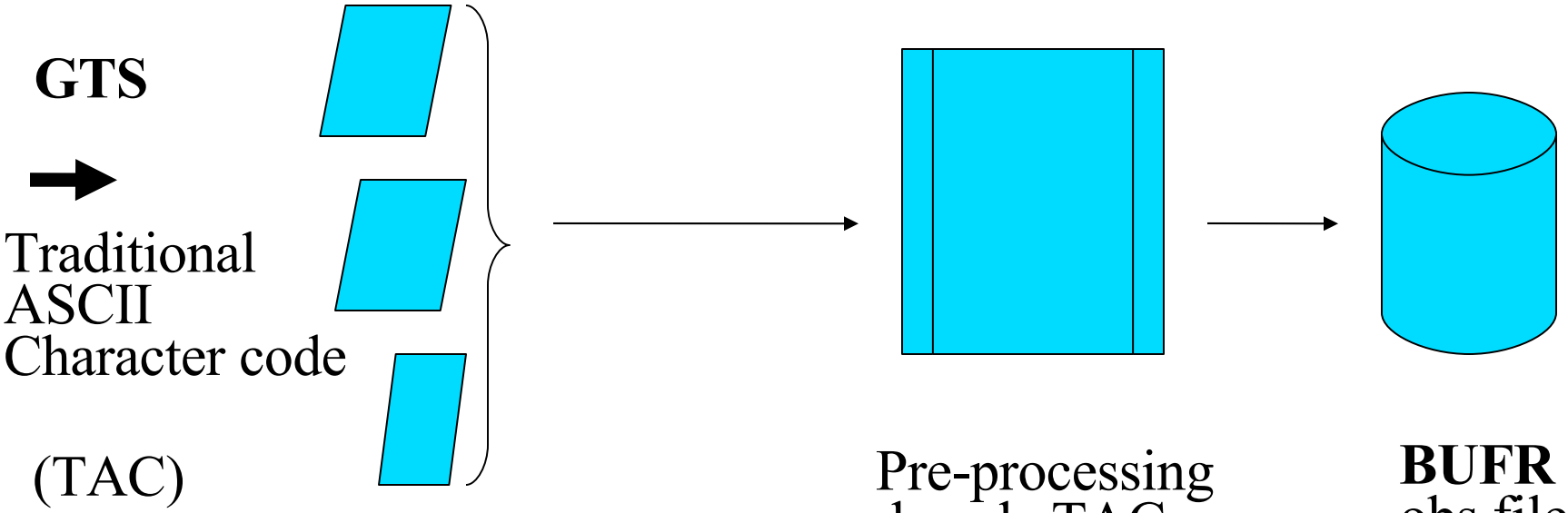
Preprocessing of Observations for HIRLAM and ALADIN

Per Undén

SMHI

with input from SMHI and HIRLAM and ALADIN

HIRLAM Pre-processing



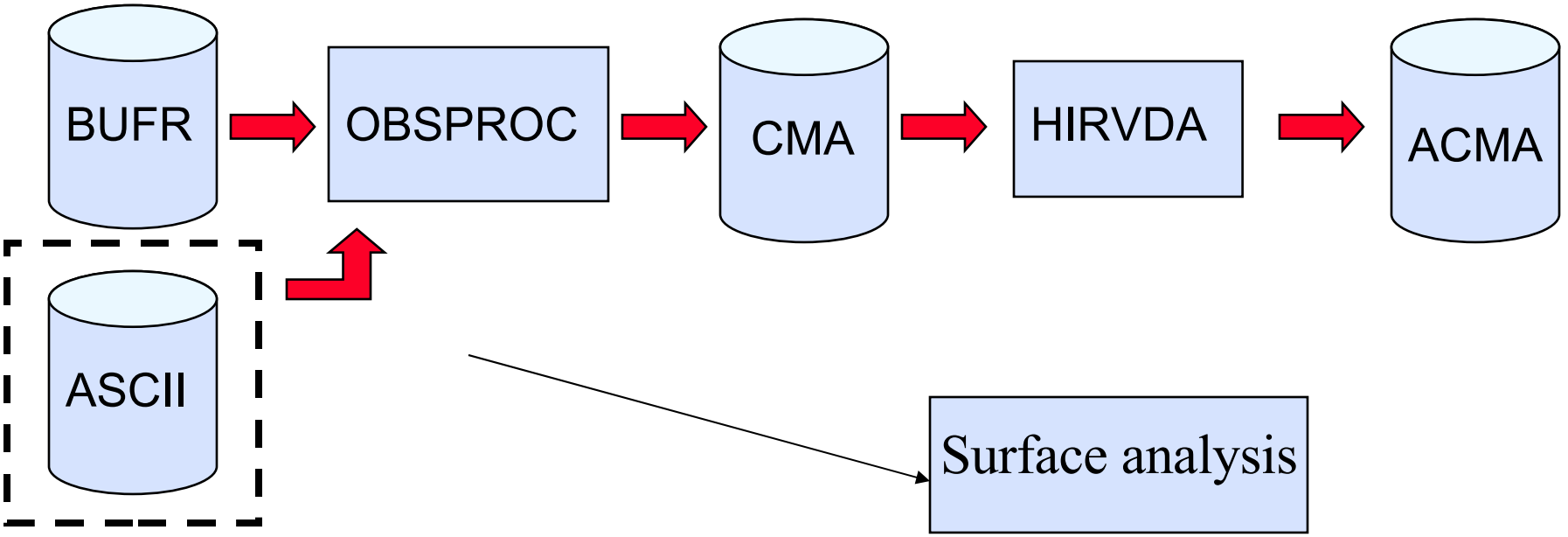
Functions of elementary QC
(needing observations only)

- Format controls
- Climate values
  - -80 < TT < +60 , Td , PPP, dd , ff ....
- Internal consistency
  - WW & TT (snow and +30 C, etc.)
  - Hydrostatic check
- Others

BUFR ?

- WMO Binary code for observations
  - (as opposed to ASCII text/ telegram formats)
- Table driven code
  - (table A,B,C,D definitions and operators)
  - First table references and operators
  - Then values
  - Then other values (like confidence %)
- Observations packed following Templates
  - Contents (variables) and order of them
  - ECMWF defined templates (and HIRLAM)
  - WMO templates different

General Observation Handling System
HIRLAM 3D-Var



OBSPROC (in MakeCMA mode)
Main Tasks

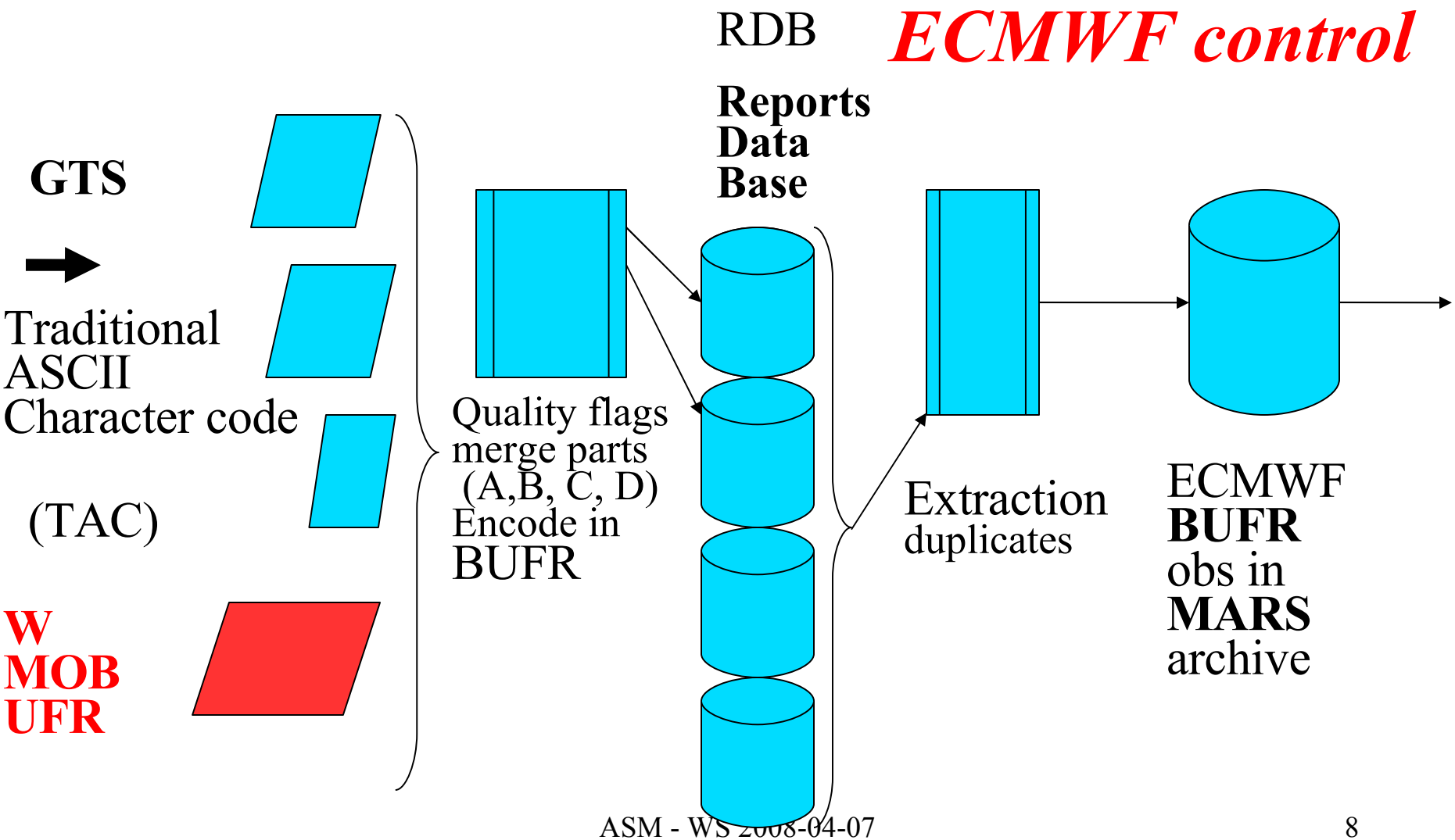
- Conversion from BUFR to CMA format
- Crudely check necessary information
- Change observed variables to those actually used by the analysis
- Assign observation errors

Code Migration Schedule

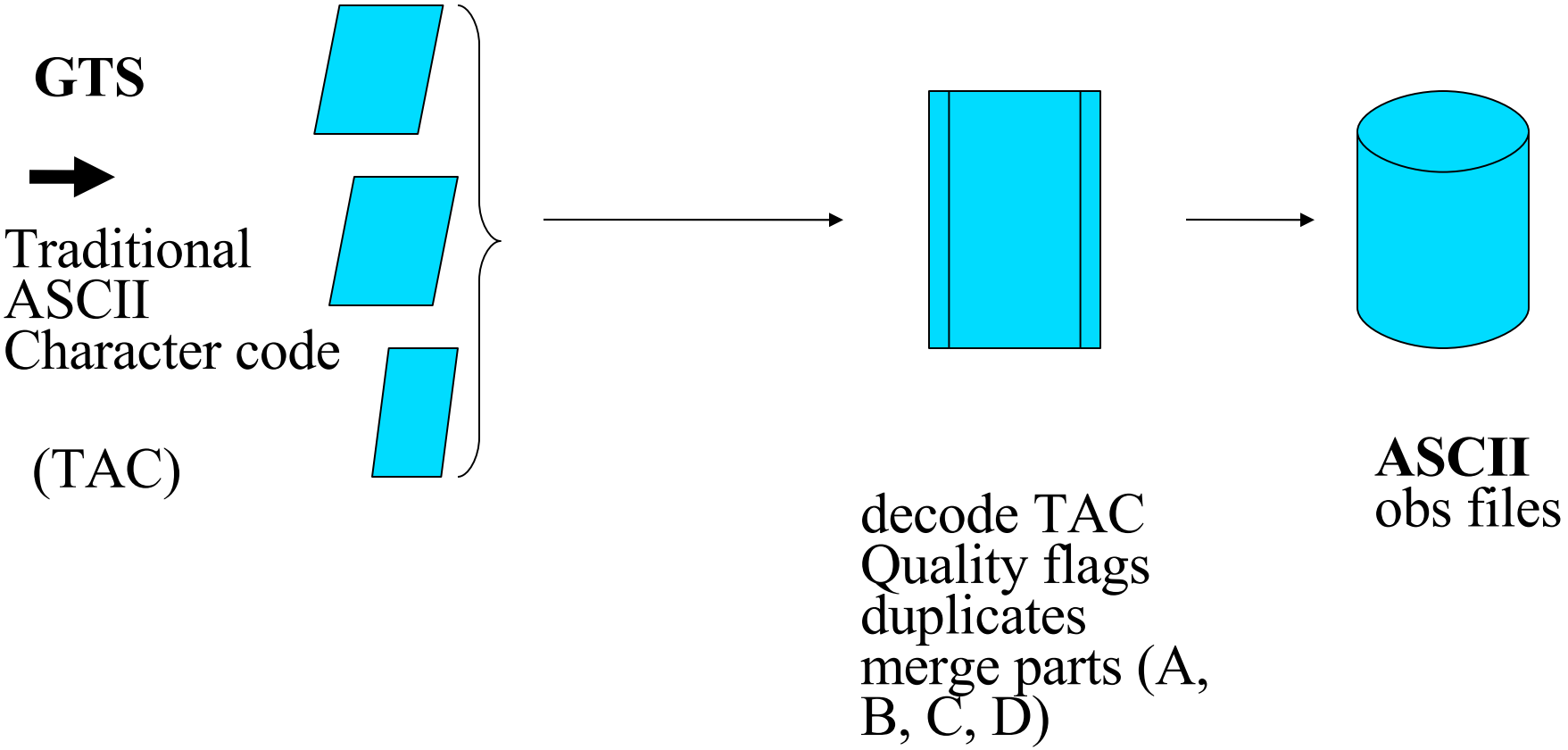
Category →	**Cat.1: common**	**Cat.2: satellite observations**	**Cat.3: aviation[1]**	**Cat. 4: maritime**	**Cat. 5[2]: miscellaneous**	**Cat. 6[2]: almost obsolete**
Lists of → Traditional code forms	SYNOP SYNOP MOBIL PILOT PILOT MOBIL TEMP TEMP MOBIL TEMP DROP CLIMAT	SAREP SATEM SARAD SATOB	METAR SPECI TAF AMDAR ROFOR	BUOY TRACKOB BATHY TESAC WAVEOB SHIP CLIMAT SHIP PILOT SHIP TEMP SHIP	RADOB IAC IAC FLEET GRID*(to GRIB)* RADOF	CODAR ICEAN GRAF NACLI etc. SFAZI SFLOC SFAZU RADREP ROCOB ROCOB SHIP ARFOR WINTEM MAFOR HYDRA HYFOR
Schedule ↓	CLIMAT TEMP			CLIMAT TEMP SHIP		
Start experimental Exchange[3]	**Nov. 2002** for some data (AWS SYNOP, TEMP USA)	Current at some Centres	**2006** **2002** at some Centres for AMDAR	**2005** **2003** for Argos data (BUOY, sub-surface floats, XBT/XCTD)	**2004**	Not applicable
Start operational exchange[3]	**Nov. 2005**	Current at some Centres	**2008** **2003** for AMDAR	**2007** **2003** for Argos data (BUOY, sub-surface floats, XBT/XCTD)	**2006**	Not applicable
Migration complete	**Nov. 2010**	**Nov. 2006**	**2016** **2005** for AMDAR	**2012** **2008** for Argos data (BUOY, sub-surface floats, XBT/XCTD)	**2008**	Not applicable

Notes:

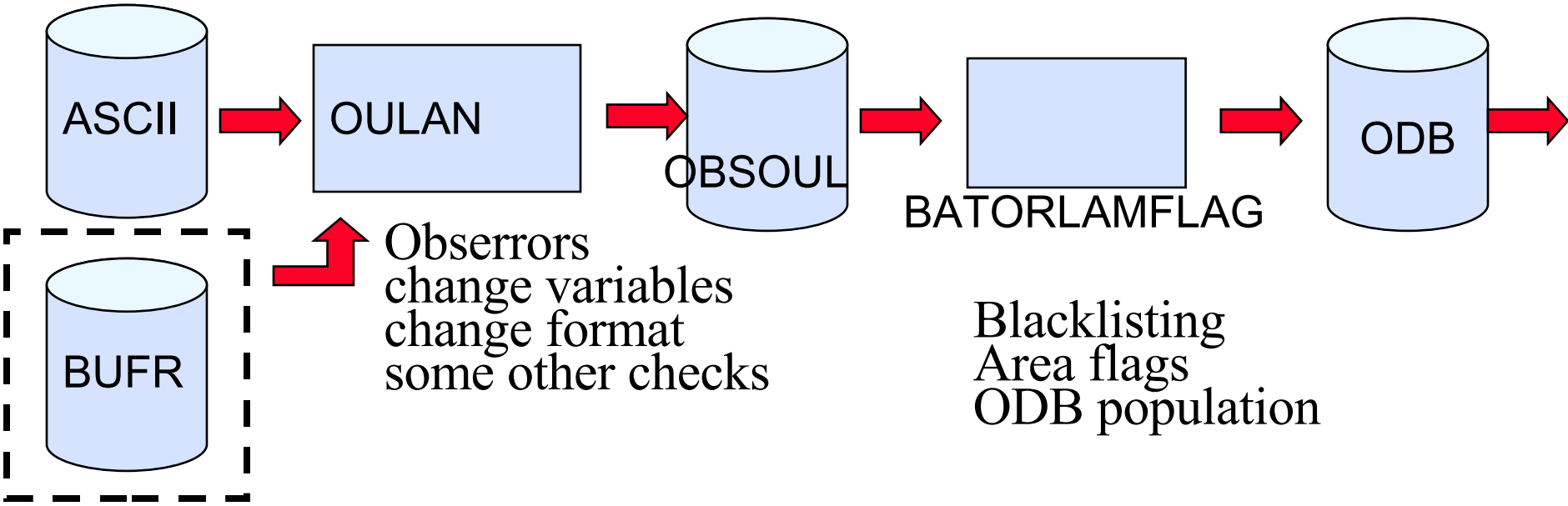
HIRLAM at ECMWF



ALADIN Pre-processing



General Observation Handling System
ALADIN 3D-Var



- BUFR2ODB at ECMWF -> IFS
- BUFR2ODB in ALADIN?
  - IFS screening additions
    - (LAM flags....)
    - Change of variables
    - Obs errors

Problems with WMO BUFR

- Template differences
  - ? OBSPROC checks templates (i.e. Order) for safety (BUFR could contain football pool table)
  - OBSPROC could be changed (but then it can't read ECMWF MARS BUFR or have switches)
  - Change templates from WMO -> ECMWF
    - + only a few templates
    - - many sub-types to change
    - Can be done with a “filter”

Problem (no 2) with WMO BUFR

- Confidence values are missing (RDB flags)
  - Elementary QC needs to be run
  - BUFR messages need to be extended and confidence values added

What to do

- 1. Change the templates
- 2. Add the confidence values (and template)
- 3. Merging of streams and duplicate check

Proposal

- Read incoming WMO BUFR at intervals
  - Decode and extract ID, time, number of values etc.
  - Write short record in a Registry file
  - Change templates, (Elem. QC), add confidence %
  - Write ECMWF BUFR
- Read old TAC based BUFR file
  - Decode partly and write record in Registry

Proposal (cont).

- Merge and eliminate duplicates
  - Read Registry file into memory and make decisions
  - Add decision at the end of each record in Registry
  - Read BUFR files in the order of Registry
  - Skip the ones to eliminate
  - (Elimentary QC ?)
  - Write BUFR messages to keep
- Or use a data base for the above?

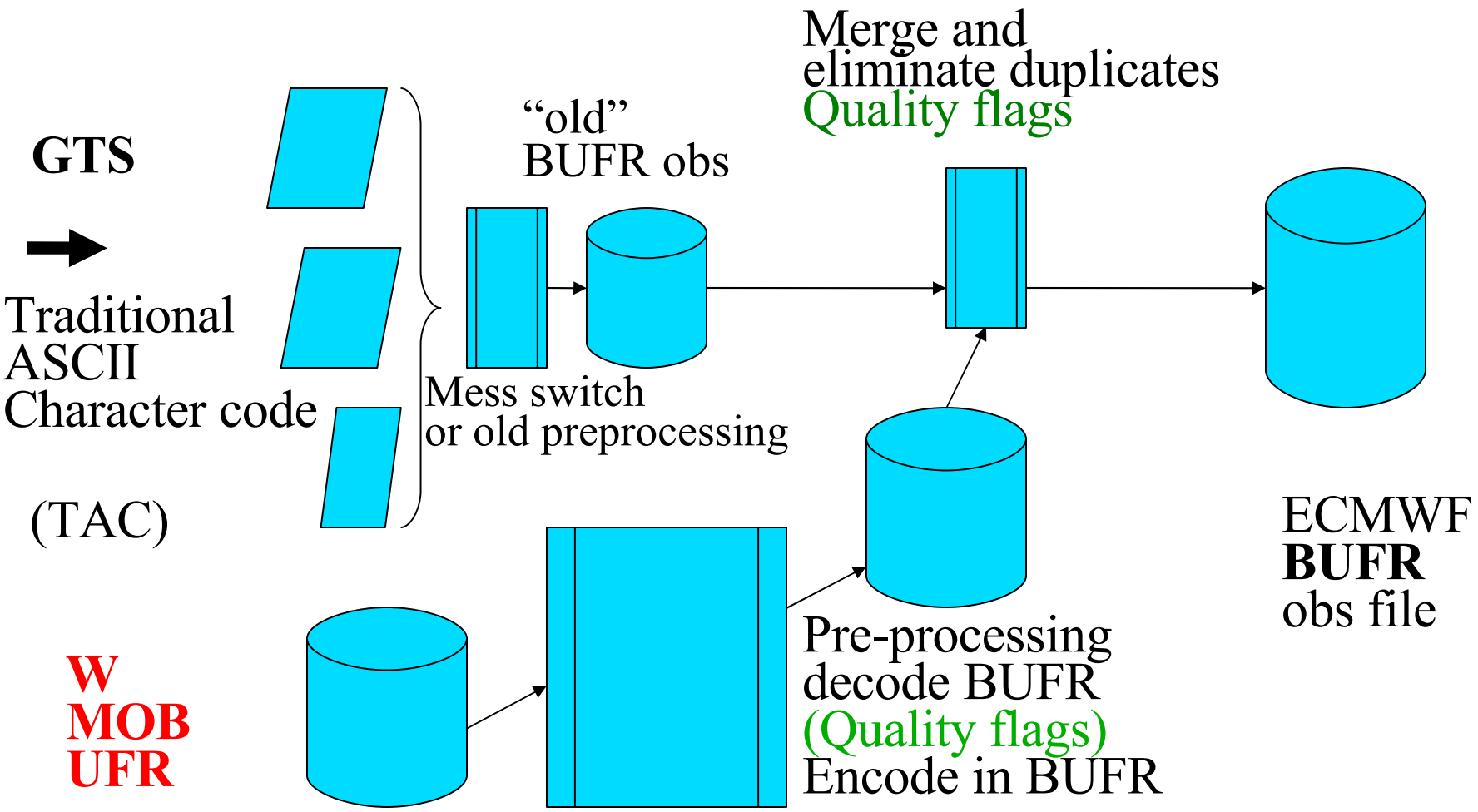
Considerations

- Simple and easy to implement everywhere
  - - Special solution and flow for NWP duplicating other QC and observational databases at home
  - + Standard solution for all HIRLAM and ALADIN institutes
- Has to work both nationally and at ECMWF
  - => ECMWF BUFR templates adhered to
- Has to work both for current operational HIRLAM and for ALADIN
  - => ECMWF BUFR input to ALADIN

Who to do it ?

- Each of us (?!@#)
- One of us ?
- met.no & SMHI
  - Discussions and some detailed investigations and plans, persons assigned
  - => NWP-NORD contribution and to HIRLAM of course
  - AND works for HARMONIE and ALADIN
- Start the work with 2 institutes but with consultation with HIRLAM and ALADIN applications&systems responsibles

HIRLAM Pre-processing



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