

Aeolus Level-2B/C Processing

ADM-Aeolus Workshop
2006
ESTEC, NL

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Talk Outline

1. Introduction

- a. What are Level-2B/2C Products?
- b. How do they differ from Level-1B Products?

2. Strategy and implementation

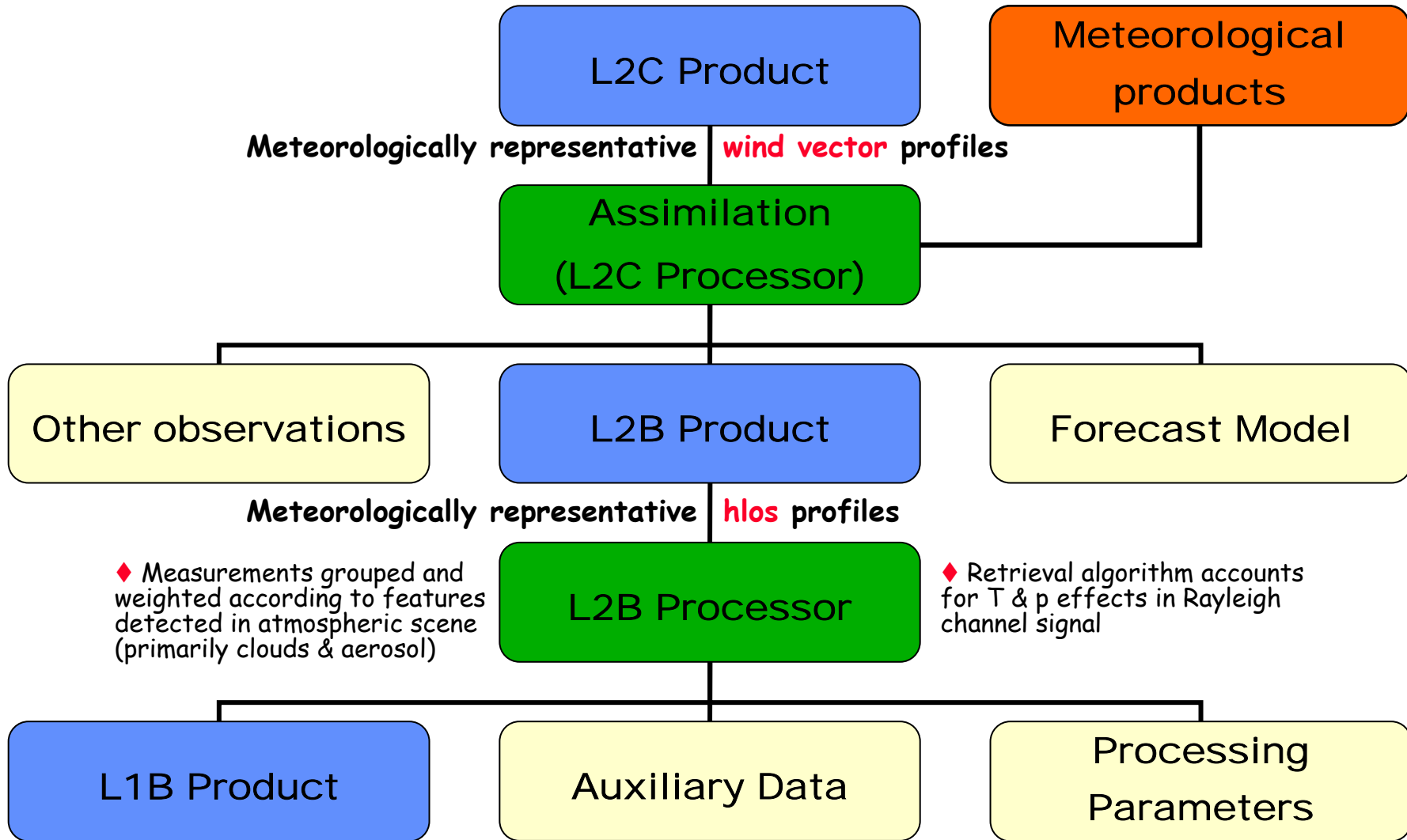
- a. Who will make them?
- b. Why distribute source code for the L2BP?

3. Does it work?

- a. Main algorithm components
- b. Retrieval examples

4. How will L2BP source code be distributed?

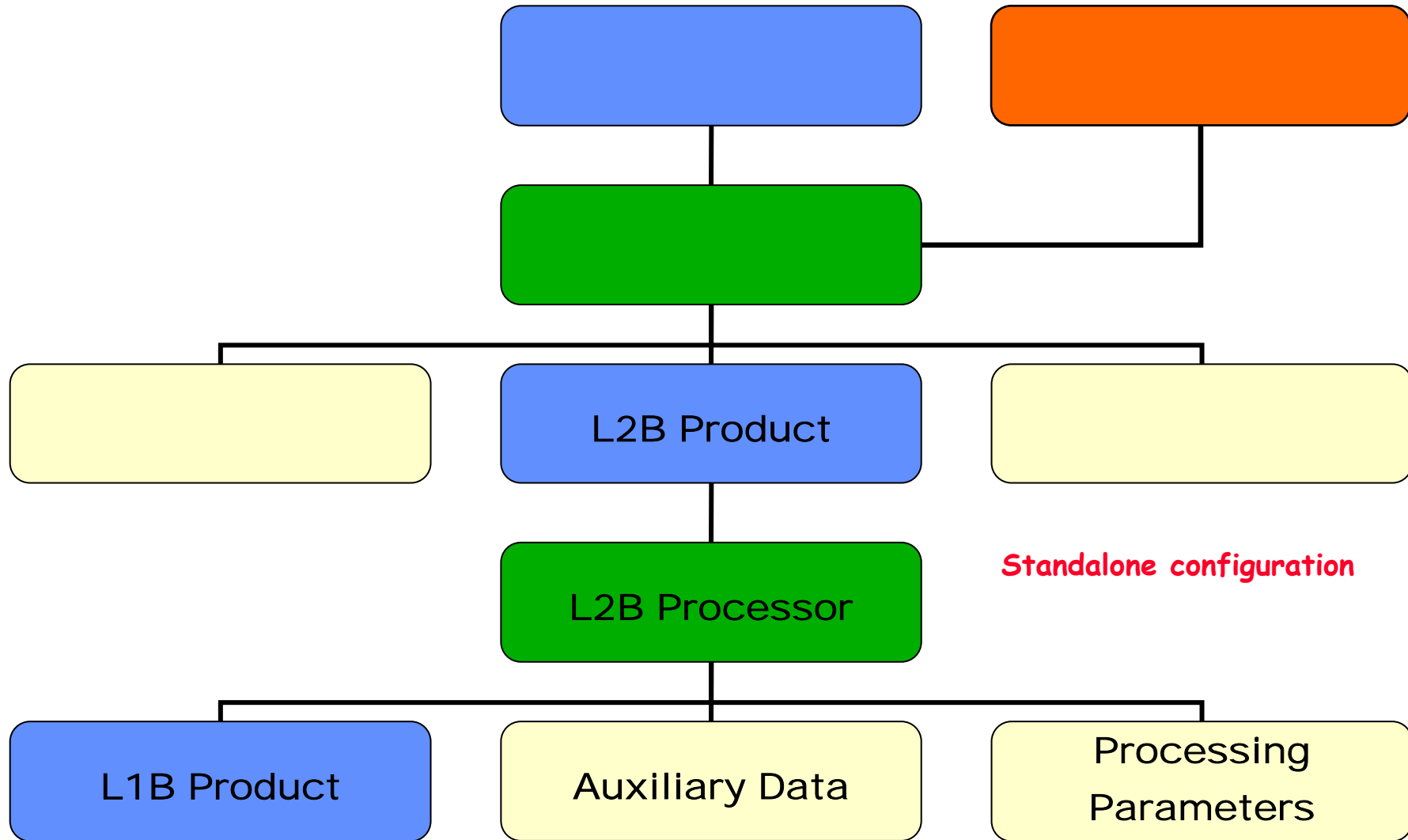
1a/b. What are Level-2B/2C Products?



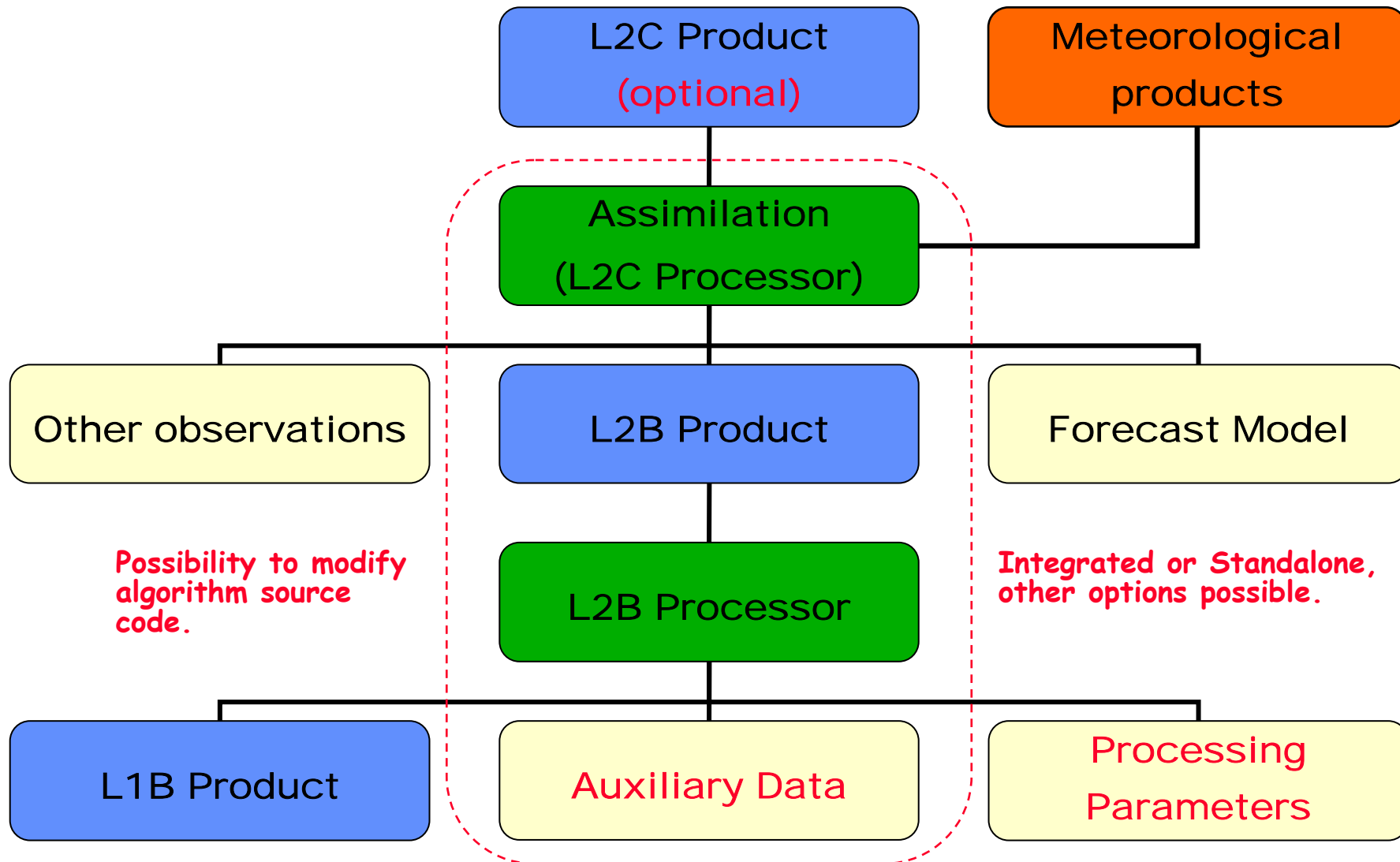
2a. Who will make Level-2B/2C Products?

- ECMWF for “operational” Level-2B/2C products
 - Processing integrated with data assimilation system
 - Products in ESA's Earth Explorer file format available from ESA (Long-Term Archive)
- ESA LTA for Level-2B late- & re-processing
 - Level-1B missing ECMWF's operational schedule
 - New processing parameters/auxiliary inputs
- Other Numerical Weather Prediction centres
 - Different operational schedule/assimilation strategy
 - Different processing params/aux inputs/algorithms
- Research institutes & general scientific users
 - Different processing params/aux inputs/algorithms

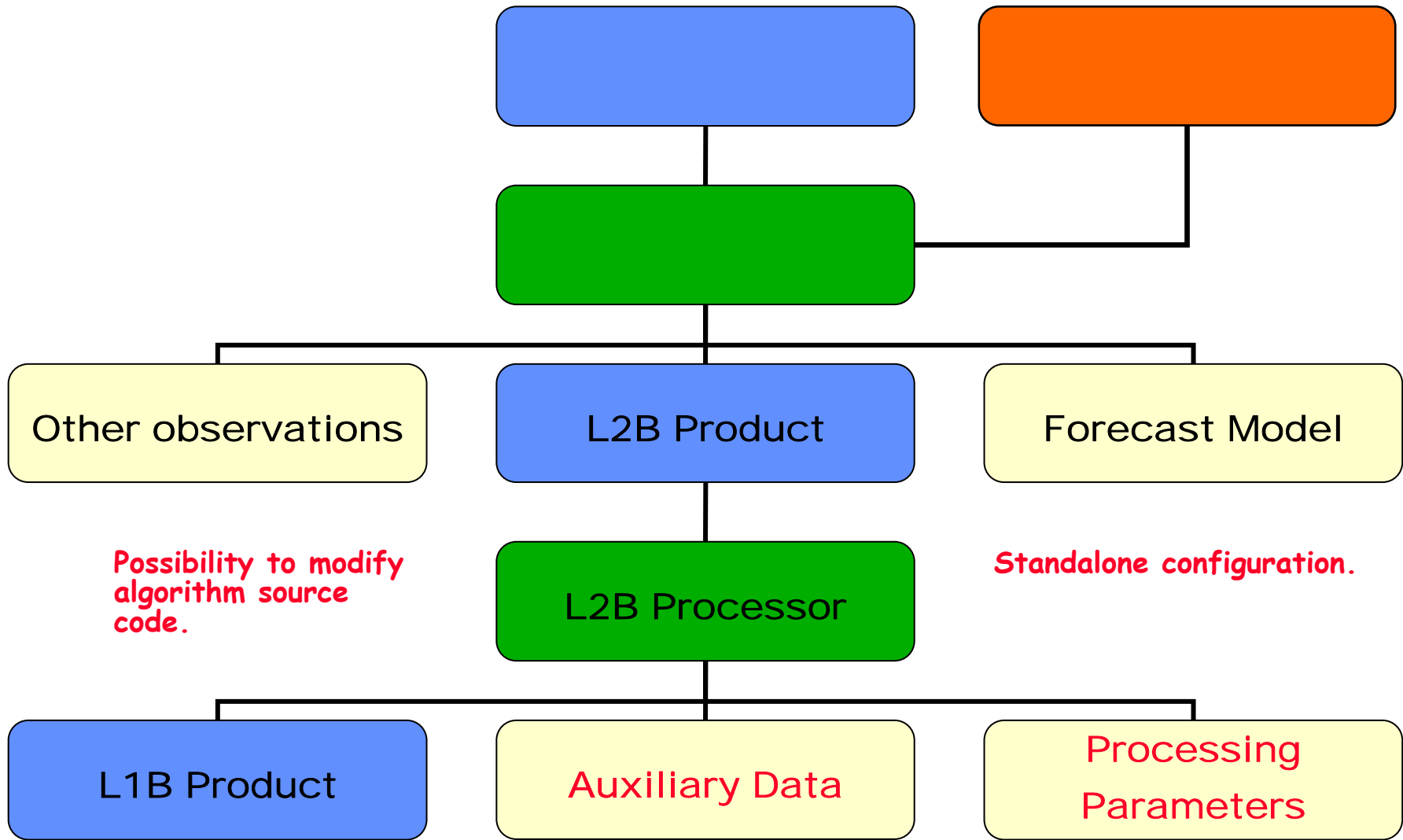
2a-2. ESA-LTA late- and re-processing



2a-3. Other NWP configurations



2a-4. Research/general scientific use



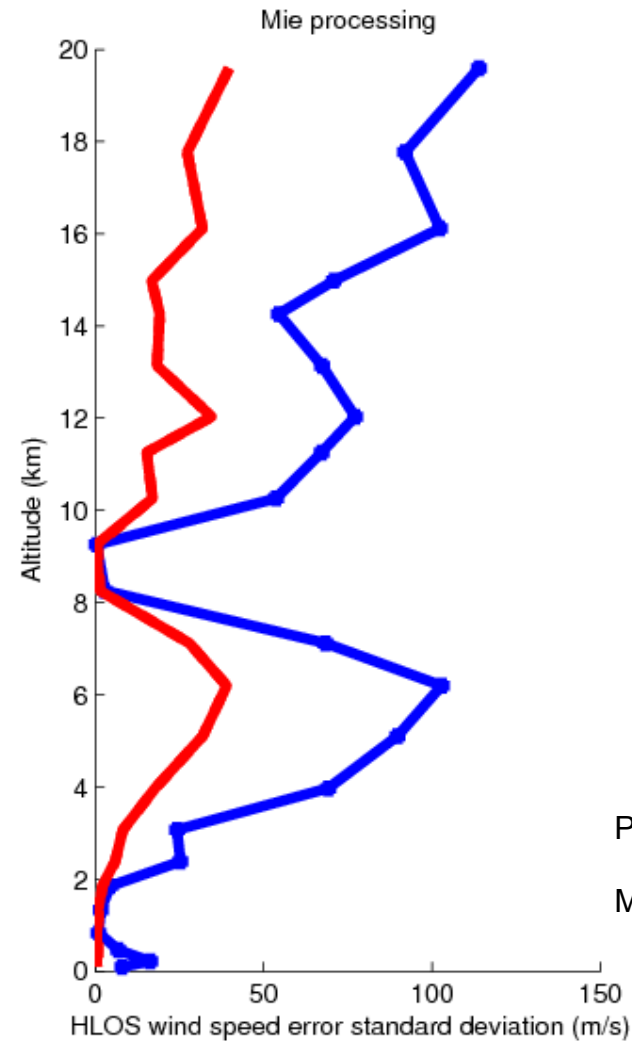
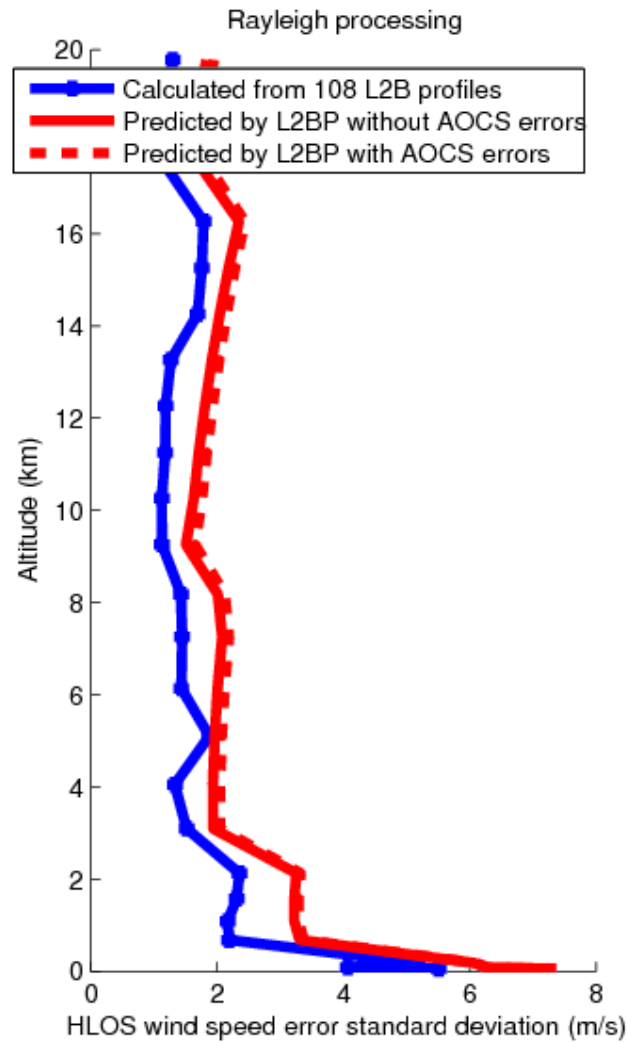
2b. Why distribute L2BP Source Code?

- **Distribution of executable binaries only permits**
 - limited number of computing platforms
 - different settings in processing parameters input file
 - thresholds for QC, cloud detection
 - different auxiliary inputs
 - option to use own meteorological data (T & p) in place of ECMWF aux met data (available from LTA)
- **Provide maximum flexibility for other centres/institutes to generate their own products**
 - different operational schedule/assimilation strategy
 - scope to improve algorithms
 - feed into new releases of the operational processor

3a. How it works

- Rayleigh channel HLOS retrieval - Dabas talk (2.6)
 - $R = (A-B) / (A+B)$ and $HLOS = F^{-1}(R;T,p,s)$
 - T and p are auxiliary inputs
 - correction for Mie contamination, using estimate of scattering ratio s
- Mie channel HLOS retrieval - Wauer/Paffrath talk (2.8)
 - peak-finding algorithm (4-parameter fit as per L1B)
- Retrieval inputs are scene-weighted - Stoffelen (2.7)
 - $ACCD = \sum ACCD_m W_m$, W_m between 0 and 1
- Error estimate provided for every Rayleigh & Mie hlos
 - dominant contributions are SNR in each channel

3b. Level-2B retrieval examples



Poli/Dabas
Meteo-France

4. Distribution of L2BP software

- **Software releases issued by ECMWF/ESA**
 - Details & timings to be determined
 - Probably via registration with ECMWF and/or ESA
 - Source code and scripts for installation
 - Fortran90, some C support
 - Developed/tested under several compilers
 - Suite of unit tests with expected test output
 - Documentation
 - Software Release Note
 - Software Users' Manual
 - Definitions of file formats (IODD), ATBD, etc.

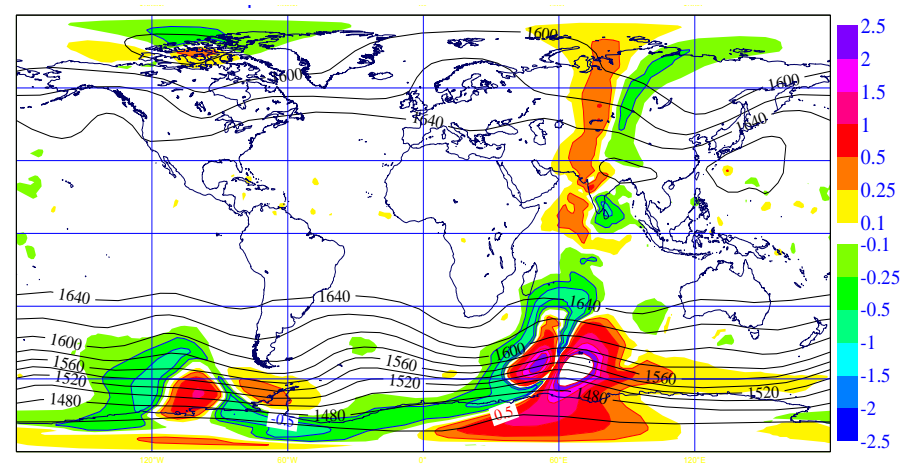
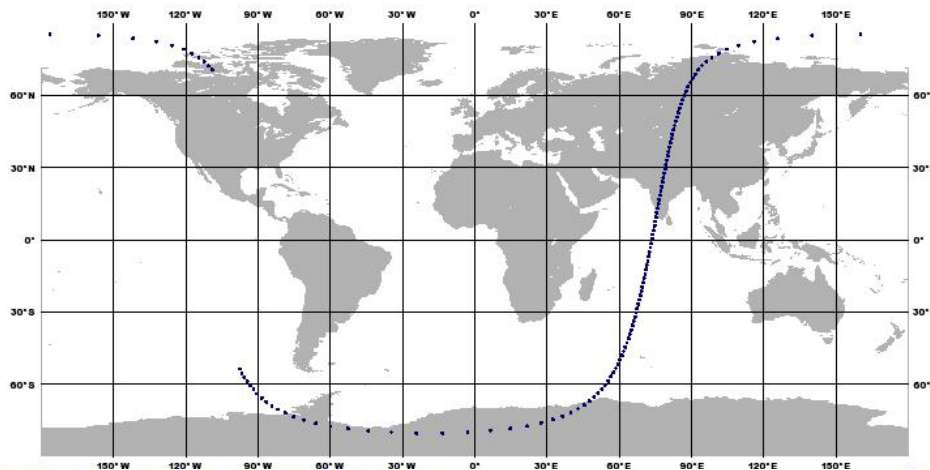
5.1 Prototype Level-2C Processing

✓ Ingestion of L1B.bufr into the assimilation system

◆ L1B obs locations within ODB (internal Observation DataBase)

✓ Assimilation of HLOS observations (from L1B)

◆ Corresponding analysis increments (Z100)



5.2 Key assimilation operators

- ◆ HLOS, TL and AD

- ◆ $H = -u \sin \varphi - v \cos \varphi$

- ◆ $dH = -du \sin \varphi - dv \cos \varphi$

- ◆ $dH^* = (-dy \sin \varphi, -dy \cos \varphi)^T$

- ◆ Generalize to layer averages later

- ◆ Background error

- ◆ Same as for u and v (assuming isotropy)

- ◆ Persistence or representativeness error

- ◆ 10 to 20 m/s for technical development

- ◆ Prototype quality control

- ◆ Adapt local practice for u and v