Summary of the current use of observations at Météo-France

First part : conventional observations

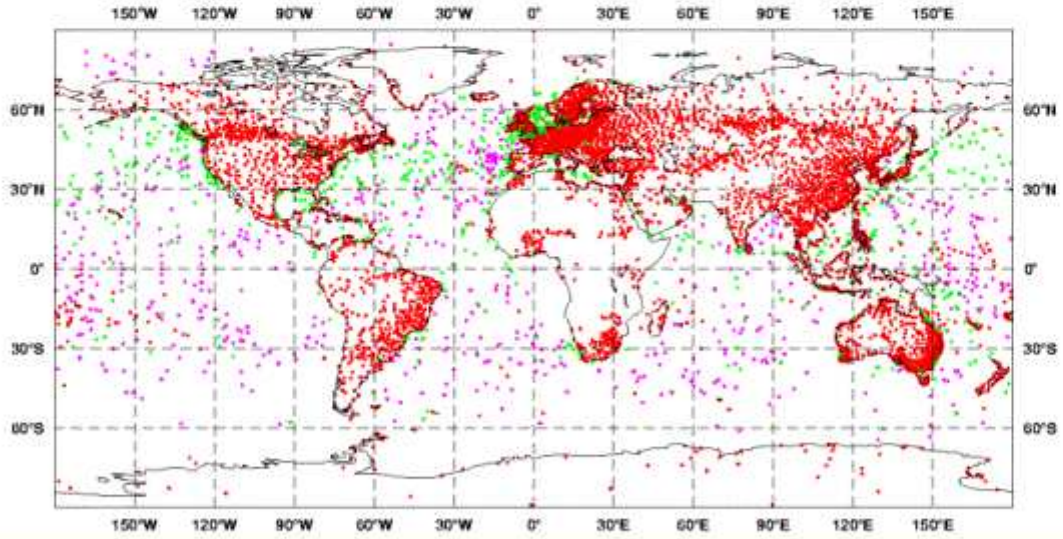
- **Surface data** :
  - Synop, Ship
  - Bathy, Tesac
  - buoy
- **Upperair data** :
  - Airep, Amdar, Acar
  - Temp, Temp-ship, Temp-mobil, Temp-drop
  - Pilot, Pilot-ship, Europrofil, Profiler
  - Satob, Satgeo

Summary of the current use of observations at Météo-France

Message type	Observation type	Extracted parameters	Used parameters	Parameter blacklisted or no used
SYNOP SYNOP-SHIP	surface observation (on land and sea)	• P_{mer} or P_{st} • u_{10m} & v_{10m} computed from dd_{10m} & ff_{10m} • T_{2m} • SST • Hu_{2m} computed from T_{2m} and Td_{2m} • q_{2m} computed from T_{2m} and Hu_{2m} • RR • SF • TTC	• P_{mer} or P_{st} following the principle : - if z_{st} <= 500 m, P_{mer} converted in geopotential - if z_{st} > 500 m, P_{st} converted in geopotential • u_{10m} and v_{10m} on sea • T_{2m} • SST • Hu_{2m} • q_{2m}	• files of blacklist identifiers. • u_{10m} and v_{10m} on land • RR • SF • TTC
BATHY TESAC	Oceanic observations (bathymetric sounding)	• u_{10m} & v_{10m} computed from dd_{10m} and ff_{10m} • T_{2m} • SST	• u_{10m} & v_{10m} • T_{2m} • SST	• files of blacklist identifiers.

Data Coverage: Surface (29/3/2001, 0 UTC, qu00)

LNDSYN (5411) SHPSYN (1331) BUOY (1683)

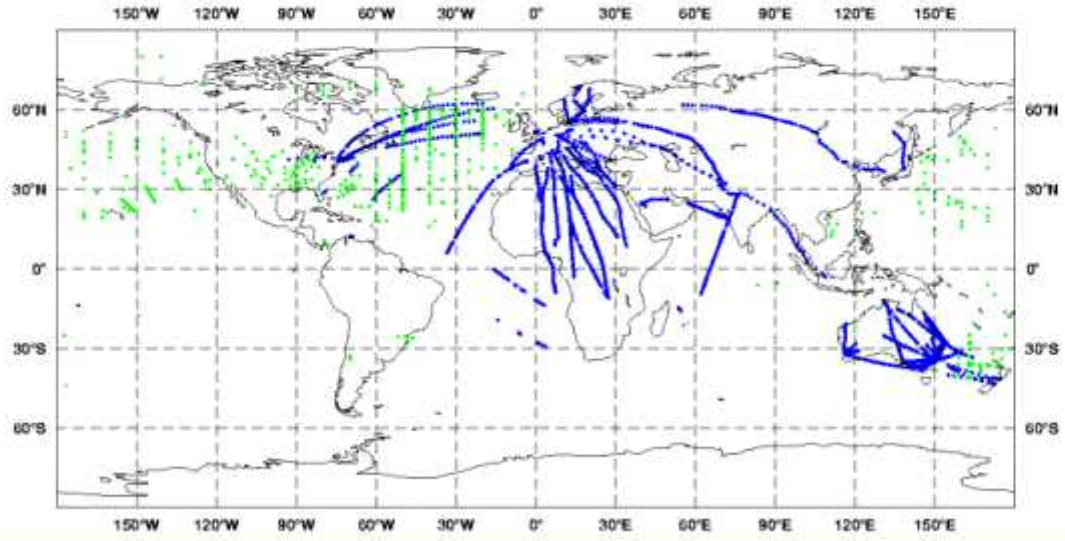


Summary of the current use of observations at Météo-France

BUOY	**oceanic observations**	• P_{mer} • u_{10m} & v_{10m} computed from dd_{10m} and ff_{10m} • T_{2m} • SST	• P_{mer} converted into geopotential • u_{10m} & v_{10m} • T_{2m} • SST	• files of blacklist identifiers
AIREP AMDAR ACAR	**multilevel observations** (aireliner messages)	• u & v computed from dd & ff • T • Hu computed from T and Td. In practice, Td is always missing.	• u & v • T	• files of blacklist identifiers • Hu

Data Coverage: Aircraft (29/3/2001, 0 UTC, qu00)

AMDARS (2396) AIREPS (706)



Summary of the current use of observations at Météo-France

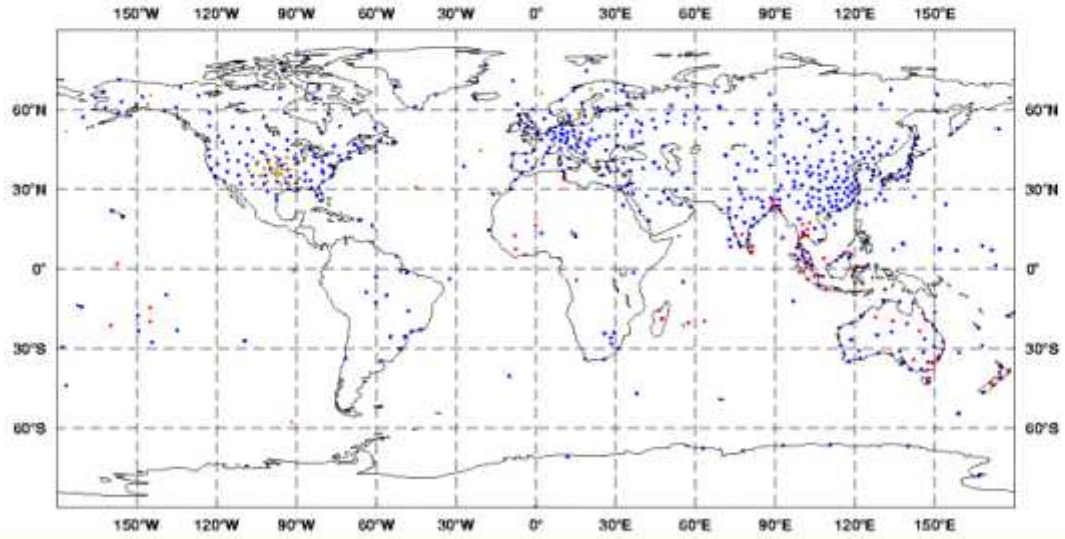
TEMP TEMP-SHIP TEMP-MOBIL TEMP-DROP	Altitude and surface observations (land, sea and airplane radiosonding)	• P_{mer} or P_{sfc} • Z • u_{10m} & v_{10m} computed from dd_{10m} and ff_{10m} • u & v computed from dd and ff • T_{2m} • T • SST • Hu_{2m} computed from T_{2m} and Td_{2m} • Hu computed from T and Td • q_{2m} computed from T_{2m} and Hu_{2m} • q computed from T and Hu	• P_{mer} or P_{sfc} following the principle : - if z_{sfc} <= 500 m, P_{mer} converted into geopotential - if z_{sfc} > 500 m, P_{sfc} converted into geopotential • Z on standard levels • u_{10m} & v_{10m} • u & v on standard levels and on characteristic levels. • T_{2m} • T on characteristic levels • SST • Hu_{2m} • Hu on characteristic levels for P >= 300 hPa • q_{2m} • q on the characteristic levels for P >= 300 hPa	• files of blacklist identifiers • levels under ground. • Hu on the characteristic levels for P < 300 hPa and on all standard levels. • q on the characteristic levels for P < 300 hPa and on all standard levels. • Z on the characteristic levels. • Z originated from TEMP-DROP

Data Coverage: Sonde (29/3/2001, 0 UTC, qu00)

PILOT LAND (279)
TEMP LAND (572)
DROPSOND (0)

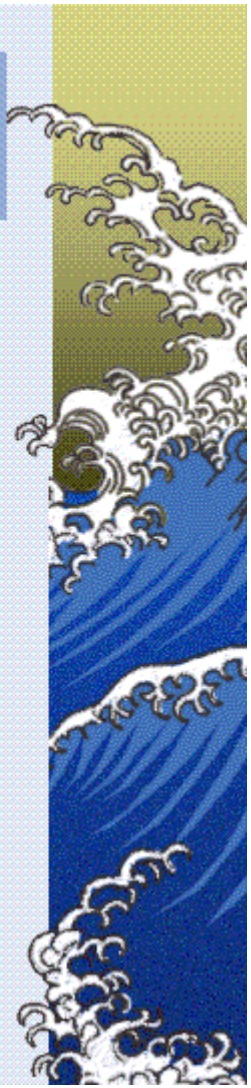
PILOT SHIP (6)
TEMP SHIP (4)
WINPRO (255)

PILOT MOBILE (0)
TEMP MOBILE (0)



Summary of the current use of observations at Météo-France

PILOT PILOT-SHIP EUROPROFIL PROFILER	Surface and altitude observations (land and sea radiosonding)	• u_{10m} & v_{10m} computed from dd_{10m} and ff_{10m} • u & v computed from dd and ff	• u_{10m} & v_{10m} • u & v on the standard and characteristic levels.	• files of blacklist identifiers • u & v originated from EUROPROFIL and PROFILER
SATOB SATGEO	Altitude Observations (geostationary satellite)	• u & v computed from dd and ff in channels VIS, IR and WV	• u & v	• u & v originated from SATOB INSAT.
ERS	Oceanic Observation (polar satellite)	• 2 couples (u_{10m}, v_{10m}) computed from 2 couples (dd_{10m}, ff_{10m})	none	• 2 couples (u_{10m}, v_{10m})

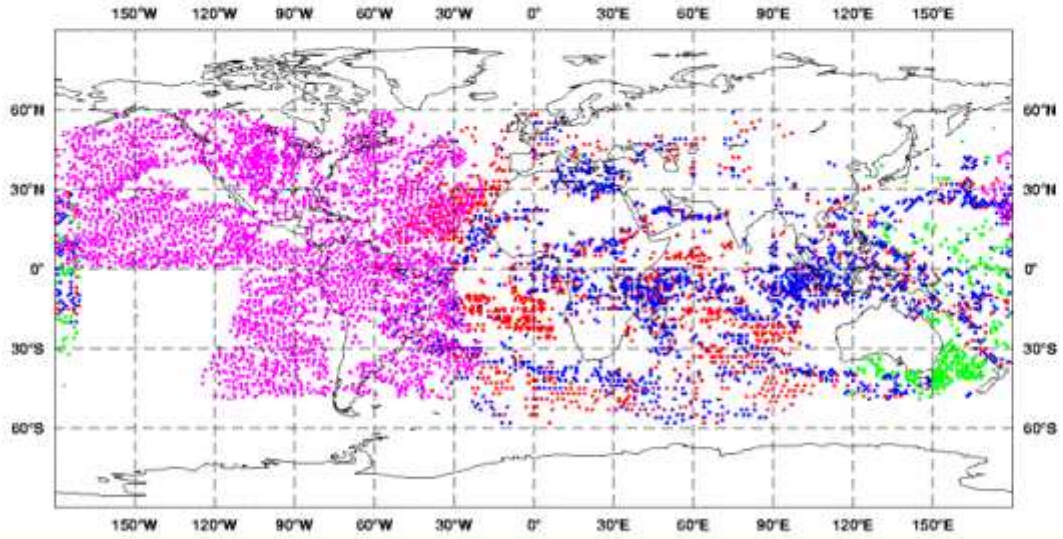


Data Coverage: Satwind (29/3/2001, 0 UTC, qu00)

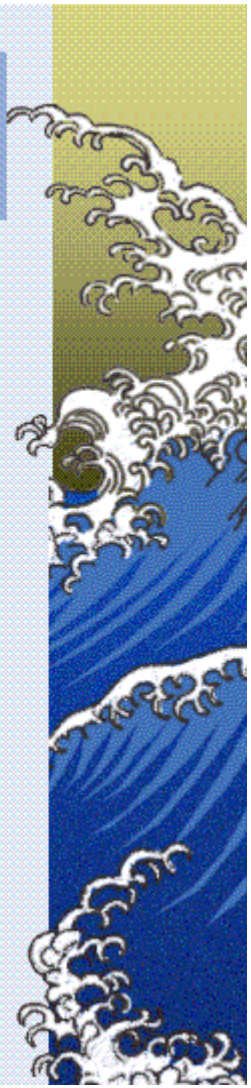
(WIND) INFRARED (1516)
GOESAMW (3358)

(WIND) VISIBLE (327)

(WIND) WATER VAPOUR (1647)



Summary of the current use of observations at Météo-France



Second part : (Used) satellite observations

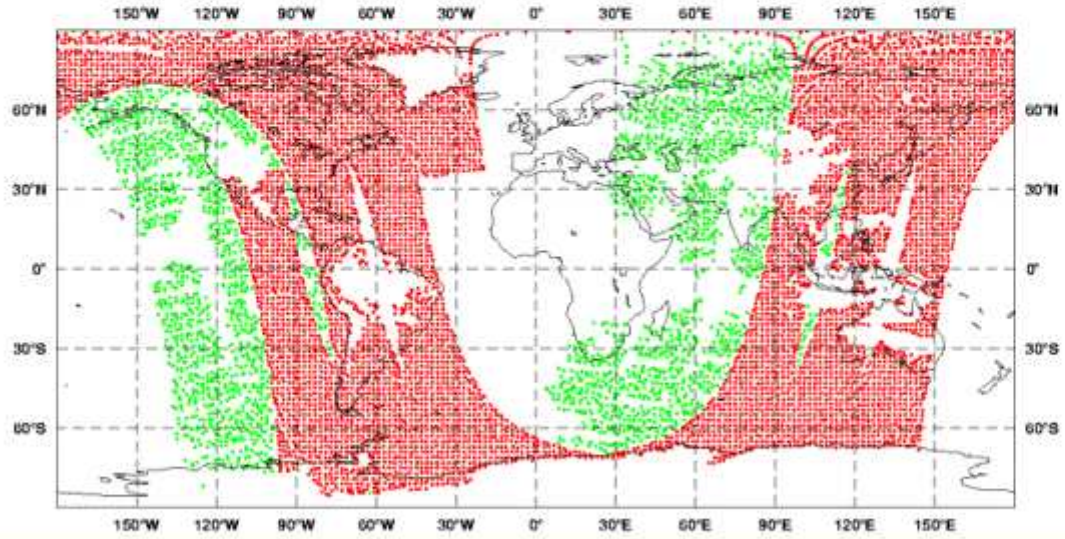
- ERS
- TOVS 120
- ATOVS 120

Summary of the current use of observations at Météo-France

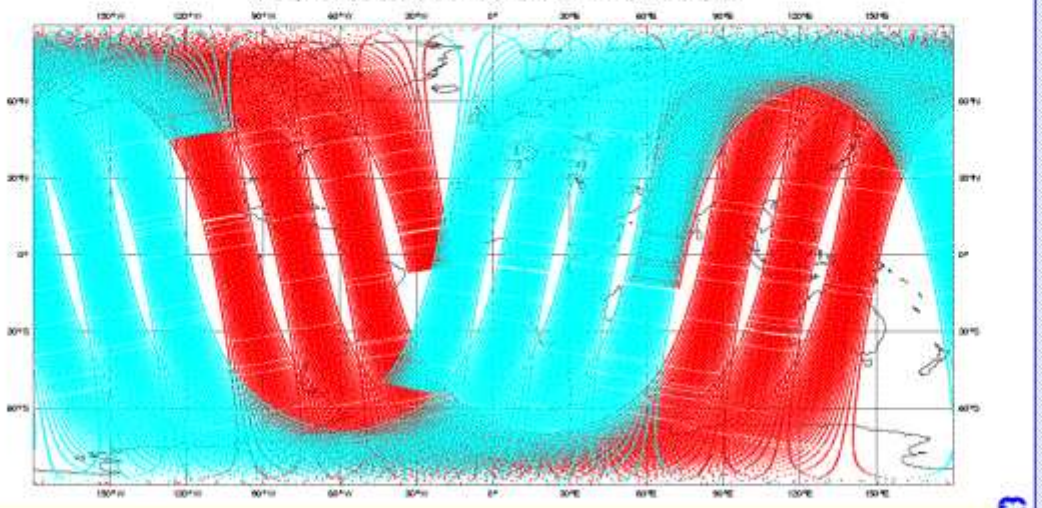
TOVS 120	multi-channels Observation (polar satellite)	• *Tb* in channels HIRS (20 channels), MSU (4 channels) et SSU (3 channels) • land/sea mask (*land*, *boarder*, *sea*) and cloud fraction (*cloudy*, *semi-cloudy*, *clear*). In practice, the types *boarder* and *semi-cloudy* are always missing. • ozone • *DZ* computed from *Tv* and for P < 10 hPa	• *Tb* in some channels, following the surface nature, the cloud fraction and the latitude. • *DZ* computed from *Tv* and for P < 10 hPa (just in au 1D-Var)	• *Tb* in some channels, following the surface nature, the cloud fraction and the latitude. • O_3

Data Coverage: ATOVS
(29/3/2001, 0 UTC, qu00)

2351 NOAA-14 TOVS (green), 6290 NOAA-15 ATOVS (red), 0 NOAA-16 ATOVS (blue)



ECMWF Data Coverage - ATOVS
29/MAY/2001; 00 UTC
Total number of obs = 156713

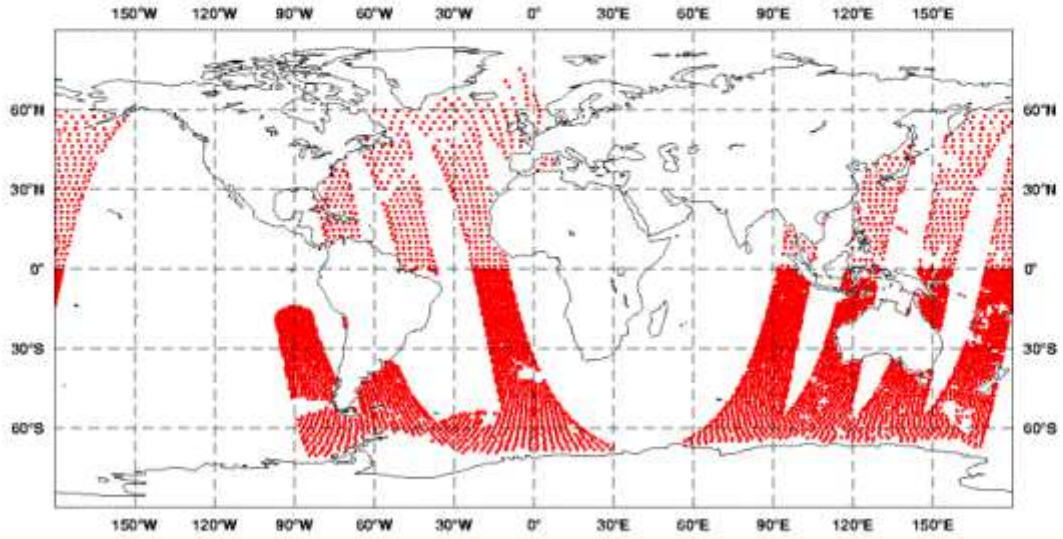


Summary of the current use of observations at Météo-France

ATOVS 120	Observation multi-canaux (polar satellite)	• *Tb* in channels HIRS (20 channels), and AMSU-A (15 channels) • land/Sea mask (*land*, *border*, *sea*) and cloud fraction (*cloudy*, *semi-cloudy*, *clear*). In practice, the types *boarder* and *semi-cloudy* are always missing. • ozone • *DZ* computed from *Tv* and for P < 10 hPa	*Tb* in some channels, following the surface nature, the cloud fraction and the latitude. • *DZ* computed from *Tv* and for P < 10 hPa (just in au 1D-Var)	• *Tb* in some channels, following the surface nature, the cloud fraction and the latitude. • O_2

Data Coverage: SSM/I (29/3/2001, 0 UTC, qu00)

SSM/I (4848)



The observations in the Numerical Weather Prediction models

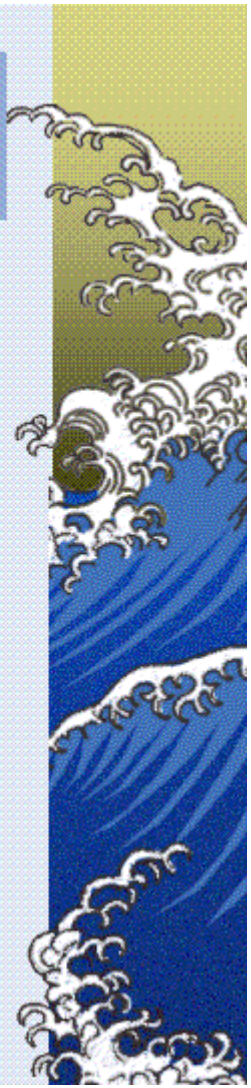
Observations in Arpege

Type of observation	Number of obs/day (mean)	Number of obs/day (std dev)
SURFACE OBSERVATIONS		
SYNOP	43.560	821
SHIP	5.784	243
SYNOR	7.052	318
BUOY	7.886	381
BATHY	51	15
TESAC	4,6	4,3

The observations in the Numerical Weather Prediction models

Observations in Arpege

Type of observation	Number of obs/day (mean)	Number of obs/day (std dev)
UPPERAIR OBSERVATIONS		
ACAR	42.930	4933
AIREP	3.530	192
AMDAR	22.761	8315
TEMP	1.224	53
TEMPDROP	2,3	6,1
TEMPSHIP	15,9	2,5
PILOT	1.011	48
PILOTMOBIL	25,7	5,4
PROFILER	662	45
EUROPROFIL	559	130
SATOB	417.026	33.141
SATGEO	12.048	1.671



The observations in the Numerical Weather Prediction models

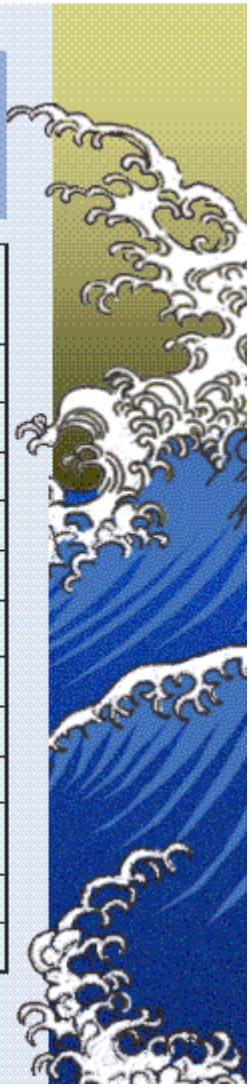
Observations in Arpege

Type of observation	Number of obs/day (mean)	Number of obs/day (std dev)
SATELLITE OBSERVATIONS		
SATEM	26.707	3.560
SSMI	21.537	4.393
TOVS120	57.416	5.105
ATOVS120	39.186	4.747
(ERS1UWI)	(354.394)	(59.709)

The observations in the Numerical Weather Prediction models

Type of observation	Advantage	Problems
Surface data		
SYNOP	Numerous, frequent	Distribution, representativity
SHIP	Geographical sparse data	Number (South Hem),representativity
BUOY	Distribution	Few parameters, representativity
ERS diffusiometer		
Upperair data		
TEMP	multilevels P, T, Hu and Wind	Distribution, low frequency
PILOT	Multilevels wind	Distribution, low frequency, wind only
Wind Profiler	Multilevels wind	Distribution (USA, EU), quality, wind only
AIREP (Airplanes)	Multilevels T and wind, quality, good distribution	Hu missing ans often only cruise levels
SATOB	Good tropical distribution	Quality, obs above 150hpa (clouds)
Radiances	Global distribution	Quality, difficult to use (channels...)

700.000 obs/day, but 10.000.000 degrees of freedom in the model



The observations in the Numerical Weather Prediction models

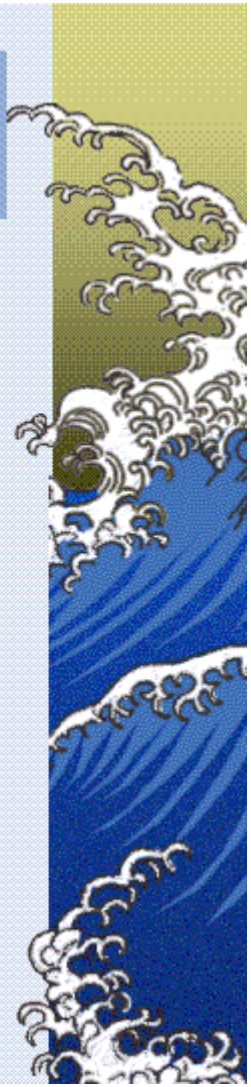
Various problems with observations

Surface data :

- Position errors (ship)
- Station elevation (synop, ship ?)
- Constant bias (Ship/Synop)
- Drifting bias (Dribu)
- Gross errors in manual observations

Satob data :

- Speed bias at high wind speed

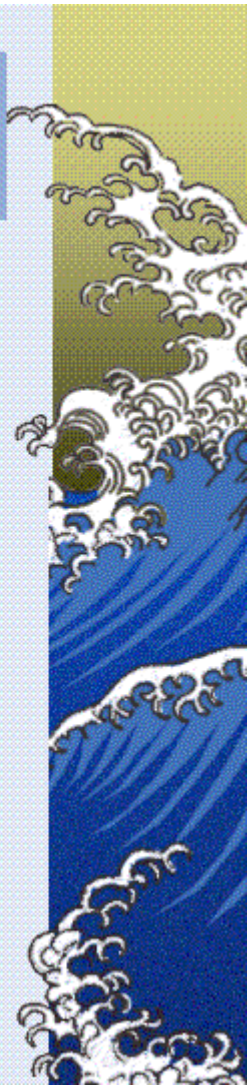


The observations in the Numerical Weather Prediction models

Various problems with observations

Sonde data :

- Station elevation
- Height measurement
- Radiation correction
- Direction alignement

Airep/Amdar data :

- Lack of a standard code (Airep)
- Position errors (Airep)