Overview of work package 1

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ERA CLIM 2

SEVENTH FRAMEWORK PROGRAMME

Objective of work package 1

Production of extended climate reanalyses of the 20th century:

- provide a record of low-frequency climate variability
- provide a consistent description of atmosphere, land, ocean, ice and carbon cycle
- provide a measure of uncertainty using ensemble techniques

Methodology for reanalysis:

- modern data assimilation system and forecasting model to transform the heterogeneous observations into a consistent view of the global climate
- use only a restricted set of observations (whitelisting approach selecting datasets suitable for climate application)

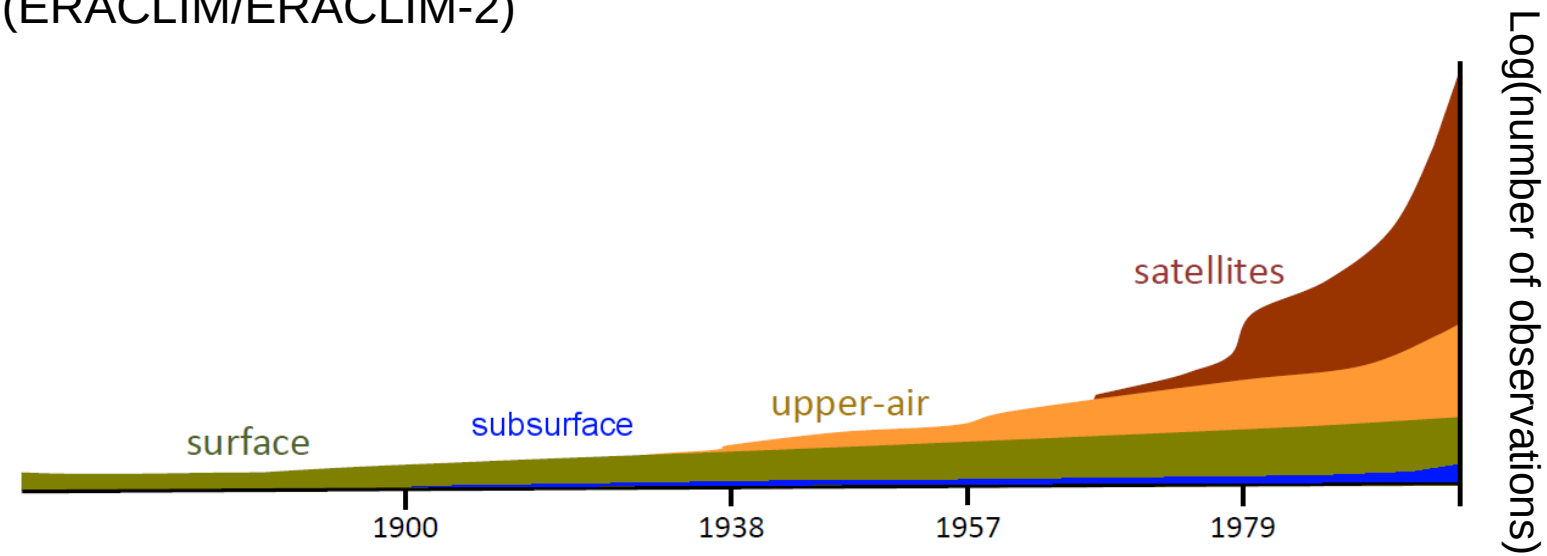
Results:

- a complete reconstruction of the recent global climate based on observations
- long time series of gridded Essential Climate Variables (ECVs) that are physically consistent

Observations for extended climate reanalyses of the 20th century

Observation selection:

- observational dataset with long time series of weather observations
- consistent observational dataset over the century
- international initiatives rescued/digitised historical weather observations (ERACLIM/ERACLIM-2)

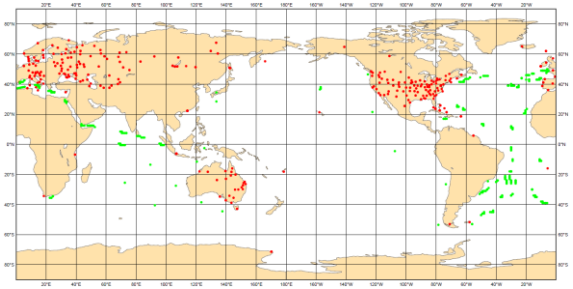


To produce CERA-20C: global coupled reanalysis of the 20th century (1901-2010)

- Atmosphere: conventional surface observations (pressure and marine wind)
- Ocean: temperature and salinity profiles
- Air-sea interface: Sea Surface Temperature analysis product

Insight on atmospheric observations in CERA-20C

Surface pressure observations from ICOADS and ISPD datasets (observations per day)



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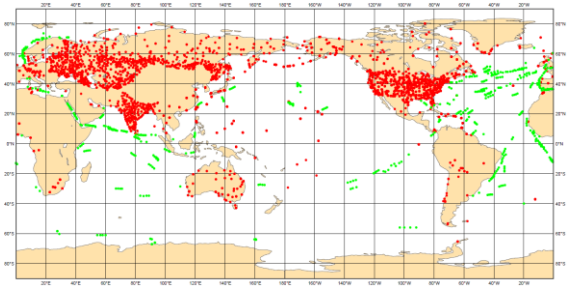

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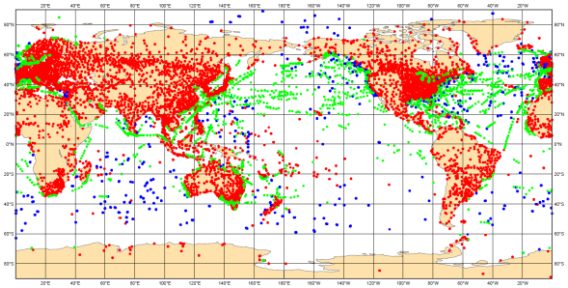
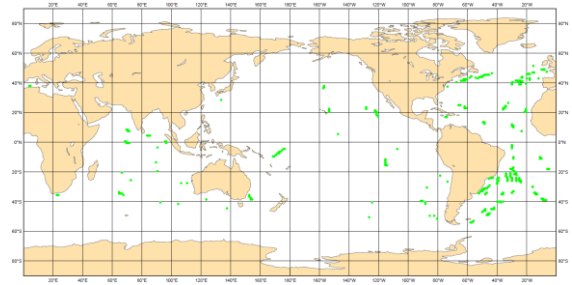


2010

- observations initially concentrated in the northern hemisphere
- global coverage increases with time
- few observations for the poles even for the recent period

Surface marine wind observations from ICOADS dataset (observations per day)



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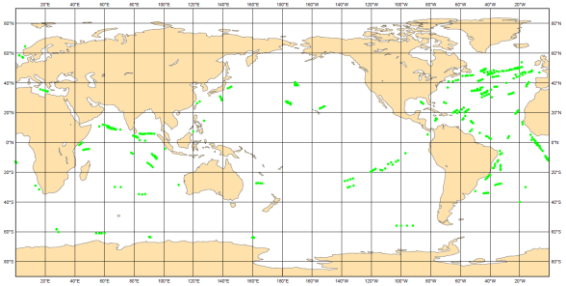

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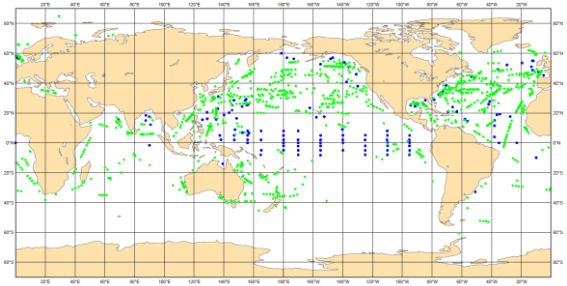

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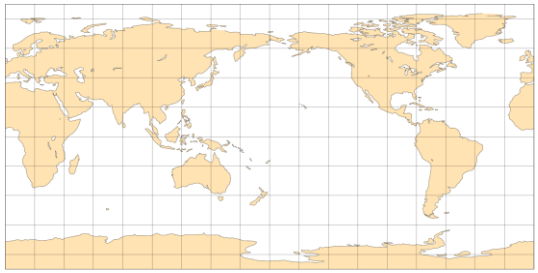
Insight on ocean observations in CERA-20C

Temperature and salinity profiles from EN4 dataset (observations per day)



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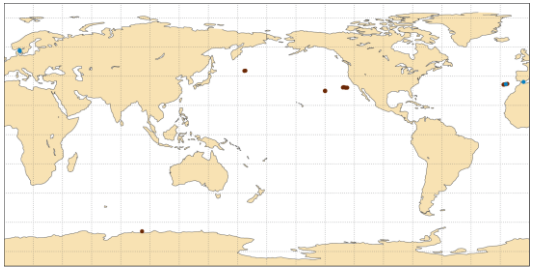

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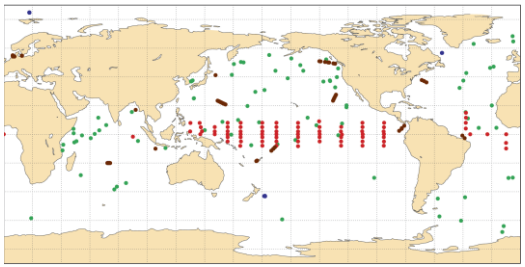
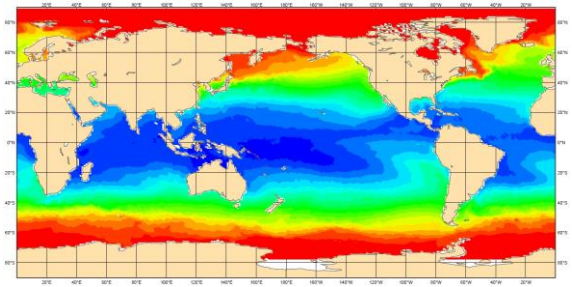


2010

Sea Surface Temperature analysis from HADISST2 monthly product



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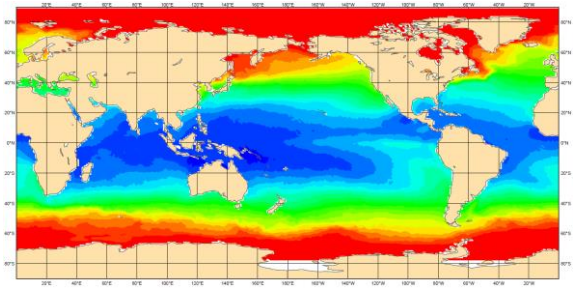

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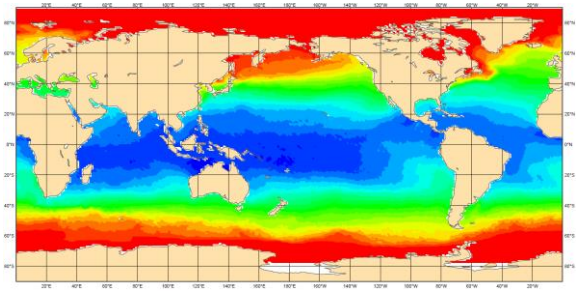
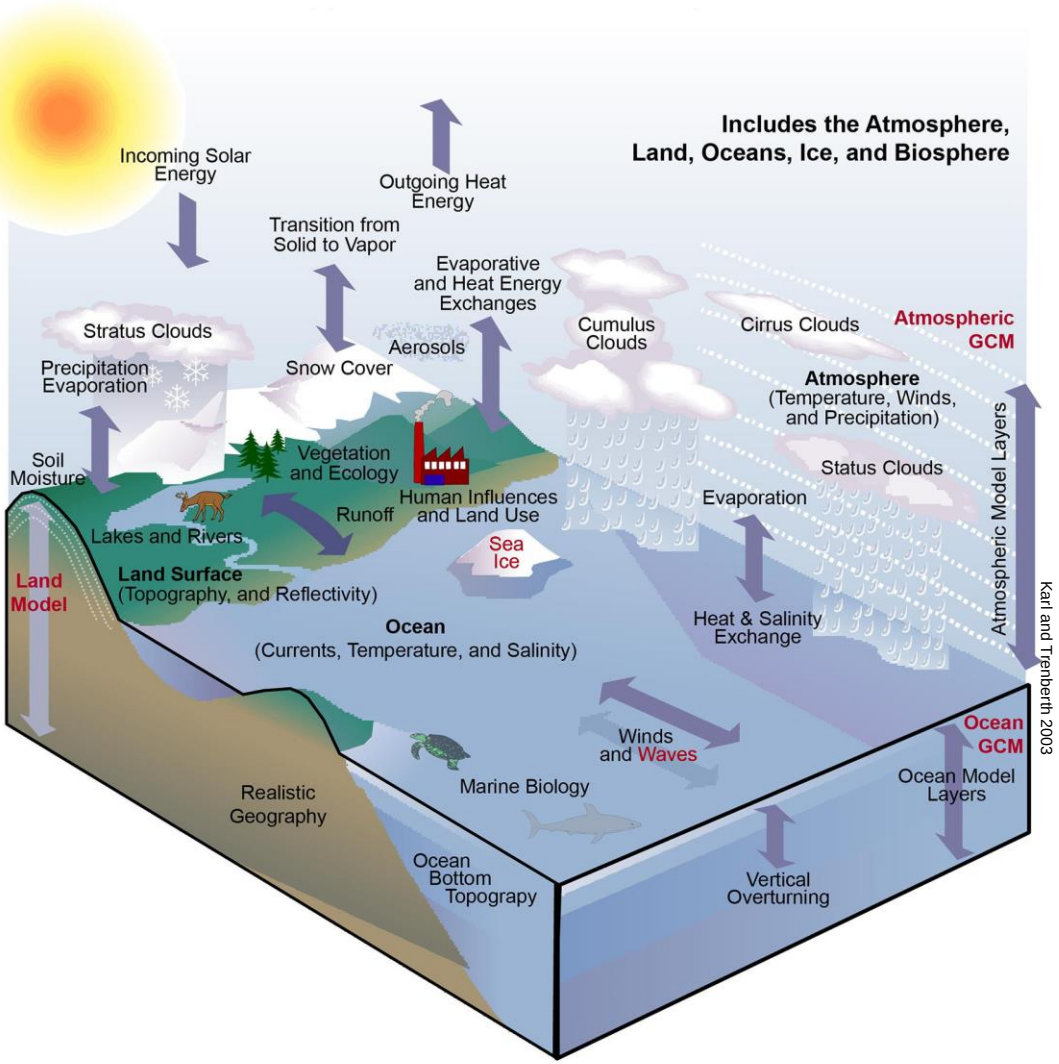


2010

- HADISST2 is a reanalysis product for SST based on observations
- used to constrain the air-sea interface

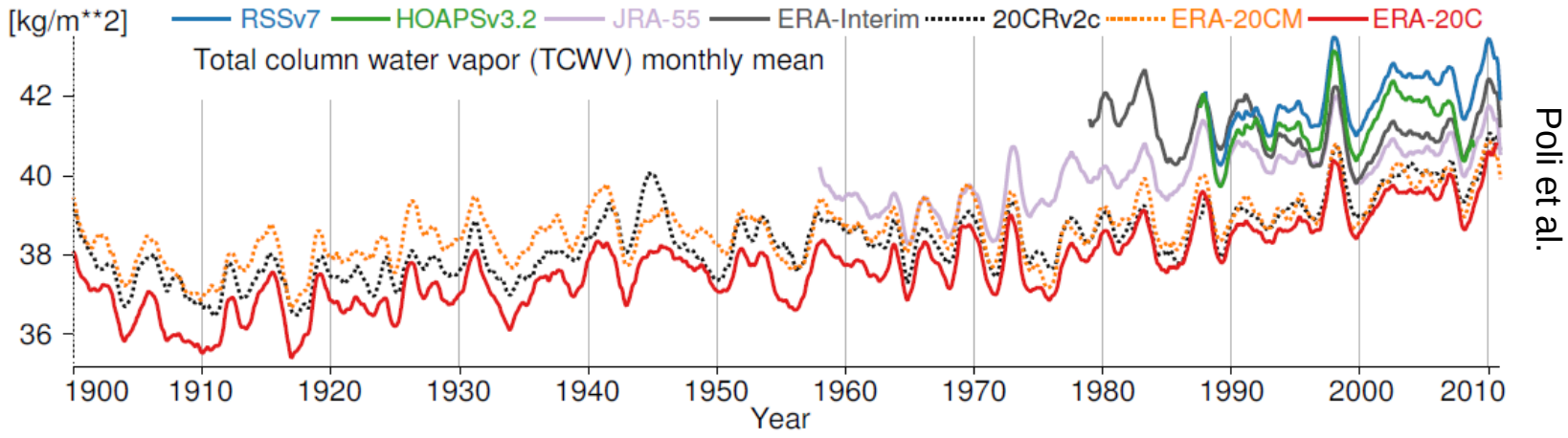
Forecasting model and assimilation system in CERA-20C



- ECMWF has been developing a coupled Earth model to produce medium-range weather forecast
- A new coupled assimilation system (CERA) uses the coupled Earth model to assimilate simultaneously atmospheric and ocean observations
- CERA system will run over the 20th century to produce the CERA-20C reanalysis
- Global climate reconstruction for all the model parameters (observed or not)

Reanalysis products

- estimates of all the model parameters every 3-hours (1901-2010)
- long timeseries of gridded Essential Climate Variables
- ECVs comparison with other reanalysis projects



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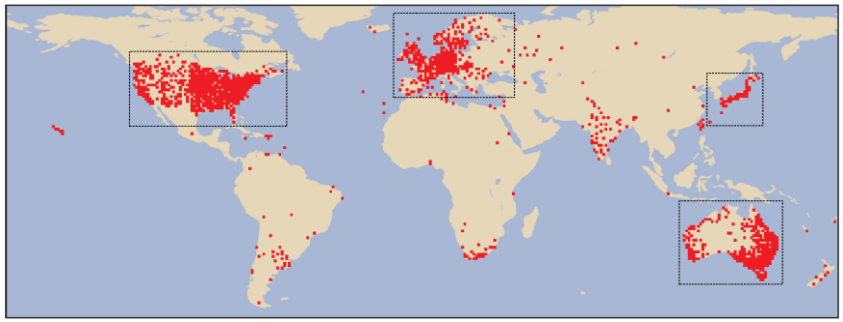
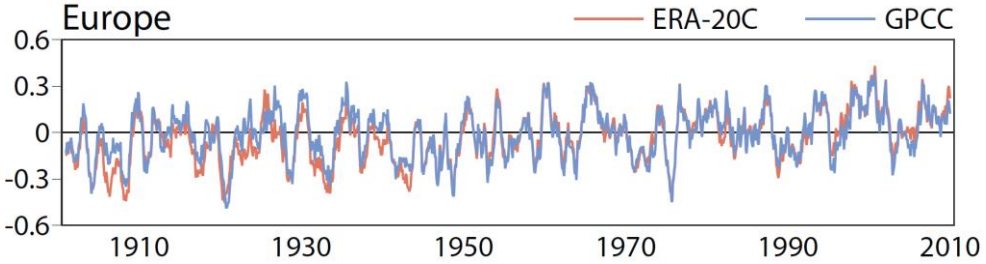
- validation of reanalysis using independent observations

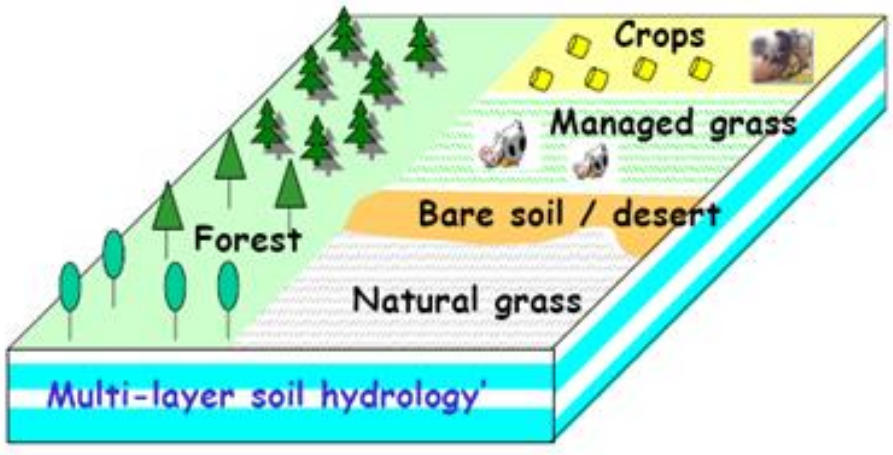


Global Precipitation Climatology Centre dataset

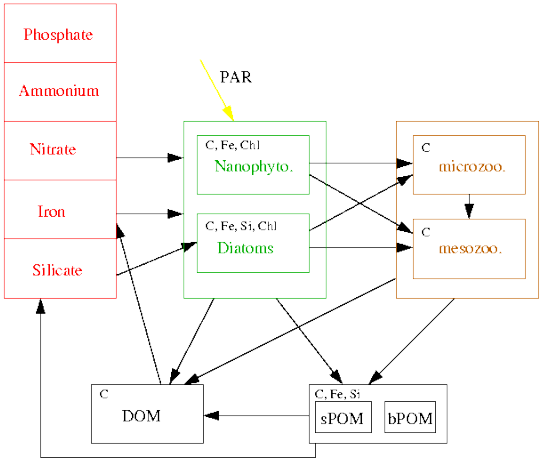


Associated reanalyses CERA-20C/CARBON

- Global reanalysis of carbon fluxes and stocks for the land from 1901 to 2010 using a terrestrial biosphere model (LSCE)



- Global reanalysis of the ecosystem and carbon-cycle for the ocean from 1901 to 2010 using a biogeochemical model (MERCATOR)



Workplan for CERA-20C

Production of a coupled reanalysis of the 20th century (CERA-20C)

- delivery of CERA-20C reanalysis has been delayed (M24 to M36)

Production of associated reanalyses (CERA-20C/CARBON)

- CERA-20C/CARBON require atmospheric forcing fields
- ERA-20C (atmospheric reanalysis of the 20th-century) available
- CERA-20C/CARBON is based on ERA-20C instead of CERA-20C to avoid further delays

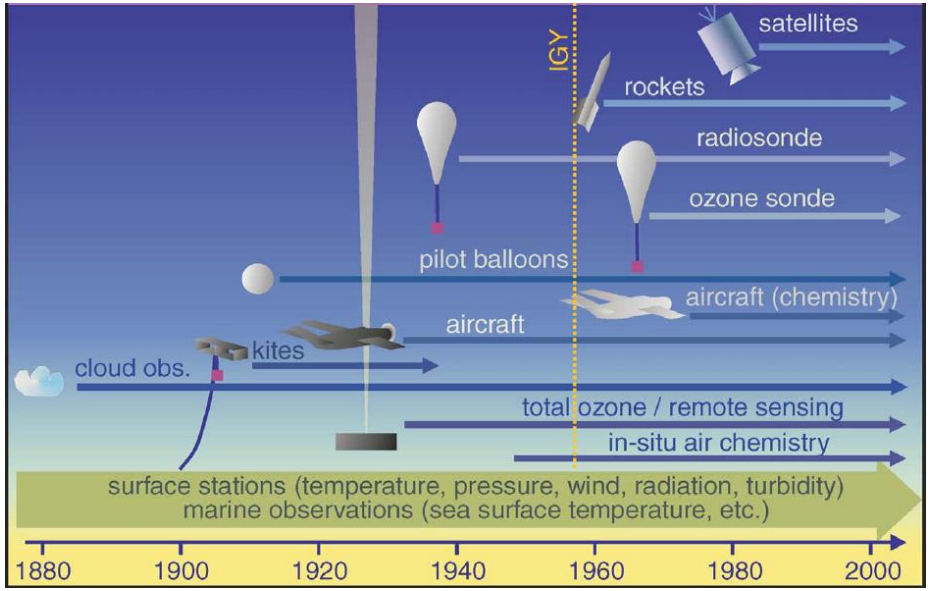
Workplan for CERA-SAT

Production of a coupled reanalysis of the satellite era

- the implementation will start in 2016Q1
- based on ERA-5 infrastructure (new ECMWF atmospheric reanalysis of the satellite era implemented by C3S)

CERA-SAT system:

- implement the coupled assimilation system at higher resolution (125km to 39km)
- use as many observations as possible, including from satellites
- run for a sub-period of the satellite era




Any questions?