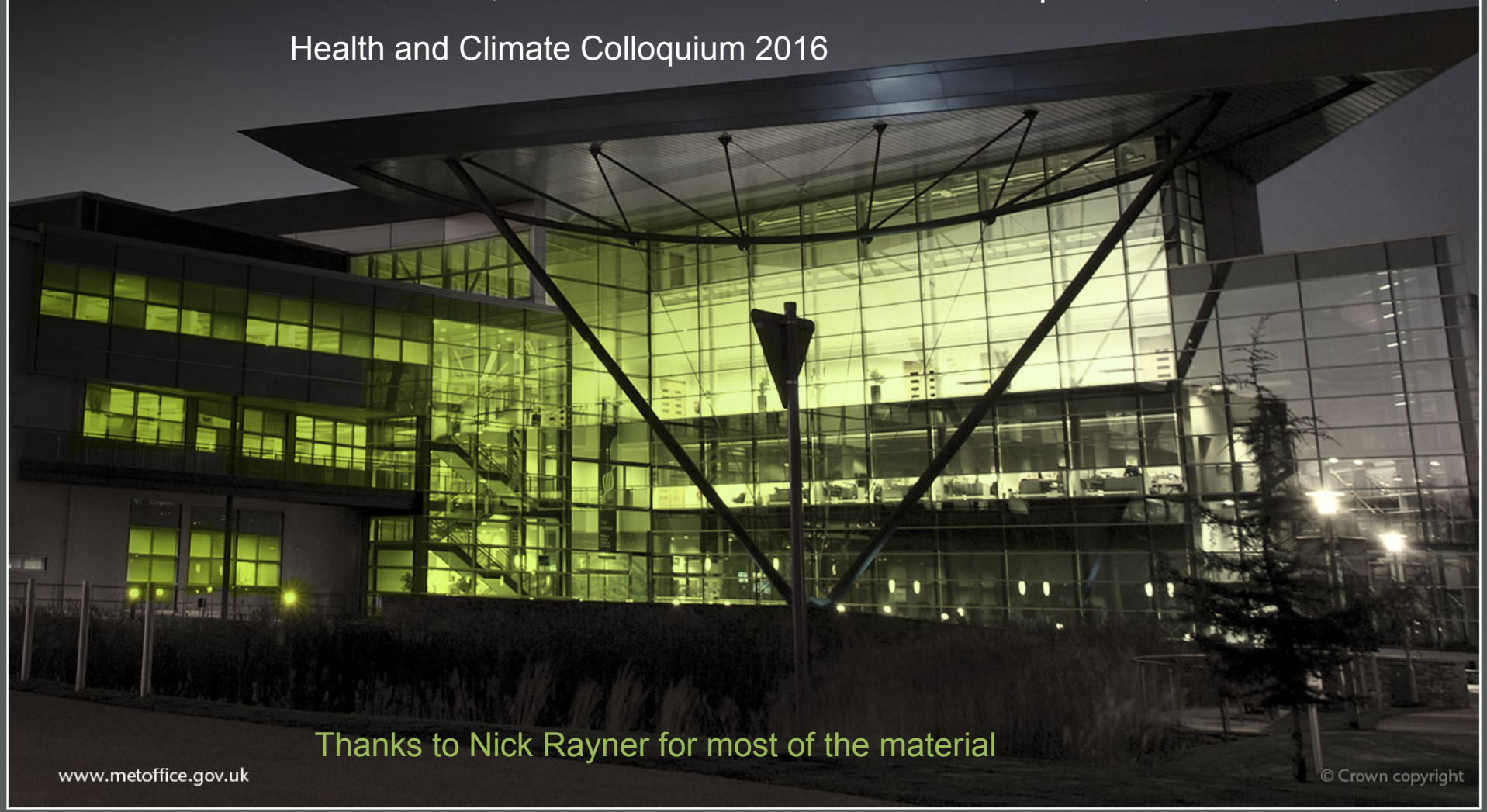
Global climate observations and monitoring products

Chris Hewitt, Head of Climate Service Development, Met Office, UK

Health and Climate Colloquium 2016



Thanks to Nick Rayner for most of the material

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Contents

- Climate information to aid decision-making (climate services)
- Climate observing systems
- Sources of data, availability, relevance at difference spatial and temporal scales
- Data sharing policies

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Climate information is potentially of use in decision-making and risk management

Climate services are being actively developed world-wide

- Must respond to user needs
- Need to be based on scientifically credible information and expertise
- Require appropriate engagement between the users and providers with an effective access mechanism

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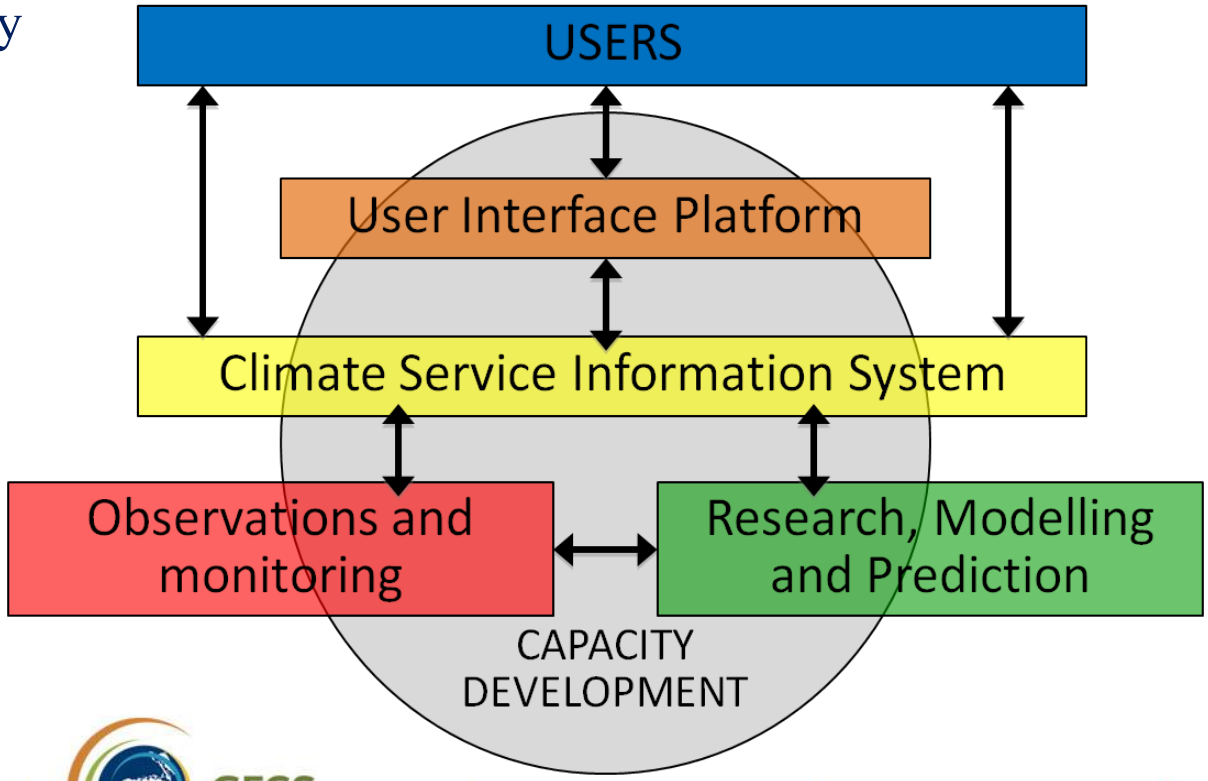
Global Framework for Climate Services (GFCS)

Vision: enable society to manage better the risks and opportunities arising from climate variability and change. Using science-based climate information

Priority areas:

- Agriculture and food security
- Water management
- Health
- Disaster risk reduction
- Energy
- Urban environments



GFCS
GLOBAL FRAMEWORK FOR CLIMATE SERVICES

Timescales in scope?

1. Past climate

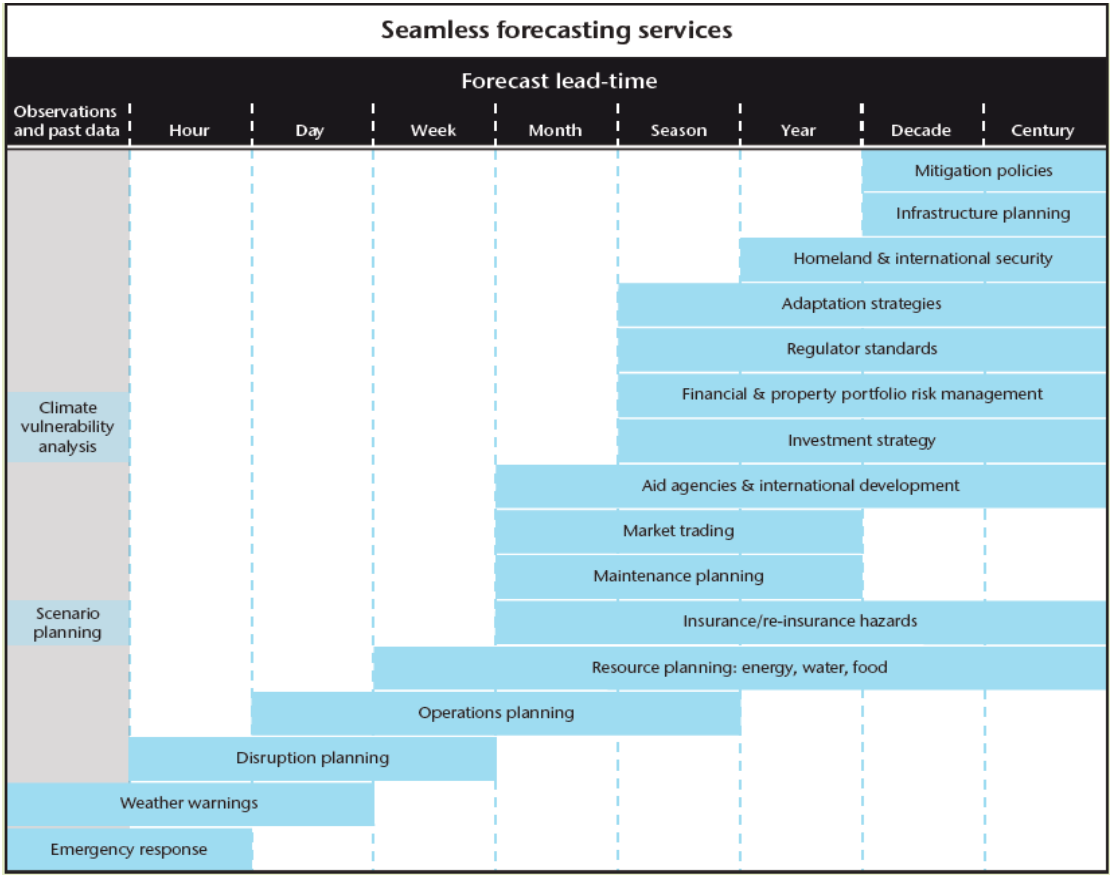
   observations and monitoring, climatologies

2. Near-term future climate

   month-season-decade predictions

3. Long-term future climate

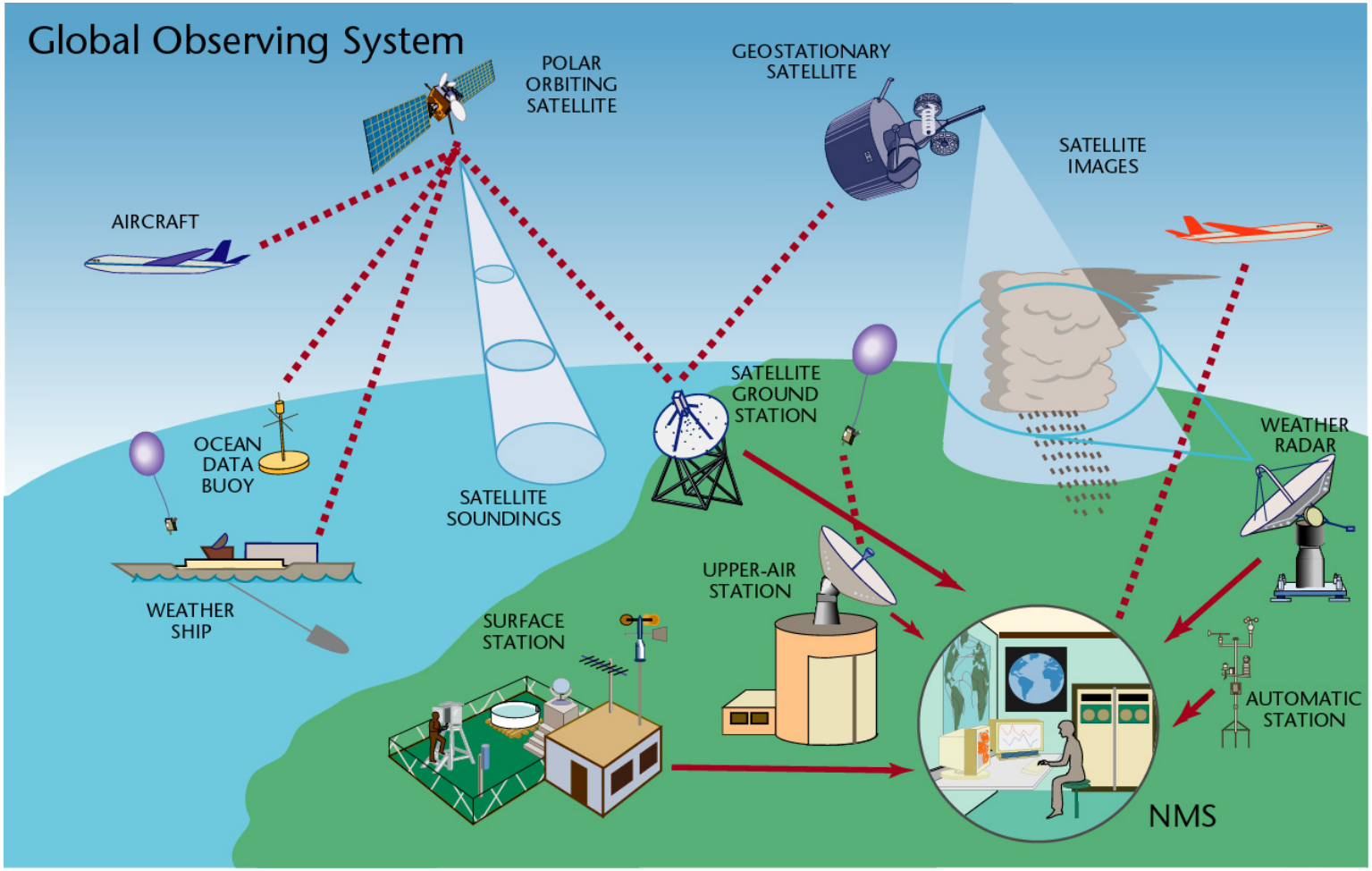
   multi-decadal projections



Often an overlap with weather services

The climate observing system

A mixture of new technology and continuity



Example sources of information

- Climate variables of interest to health sector:
  temperature, humidity, precipitation, wind, insolation
- NMHSs provide information from weather stations (may charge)
  - international collections are also available, but subject to data sharing policies
- International data centres also provide gridded information (e.g. GPCC for precipitation)
  - some national institutions provide global information (e.g. Met Office Hadley Centre)
- Space agencies (e.g. NASA, ESA, JAXA)
- Reanalysis centres (e.g. ECMWF, NCEP)
- Earth System Grid Federation

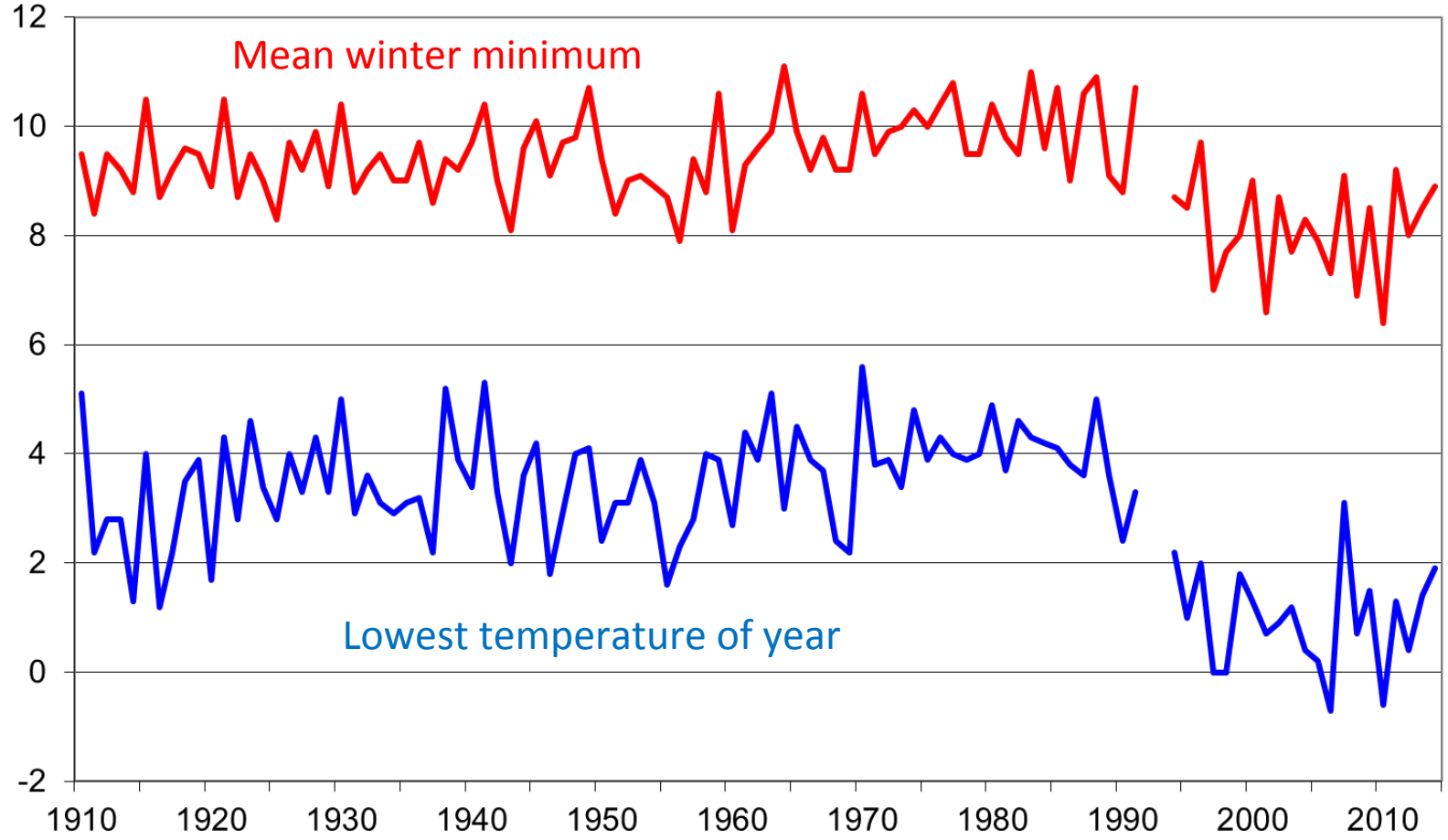
Types of observational product

1. Measurements from individual weather stations
2. Estimates from satellite measurements
3. Variables presented on regular lat-longitude grid

Measurements from weather stations

- Some records extend back more than 100 years (Europe, N America), but most are <50 years
  - can get monthly (good coverage), daily, sub-daily data
- No standardization of time of measurement, so station data from different countries can be difficult to compare
  - e.g. when was the maximum temperature for a day recorded?
- When using long records, need to bear continuity in mind
  - stations can move, change instrumentation, etc.
- Rainfall is more variable than temperature
  - need many more rainfall stations to provide representative information for a wider area

Perth – a very visible minimum temperature inhomogeneity



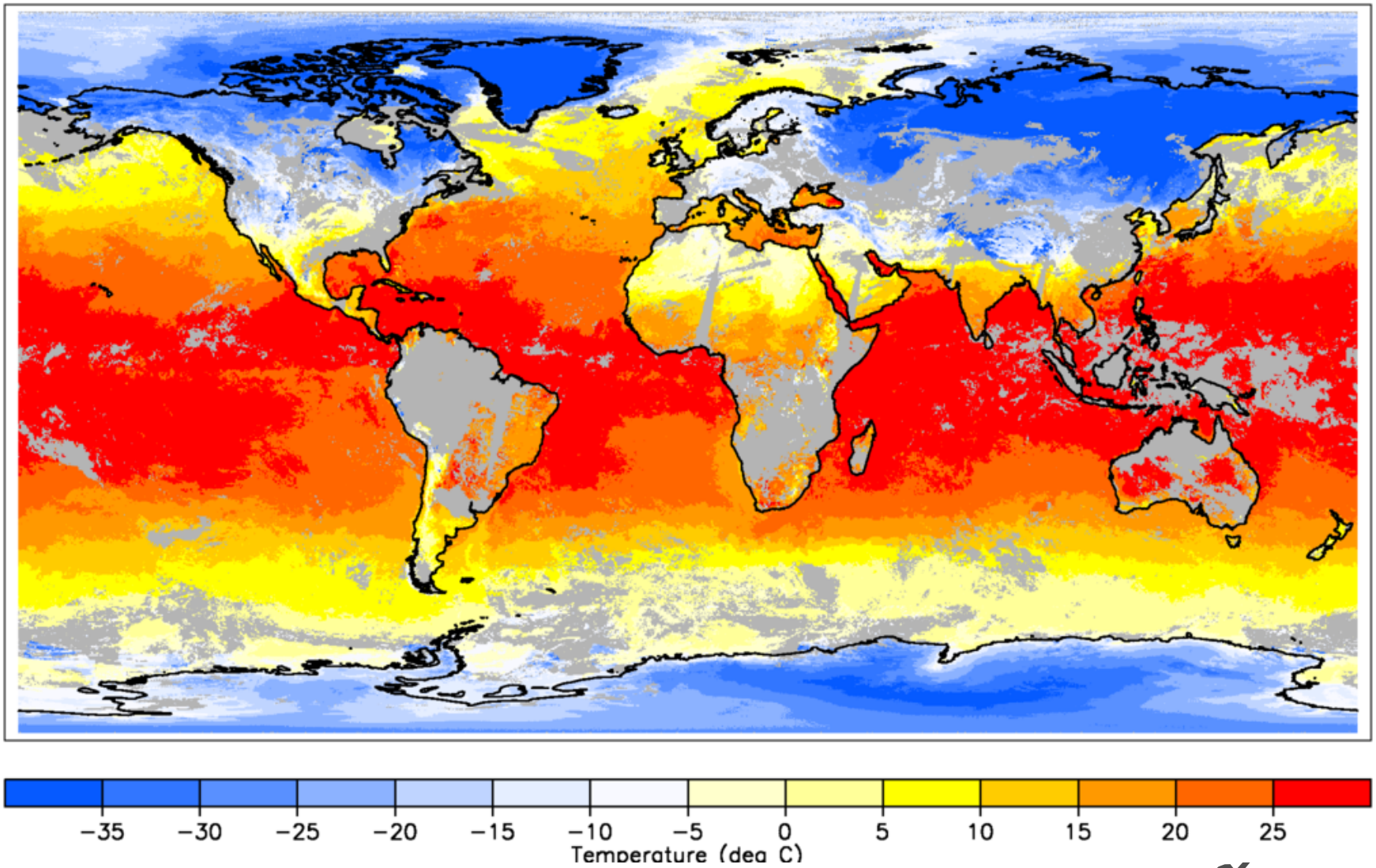
Site moved in 1992-93 from inner city to park north of city centre (earlier moves 1963, 1967)
Post-1993 site about 2C cooler than 1967-92 site for means, 3C cooler for extremes
1910-1992 record low (1.2C) surpassed 38 times in 21 years since 1994

Courtesy Blair Trewin, BoM

Estimates from satellite data

- Surface temperature can be “retrieved” from infrared satellite instruments
  - Useful proxy for surface temperature especially in data sparse regions, but complicated relationship to air temperature
  - Minimum land surface temperature provides a reasonable approximation to the min. air temperature on a day. Daily maxima can be very different
- Rainfall can also be estimated from satellite data
  - Different instruments do better at representing different intensities of rainfall
  - There is often a mismatch between rainfall estimated at weather stations and by satellite instruments

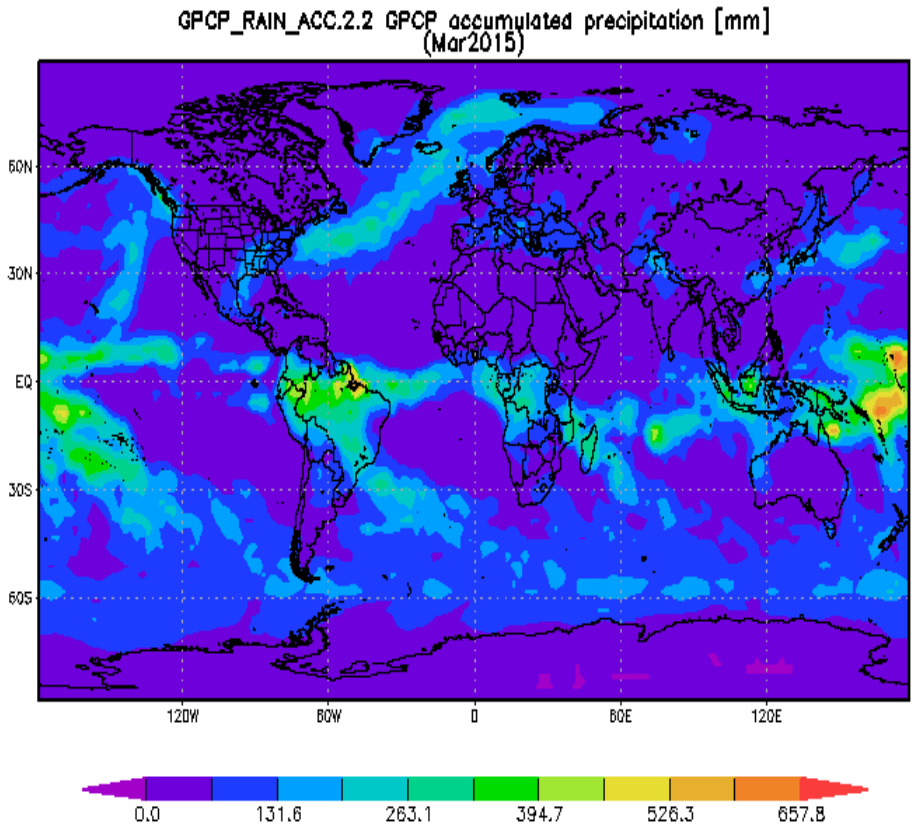
SATELLITE RETRIEVALS OF SURFACE TEMPERATURE (1 DAY)

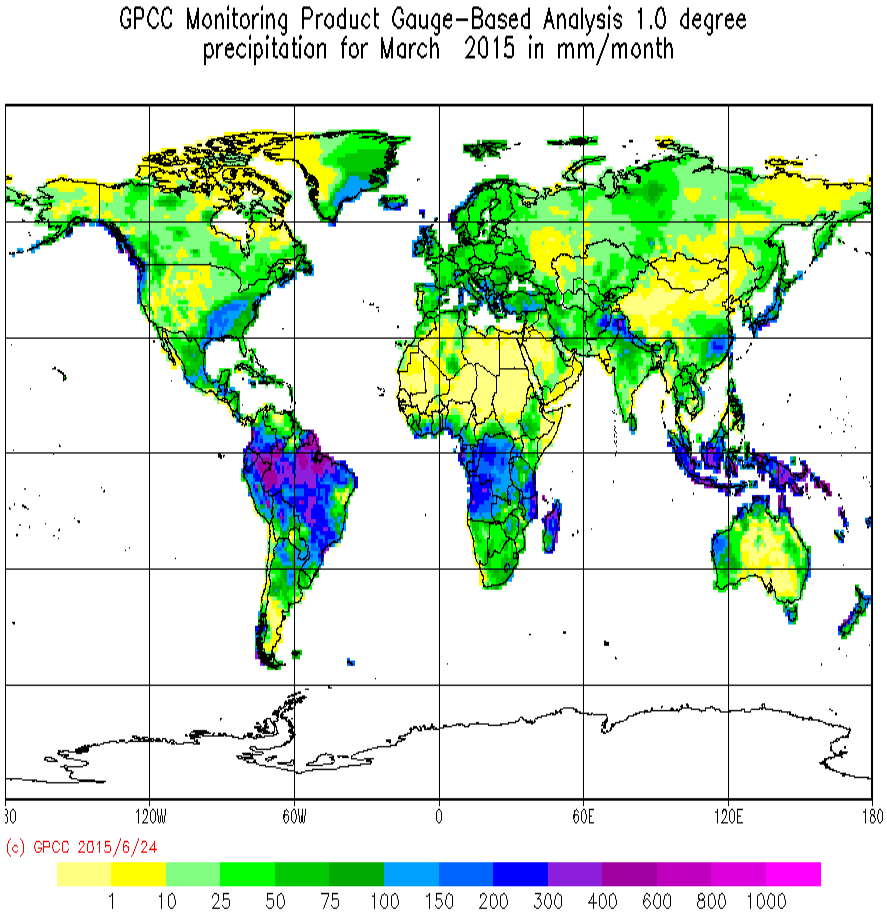


EUSTACE

Gridded products - Precipitation

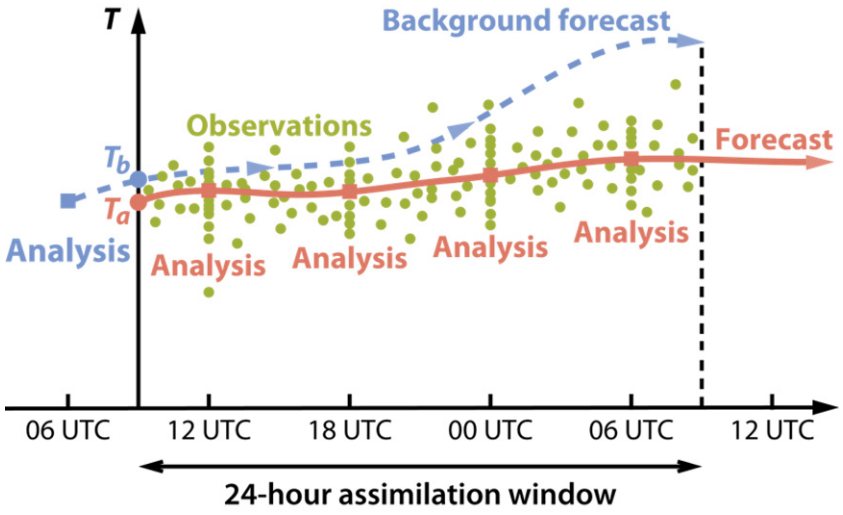
Gridded data sets based on weather station measurements only and on combined station and satellite data

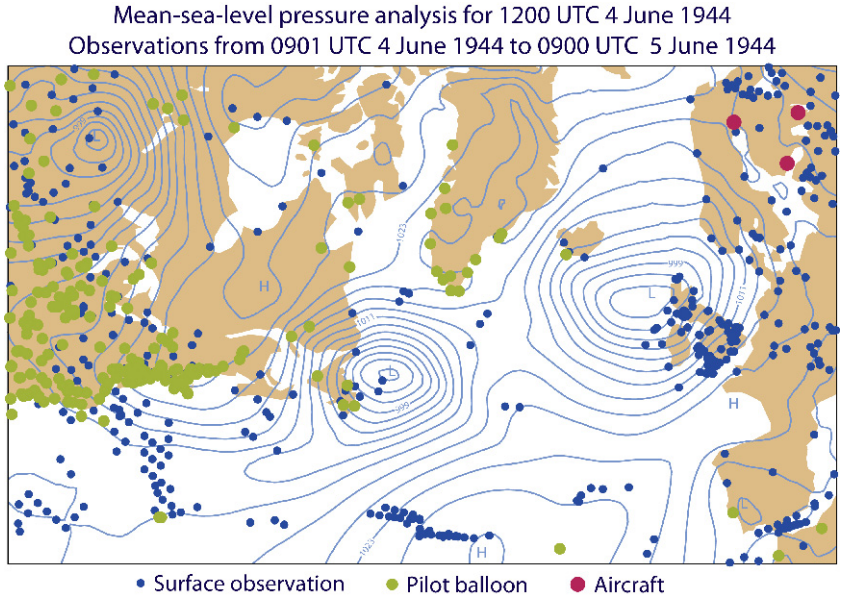




Gridded products - Reanalyses

Blending observations with state-of-the-art weather forecasting model

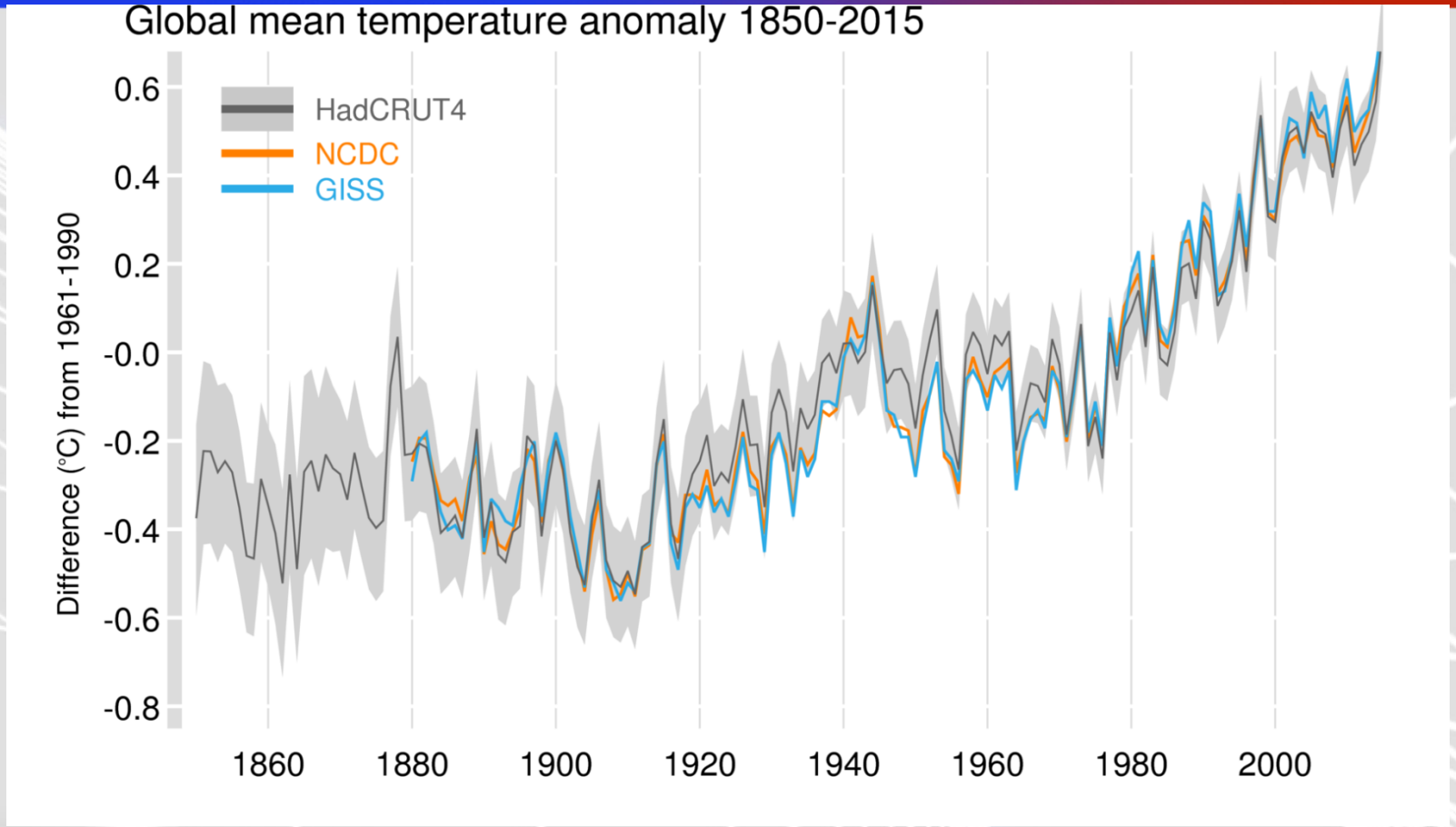




- Gridded fields, high temporal resolution
- Useful for temperature, wind/pressure
- Precipitation not assimilated into model

http://www.ecmwf.int/en/research/projects/era-clim/d-day-analyses

High confidence in the bigger picture, low confidence in the details



International Surface Temperature Initiative

Courtesy Kate Willett, Met Office

Data exchange policy *(WMO Resolutions 40 and 60)*

- Primary goal of GFCS: ensure greater availability of, access to and use of enhanced climate services for all countries
- Climate information is primarily an international public good.
- Promote the free and open exchange of climate-relevant data while respecting national and international policies

- WMO urges governments to strengthen capabilities to collect, rescue and exchange data and products. But recognises:
  - governments choose how they make their data and products available
  - users respect the conditions of use set by the owners of the data and products
  - some NMHSs require cost recovery to support the infrastructure necessary for generating the data and products

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Summary

- Climate observations and monitoring are essential components of climate services for a range of sectors
- For the health sector, there are potentially useful global records from a range of sources (long weather records, satellite measurements, gridded products, reanalyses)
- There is a growing move towards making more data more freely available (e.g. GFCS)

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Thank you for listening

Any questions?

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