0.3
0.2
0.1
0.0
1750
1800
1850
1900
1950
2000

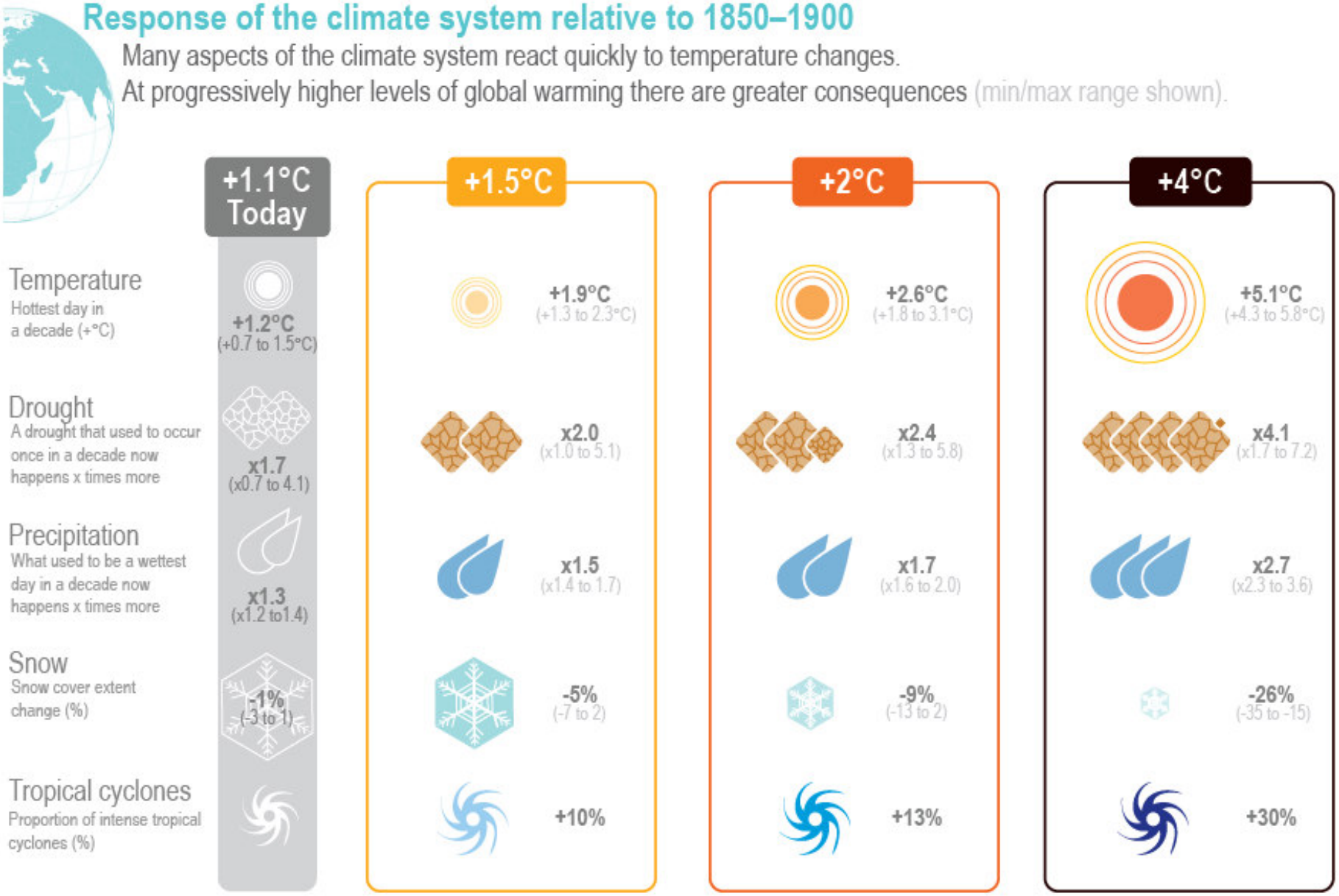

(a) Effective radiative forcing
1750 to 2019
Emitted Components
CO_2
CH_4
N_2O
CFC + HCFC + HFC
NO_x
NMVOC + CO
SO_2
Organic carbon
Black carbon
Ammonia
−1.5 −1.0 −0.5 0.0 0.5 1.0 1.5 2.0
W m^{-2}
(b) Change in global surface temperature
1750 to 2019
Climate effect through:
Carbon dioxide (CO_2)
N_2O
CFC + HCFC
HFC
Methane (CH_4)
Ozone (O_3)
H_2O (strat)
Aerosol-radiation
Aerosol-cloud
Sum
−1.0 −0.5 0.0 0.5 1.0 1.5
°C


Observed
Reconstructed
Simulated
Global surface temperature relative to 1850–1900 (°C)
1.0
0.8
0.6
0.4
0.2
0
−0.2
−0.4
−0.6
1000
1200
1400
1600
1800
2000
Year (CE)


Changes in Temperature, Sea Level and Northern Hemisphere Snow Cover
(a) Global average temperature
(°C)
0.5
0.0
−0.5
14.5
14.0
13.5
Temperature (°C)
(b) Global average sea level
Difference from 1961–1990 (mm)
50
0
−50
−100
−150
(c) Northern Hemisphere snow cover
(million km²)
4
0
−4
40
36
32
(million km²)
1850
1900
1950
2000
Year

Multi-model Averages and Assessed Ranges for Surface Warming

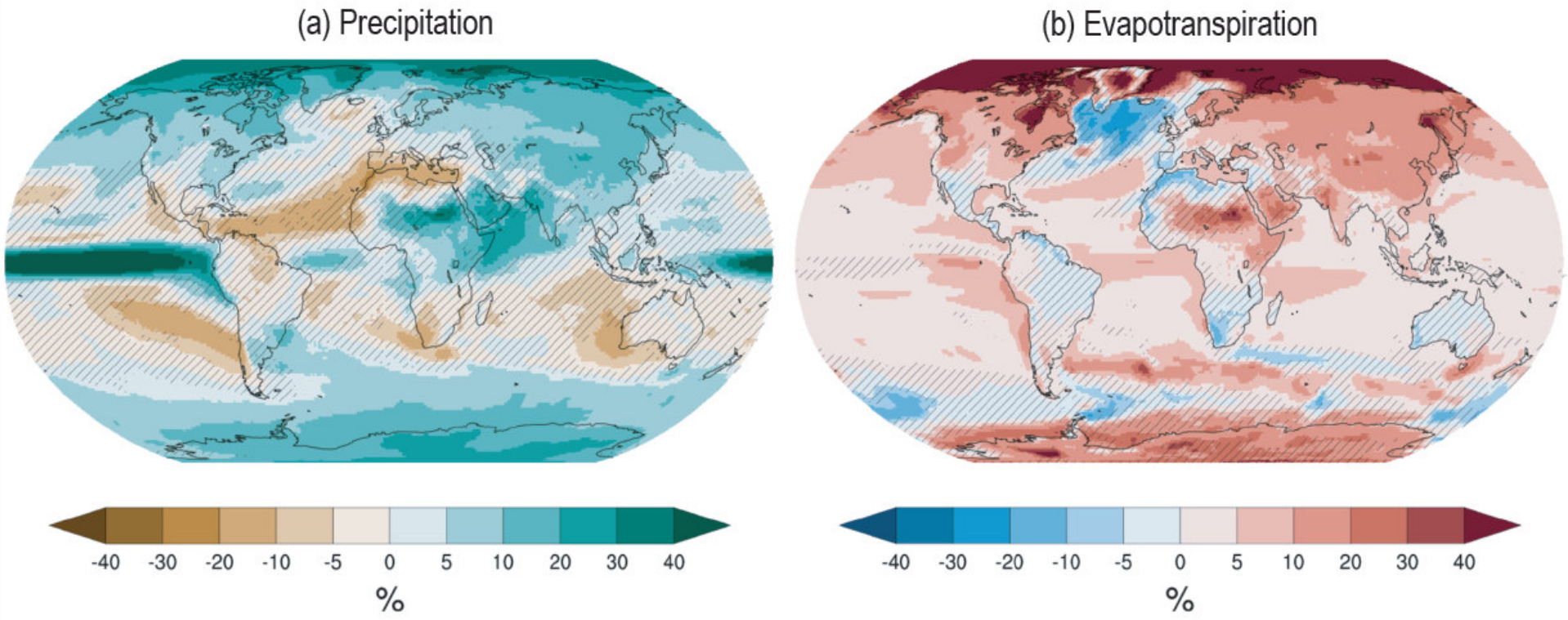



Response of the climate system relative to 1850–1900
Many aspects of the climate system react quickly to temperature changes.
At progressively higher levels of global warming there are greater consequences (min/max range shown).
+1.1°C Today
+1.5°C
+2°C
+4°C
Temperature
Hottest day in a decade (+°C)
+1.2°C (+0.7 to 1.5°C)
+1.9°C (+1.3 to 2.3°C)
+2.6°C (+1.8 to 3.1°C)
+5.1°C (+4.3 to 5.8°C)
Drought
A drought that used to occur once in a decade now happens x times more
x1.7 (x0.7 to 4.1)
x2.0 (x1.0 to 5.1)
x2.4 (x1.3 to 5.8)
x4.1 (x1.7 to 7.2)
Precipitation
What used to be a wettest day in a decade now happens x times more
x1.3 (x1.2 to1.4)
x1.5 (x1.4 to 1.7)
x1.7 (x1.6 to 2.0)
x2.7 (x2.3 to 3.6)
Snow
Snow cover extent change (%)
-1% (-3 to 1)
-5% (-7 to 2)
-9% (-13 to 2)
-26% (-35 to -15)
Tropical cyclones
Proportion of intense tropical cyclones (%)
+10%
+13%
+30%

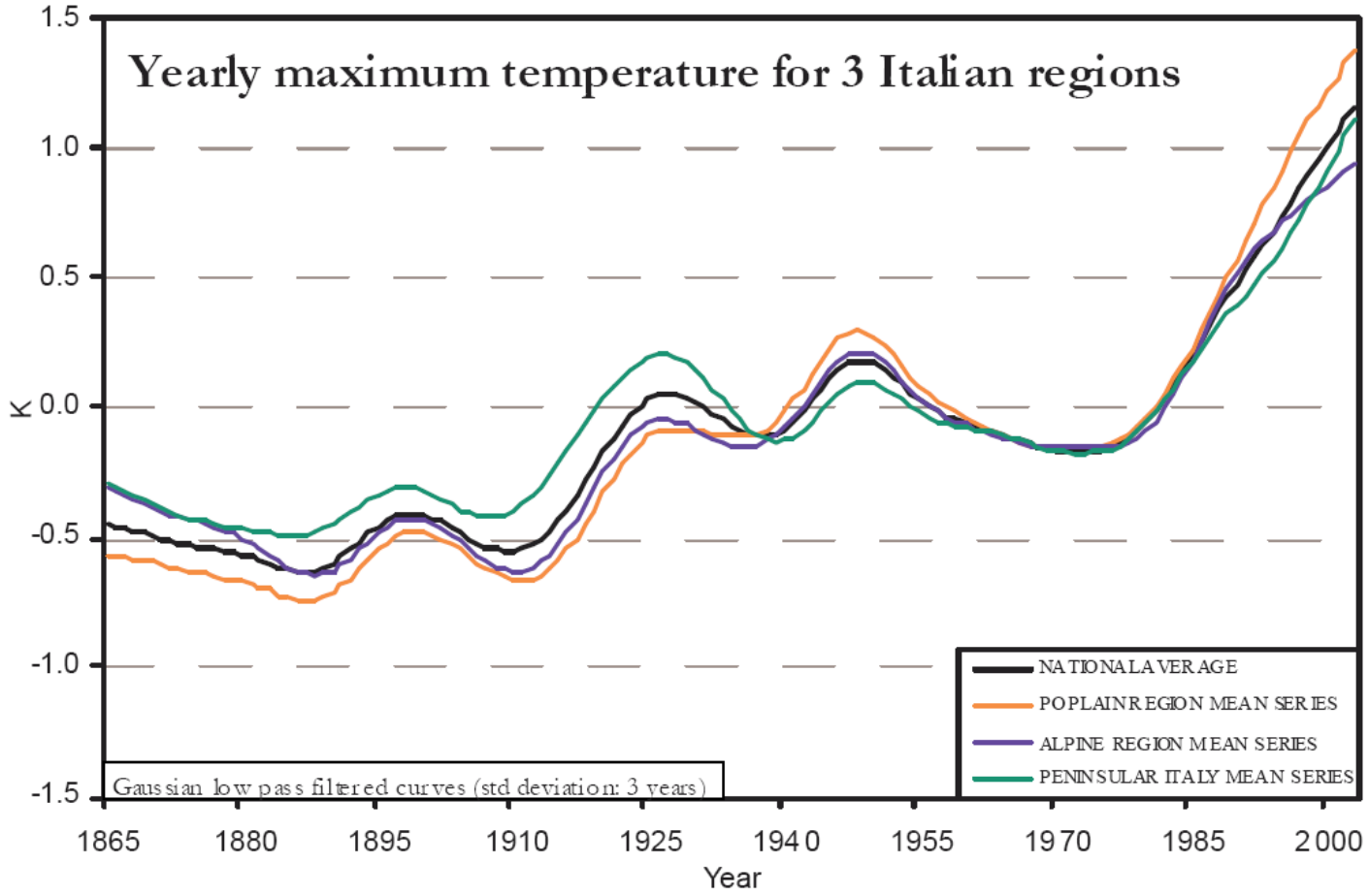
Change in Indicator	Observed (since 1950)	Attributed (since 1950)	Projected at GWL (°C)		
			+1.5	+2	+4
Warm/hot extremes: Frequency or intensity	↑	✓ Main driver	↑	↑	↑
Cold extremes: Frequency or intensity	↓	✓ Main driver	↓	↓	↓
Heavy precipitation events: Frequency, intensity and/or amount	↑ Over majority of land regions with good observational coverage	✓ Main driver of the observed intensification of heavy precipitation in land regions	↑ in most land regions	↑	↑ in most land regions
Agricultural and ecological droughts: Intensity and/or frequency	↑ in some regions	✓ in some regions	↑ in more regions compared to observed changes	↑ in more regions compared to 1.5°C of global warming	↑ in more regions compared to 2°C of global warming
Precipitation associated with tropical cyclones	↑	✓	↑ Rate +11%	↑ Rate +14%	↑ Rate +28%
Tropical cyclones: Proportion of intense cyclones	↑	✓	↑ +10%	↑ +13%	↑ +20%
Compound events: Co-occurrent heatwaves and droughts	↑ (Frequency)	✓ (Frequency)	↑ (Frequency and intensity increases with warming)		
Marine heatwaves: Intensity & frequency	↑ (since 1900)	✓ (since 2006)	↑ Strongest in tropical and Arctic Ocean		
Extreme sea levels: Frequency	↑ (since 1960)	✓	↑ (Scenario-based assessment for 21st century)		

medium confidence *likely/high confidence* *very likely* *extremely likely* *virtually certain*

Long-term water cycle variables changes for SSP2-4.5 (2081–2100 vs 1995–2014)

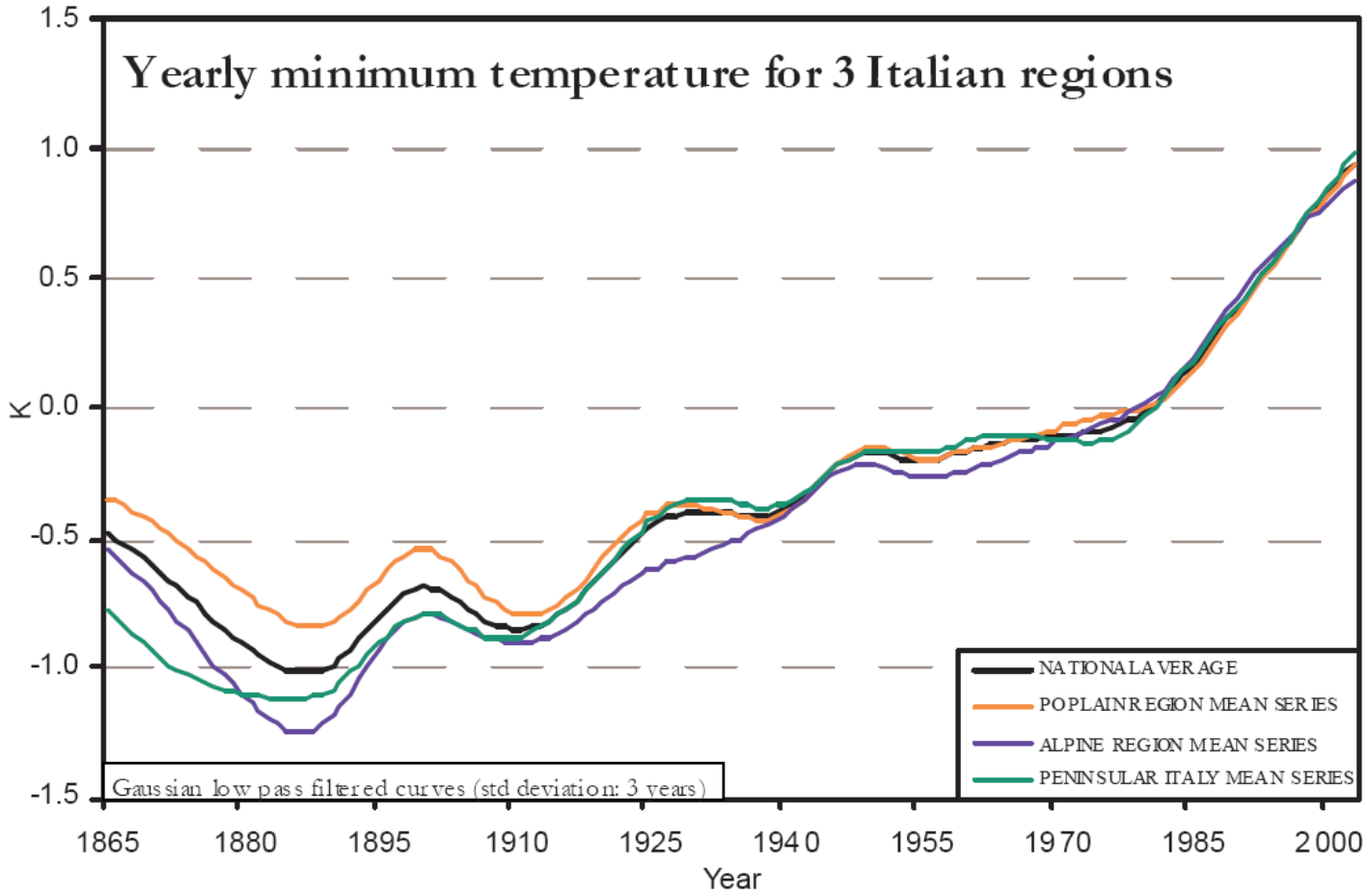


In Italia



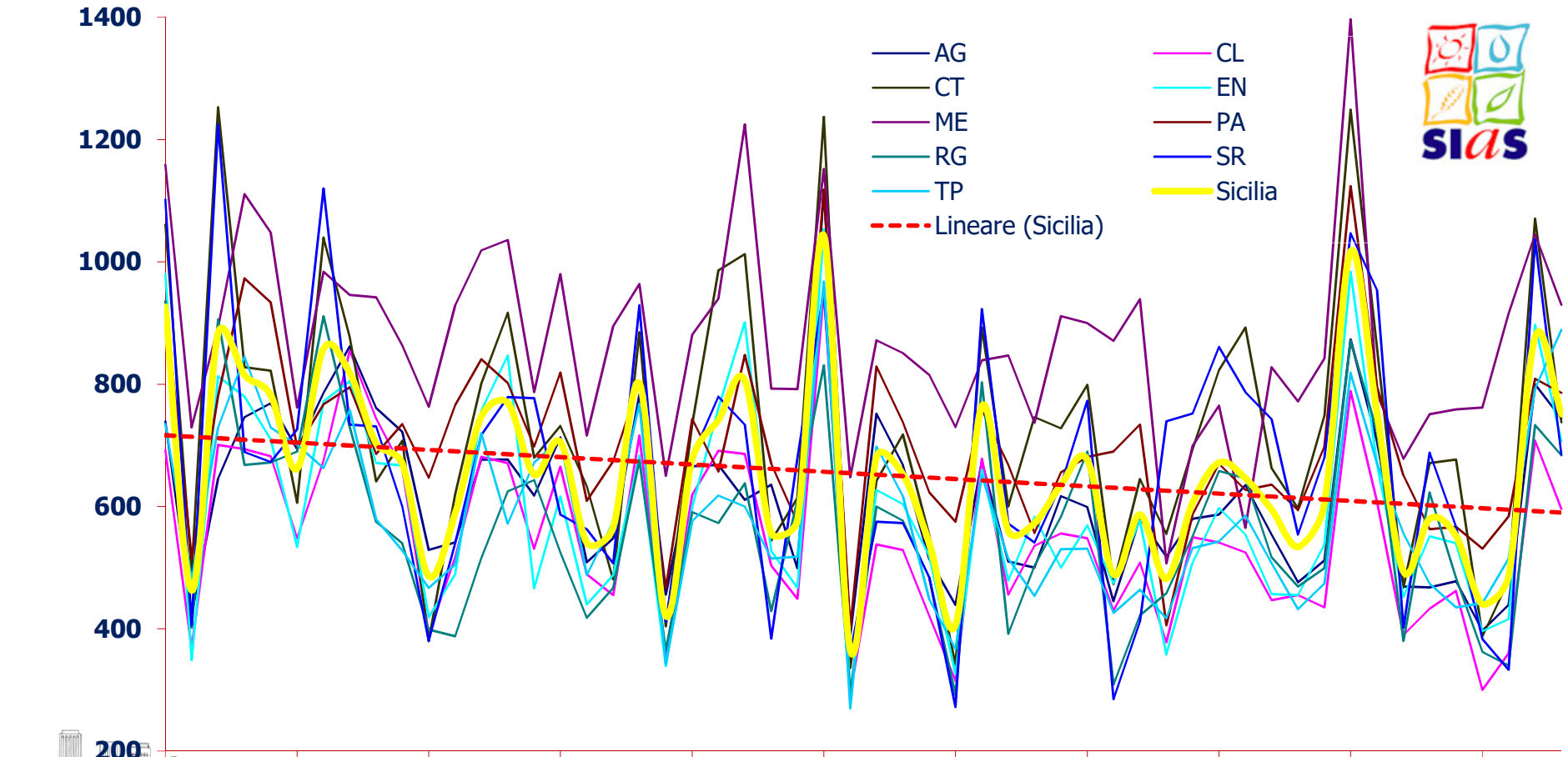
Average regional series for mean, maximum, and minimum yearly temperature series (expressed in anomalies respect to the mean of the standard period 1961-1990). The series were filtered with an 11-year window 3-year Gaussian low-pass filter.

In Italia

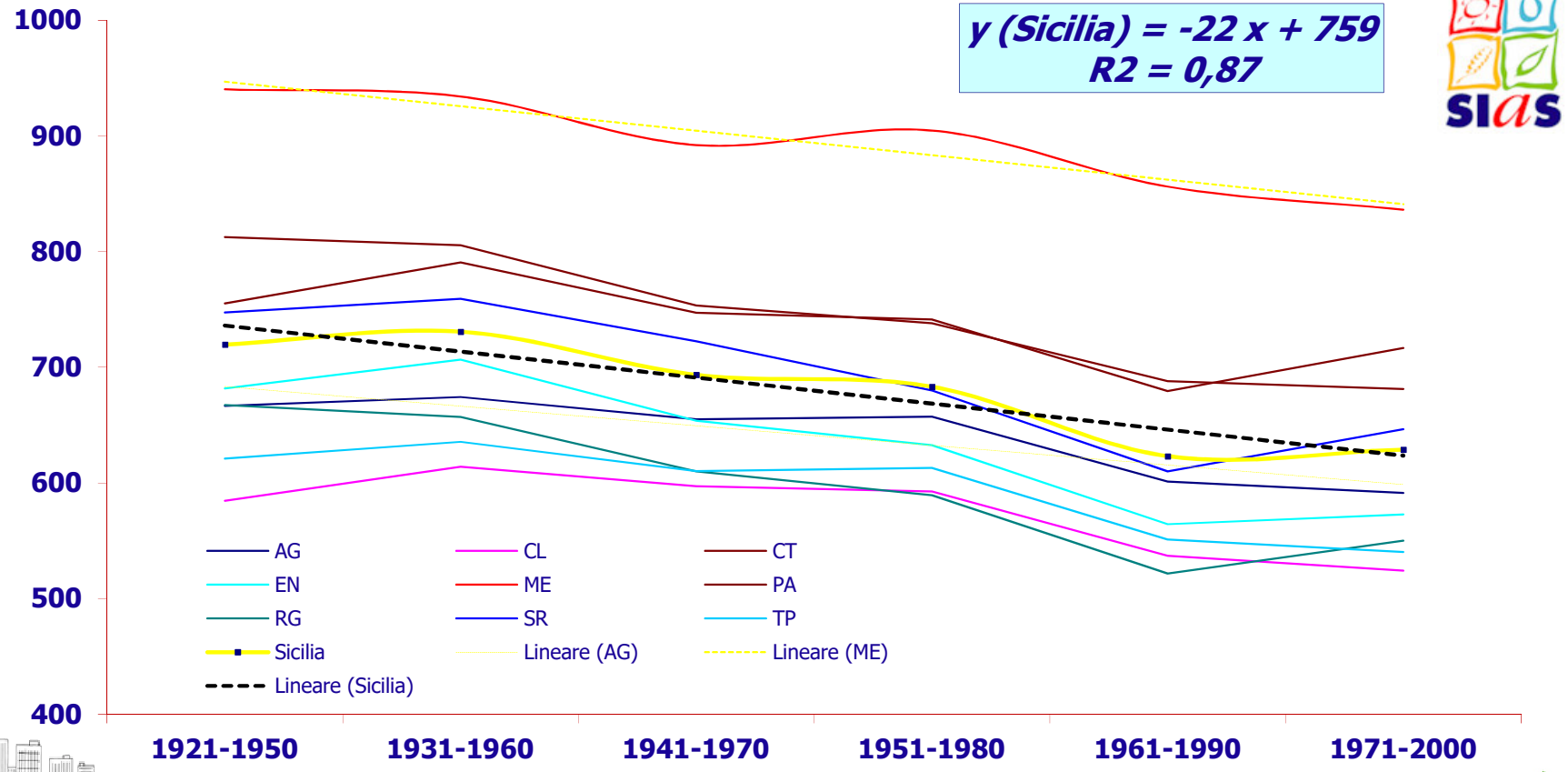


Average regional series for mean, maximum, and minimum yearly temperature series (expressed in anomalies respect to the mean of the standard period 1961-1990). The series were filtered with an 11-year window 3-year Gaussian low-pass filter.

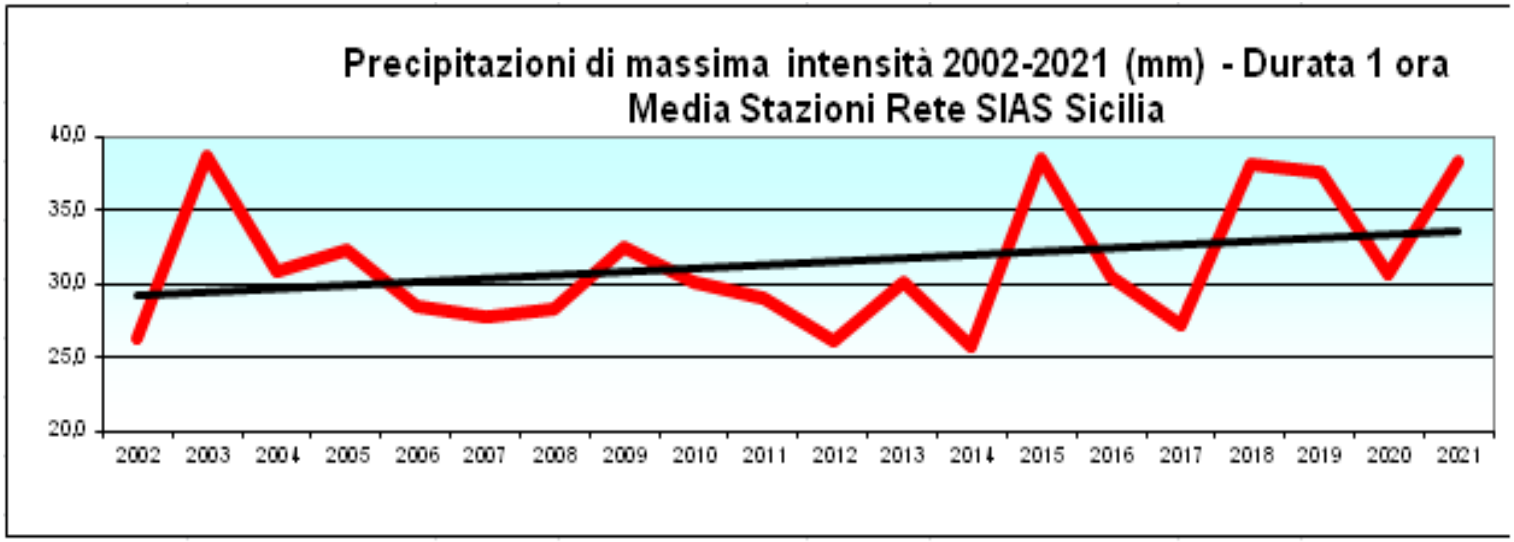
Analisi di un cinquantennio (1951-2004) di dati di precipitazioni (mm) su circa 150 stazioni meteorologiche in Sicilia.

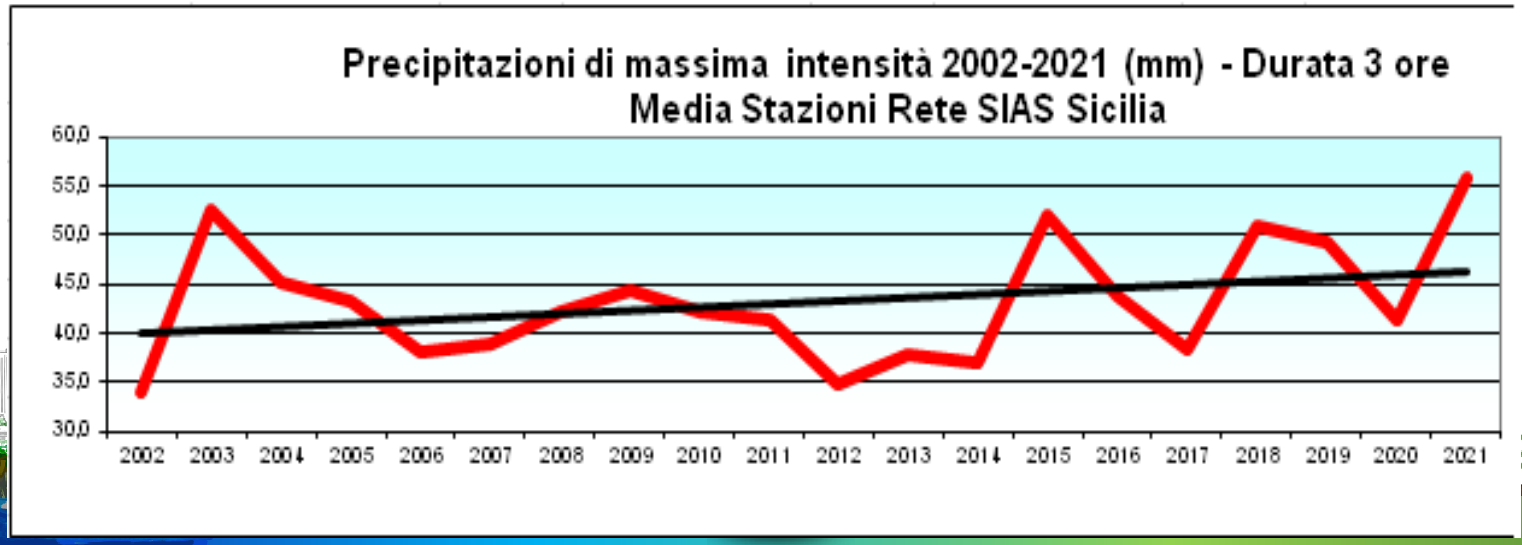


Analisi di un ottantennio (1921-2000) di dati di precipitazioni (mm) su circa 150 stazioni meteorologiche in Sicilia. Andamento in 6 trentenni successivi (media mobile)

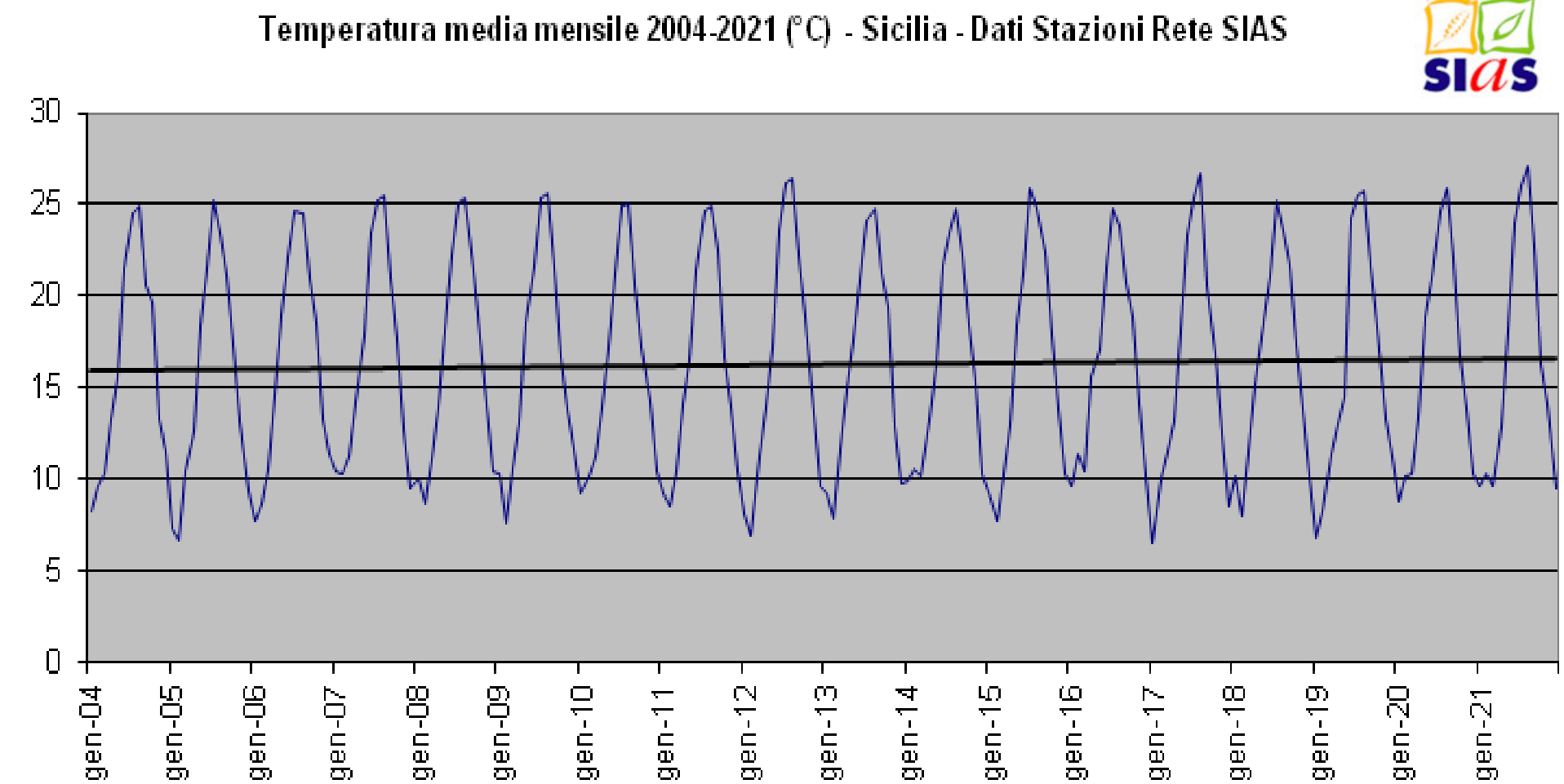


Dati SIAS ultimi vent'anni Sicilia



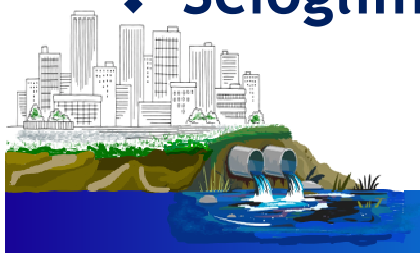


Dati SIAS ultimi vent'anni Sicilia



FENOMENI GIA' OSSERVATI E IPOTESI MOLTO PROBABILI NEGLI SCENARI DI GLOBAL CHANGE

- Aumento temperature
- Riduzione precipitazioni
  in molte aree mondiali, tra cui quelle del Mediterraneo
- Maggiore frequenza degli eventi estremi
- Aumento del livello medio del mare
- Scioglimento dei ghiacci continentali



Le parole-chiave: adattamento e mitigazione

CAMBIAMENTI CLIMATICI

Strategie di ADATTAMENTO

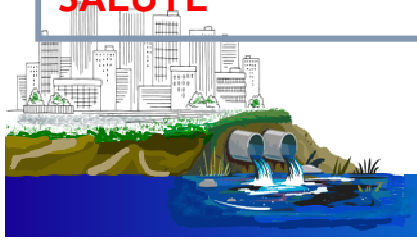
Strategie di MITIGAZIONE

ATTENUAZIONE IMPATTO SUI SISTEMI

RISORSE ALIMENTARI E IDRICHE
LOCALIZZAZIONE ATTIVITÀ e INSEDIAMENTI
PROTEZIONE ECOSISTEMI
SALUTE

COMPORTAMENTI SOCIO-ECONOMICI

CRESCITA DEMOGRAFICA
CRESCITA ECONOMICA
NUOVE TECNOLOGIE
GOVERNANCE



MITIGAZIONE

- RIDUZIONE DELL'USO DEI COMBUSTIBILI FOSSILI (CO_2)
- ENERGIE ALTERNATIVE (FONTI RINNOVABILI)
- NUOVE TECNOLOGIE
- PREVENZIONE E CONTRASTO INCENDI
- AGRO-AMBIENTE (CO_2, NH_4, NO_x)

Le parole-chiave: mitigazione

GOVERNANCE

- GLOBALE: es. PROTOCOLLO DI KIOTO e successivi
- EUROPEA: es. GREEN NEW DEAL
- NAZIONALE: es. "CONTO ENERGIA" e successivi
- REGIONALE: es. PSR-SICILIA
- LOCALE: es. interventi su bio-edilizia e fonti rinnovabili

Strategie MITIGAZIONE agricoltura

PRESUPPOSTO BASE:
AGRICOLTURA ''PIU' VITTIMA CHE RESPONSABILE''

- RINNOVABILI IN AGRICOLTURA
- RIDUZIONE EMISSIONE DI GHG (PSR E PAC: AGRO-AMBIENTE)
- CARBON SINK **(NON SOLO BOSCHI, ANCHE FRUTTICOLTURA MEDITERRANEA)**

Strategie ADATTAMENTO agricoltura

- NUOVA DISTRIBUZIONE GEOGRAFICA DELLE COLTURE
- EVENTI ESTREMI: INTERVENTI AGRONOMICI E INGEGNERISTICI
- EVENTI ESTREMI: GESTIONE DEL RISCHIO E ASSICURAZIONI
- SERVIZI AGROMETEOROLOGICI - SUPPORTO ALLE DECISIONI
- ACQUA (in eccesso e in difetto)

ECCESSO IDRICO IN AGRICOLTURA

- Difesa idro-geologica del territorio
- Canali consortili

DEFICIT IDRICO IN AGRICOLTURA

- Capacità di invaso (grandi invasi, interrimenti, piccoli invasi)
- Efficienza idrica: reti distributive interaziendali (CdB)
- Efficienza irrigua aziendale: impianti, agrometeorologia e DSS
- Risorse non convenzionali: RIUSO IRRIGUO reflui depurati

GRAZIE!

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