ALATNET Seminar on Data Assimilation
Gourdon, 11-22 June 2001

Topic « observations »

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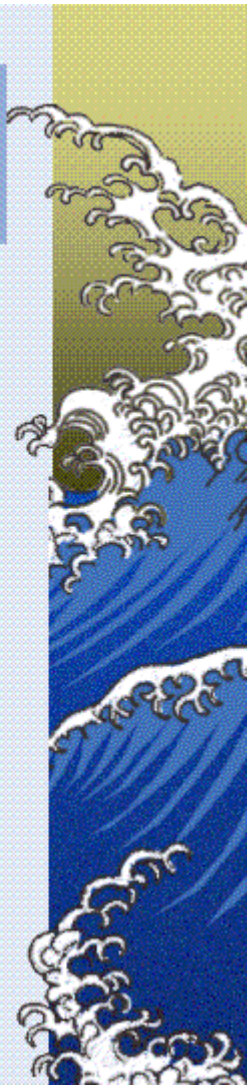
General plan of the Topic « observations »

- General presentation, operational analysis, conventional observations
- Satellite observations : general presentation
- Satellite observations : information content and bias correction
- Monitoring of data : principles and examples
- Screening of data : general presentation and application to the observations used at Météo-France
- Cost function, obs operators, adjoint
- Perspectives in the use of existing and future observations

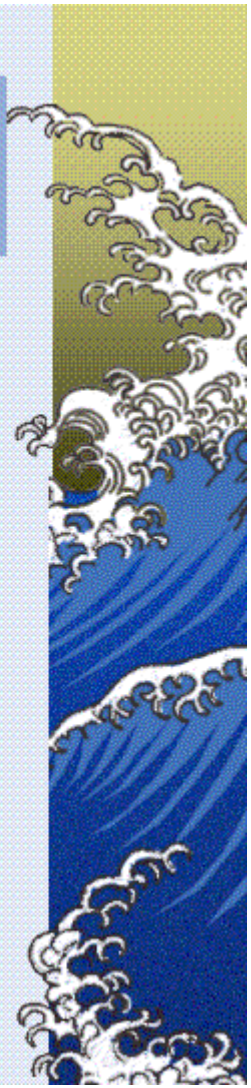
Plan of the first lecture

- General problematic of data assimilation using real state observations
- The production suite
- General process of a data assimilation
- The operational suite
- The conventional observations used at Météo-France



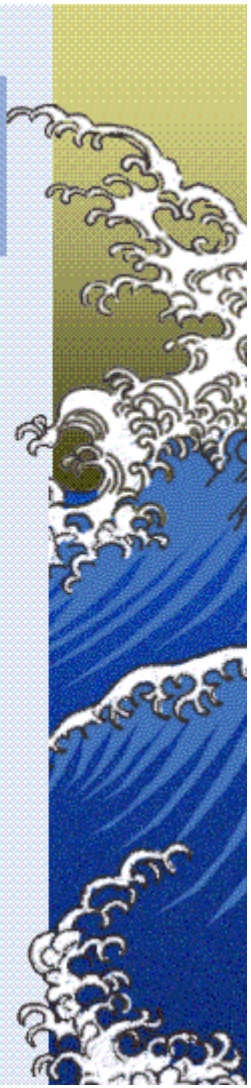
General problematic of the data assimilation

- An analysis produces an accurate image of the true state of the atmosphere at a given time
- Can be a self-consistent diagnostic of the atmosphere
- Can also be the best starting point to the prediction model, done as soon as possible (in real time)
- Provides a reference against which to check the quality of observations



Problems with the available data

- If the model state is overdetermined by the observations, the analysis is reduced to an interpolation problem
- But data inhomogeneous in space and time, and some are indirectly related to the model variables ⇒ in many geographical areas, problem well-posed only if some background information is available
- In some areas, data are too dense ⇒ one must thin them
- Observations are not perfect ⇒ we have to deal with observation errors ⇒ observation errors handling ⇒ screening, and bias correction for several types (radiosondes, satellite observations)



Real time available data

Networks

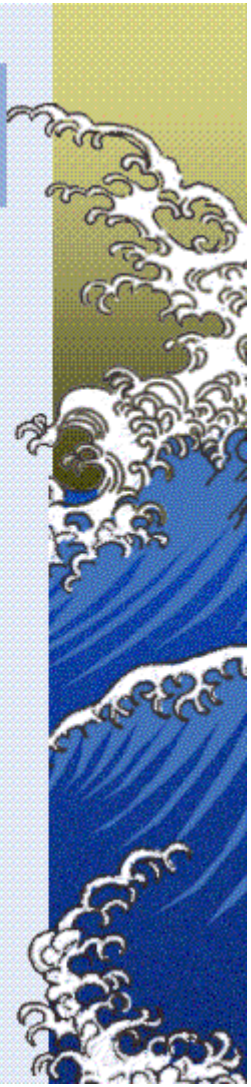
- observations arrive through GTS (Global Telecommunication System) in ASCII or BUFR format
- direct satellite reception (CMS Lannion)
- special TCP/IP lines
- internet FTP in some cases

Providers

- all WMO countries for most of the observations types
- space agencies for satellite observations (Eumetsat for Météosat, ESA for the polar satellites, NESDIS for US satellites of NOAA, NASA or defense)
- Météo-France for the national data

Types

- observations
- analyses (for example : SST, ice…)
- Meta-data (list of OMM stations : height, type…)



Production suite

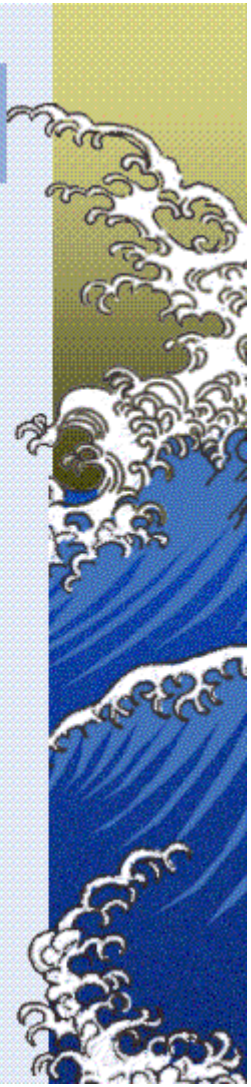
Production delay : steps between observation and providing of final product

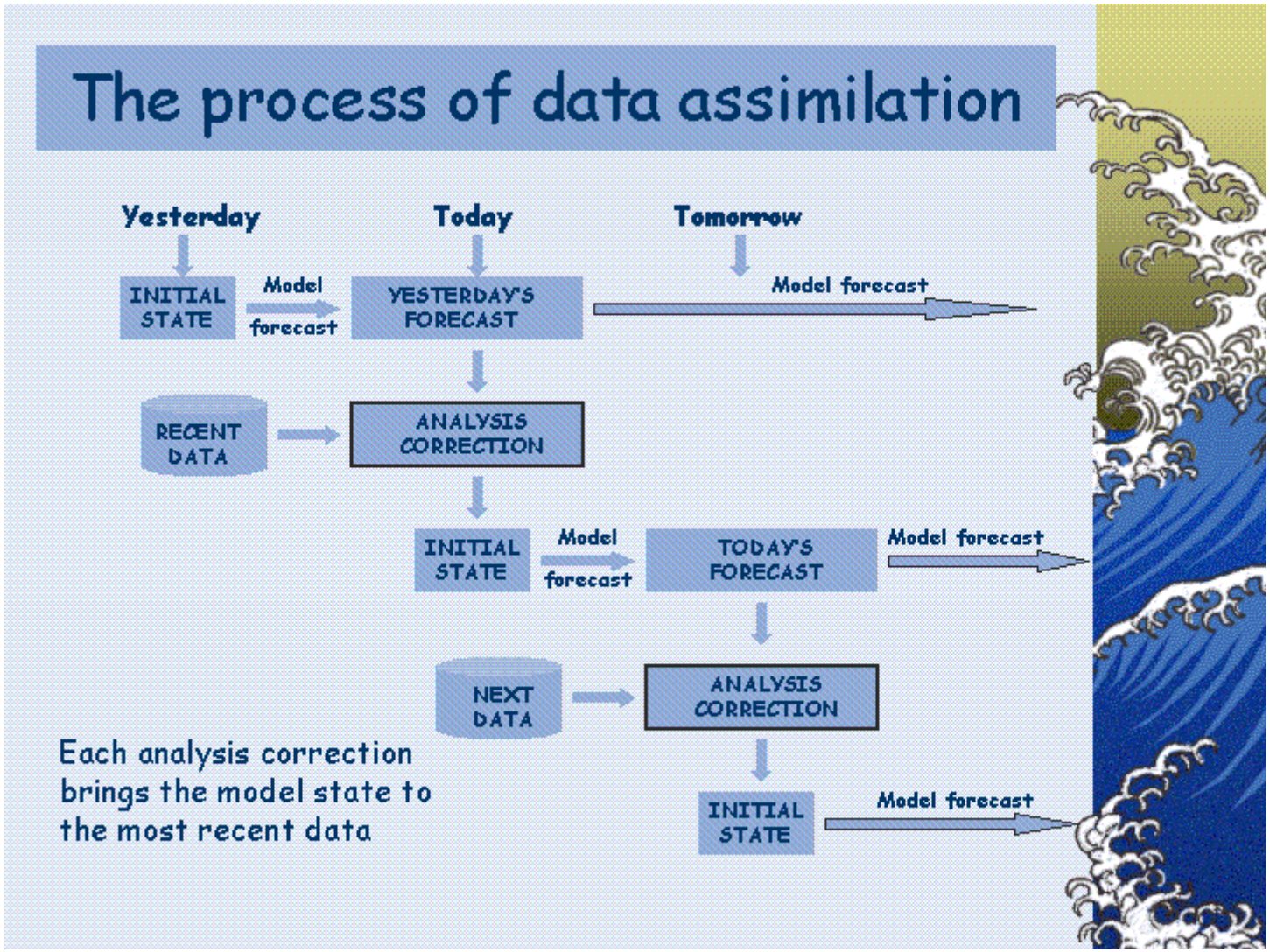
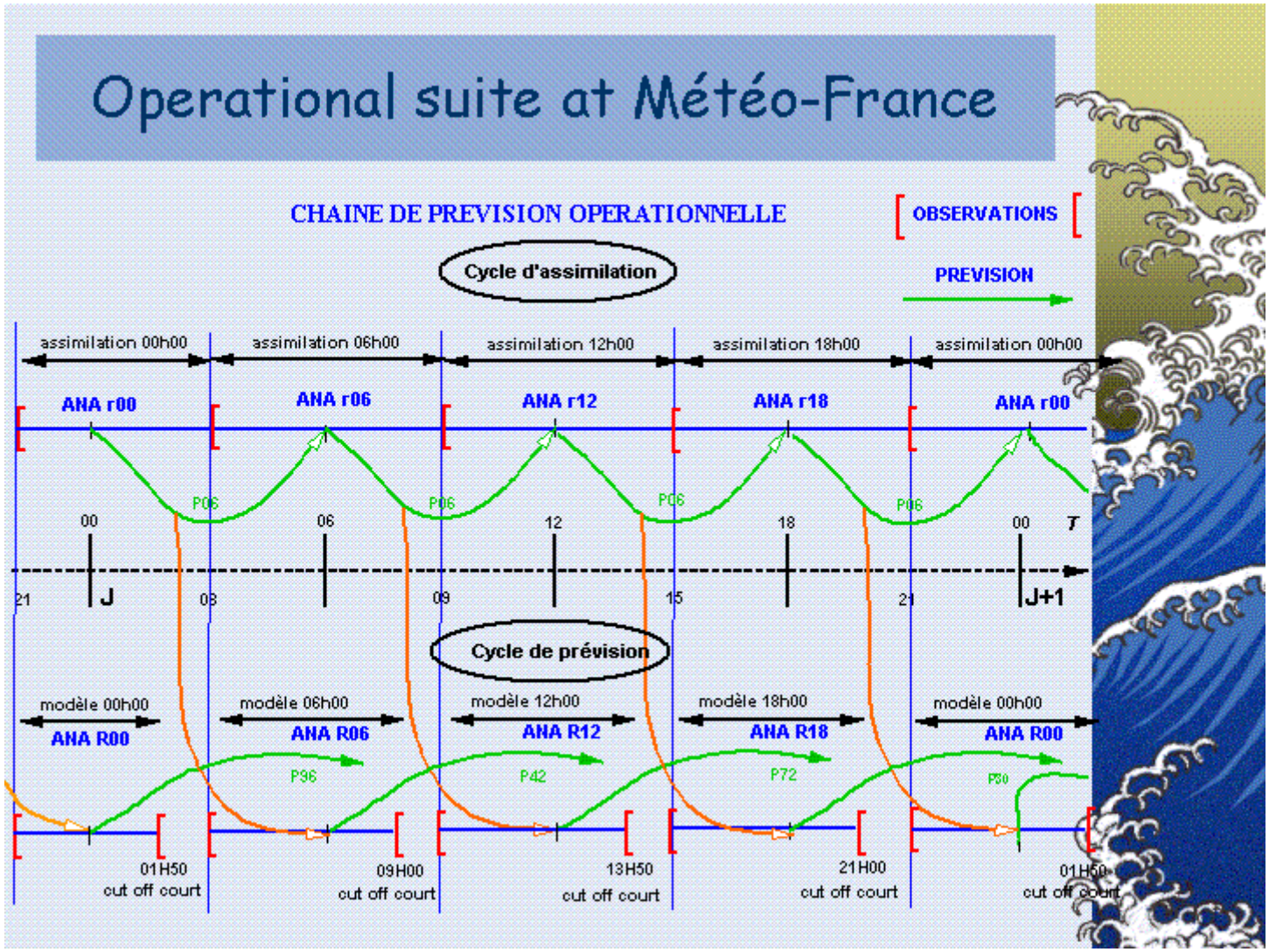
- observation time lentgh (45 minutes for a radiosonde)
- encoding, transmission, reception
- storage/extraction of a data base (BDM and BDAP in MF)
- Pretreatment : verifications, formatting for faster I/O (BUFR → ODB on the Fujitsu disc)
- analysis : departures computation, increments computation
- forecast
- post-processing and diffusion of final results (Synergie, RETIM, médias…)

Production frequency : 4 times a day

Characteristic times :

- cutoff (short (1h50) and long)
- analysis : 20 mn at MF, 1h at CEPMMT
- final production available a few hours after the synoptic time




The process of data assimilation
Yesterday
Today
Tomorrow
INITIAL STATE
Model forecast
YESTERDAY'S FORECAST
Model forecast
RECENT DATA
ANALYSIS CORRECTION
INITIAL STATE
Model forecast
TODAY'S FORECAST
Model forecast
NEXT DATA
ANALYSIS CORRECTION
INITIAL STATE
Model forecast
Each analysis correction brings the model state to the most recent data

Operational suite at Météo-France