The Ionospheric Products of Taiwan Radio Occultation Process System (TROPS)

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Introduction

Taiwan Radio Occultation Process System (TROPS) is a process system including the retrieval procedure and user interface, which is developed by National Space Organization (NSPO), GPS Science and Application Research Center (GPSARC) of National Central University, and Taiwan Analysis Center for COSMIC (TACC) of Central Weather Bureau. TROPS is developing for the data analysis of FORMOSAT-7/COSMIC-2 (F-7/C-2) mission, which will launch 6 LEO satellites constellation in 2018. In this study, the ionospheric data of FORMOSAT-3/COSMIC (F-3/C) mission is used for TROPS calibration. In ionospheric retrieval procedure of TROPS, the ionospheric parameters profiles, which including the electron density and the absolute total electron content profiles, are retrieved from RO observation. The retrieval methods and processes are introduced in this poster.
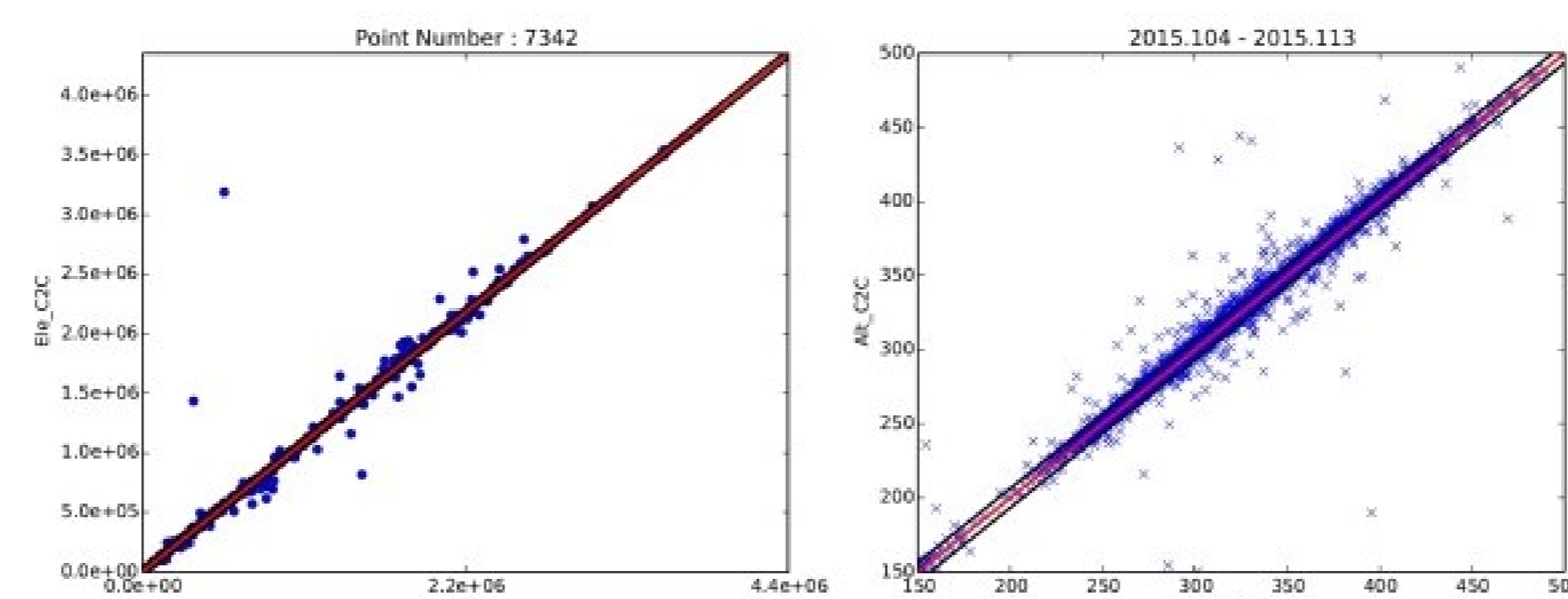
TROPS System Architecture

TROPS Ionospheric products

Electron density profile retrieval process
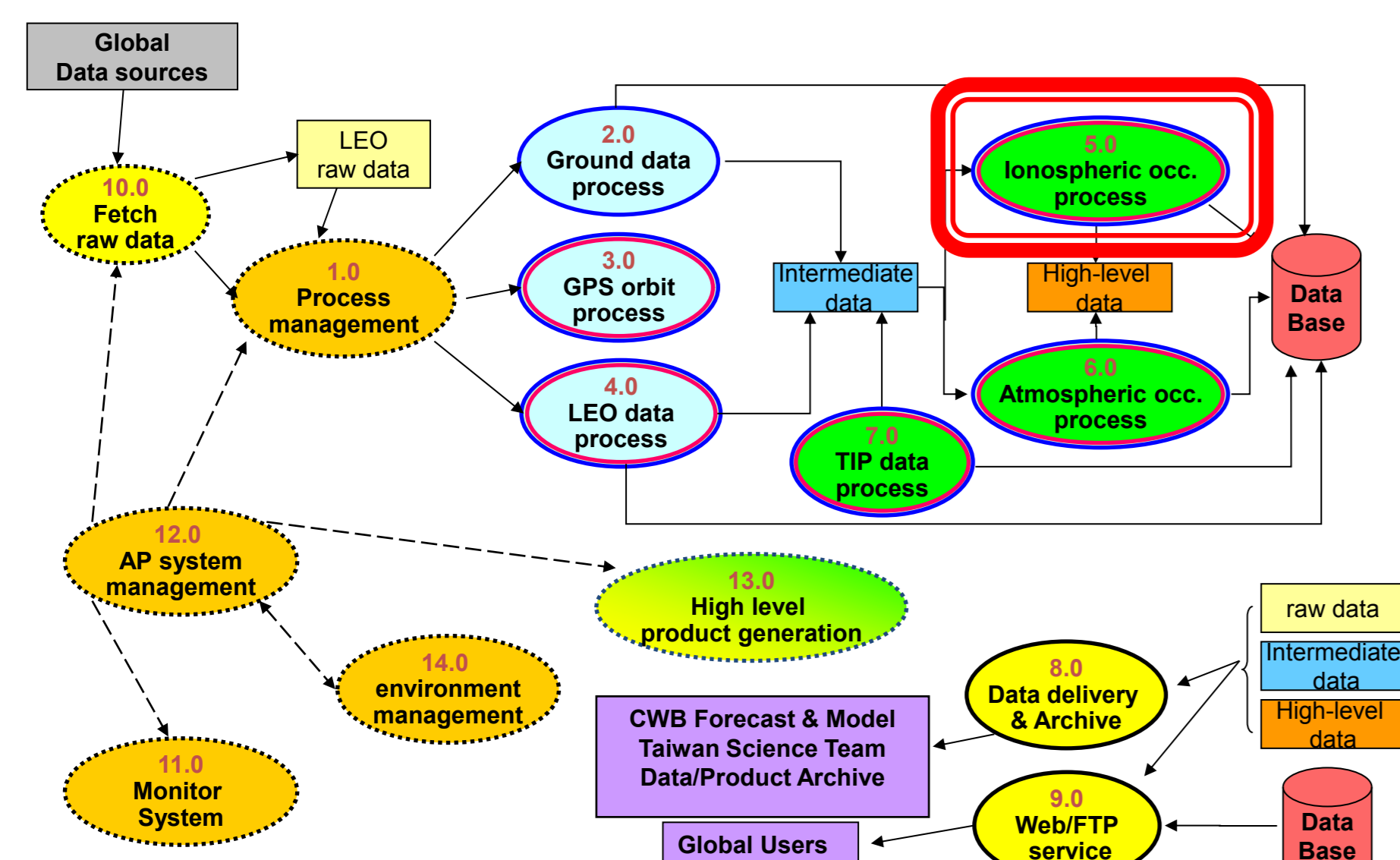
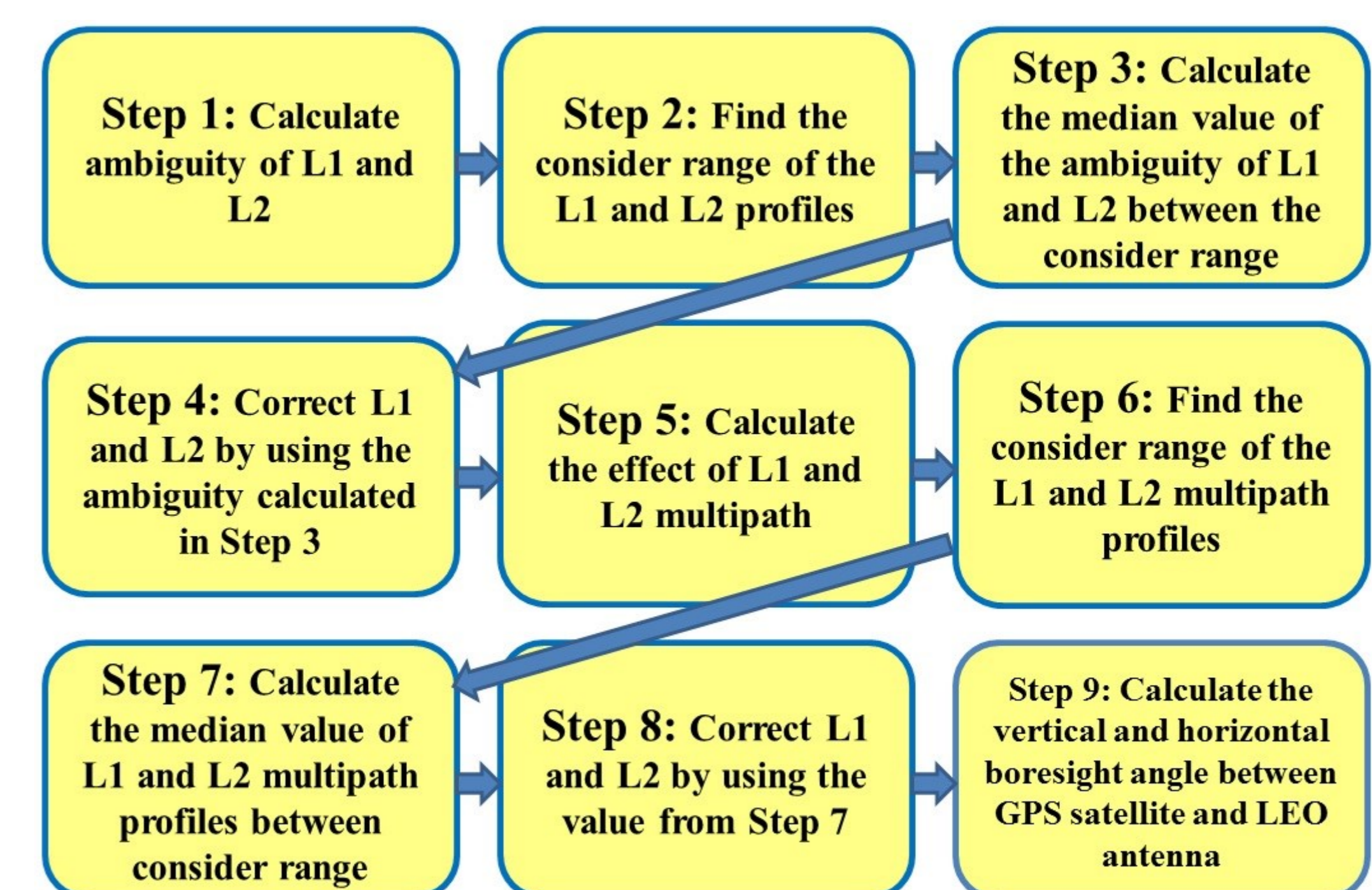## Electron density profile retrieval results

Retrieval results
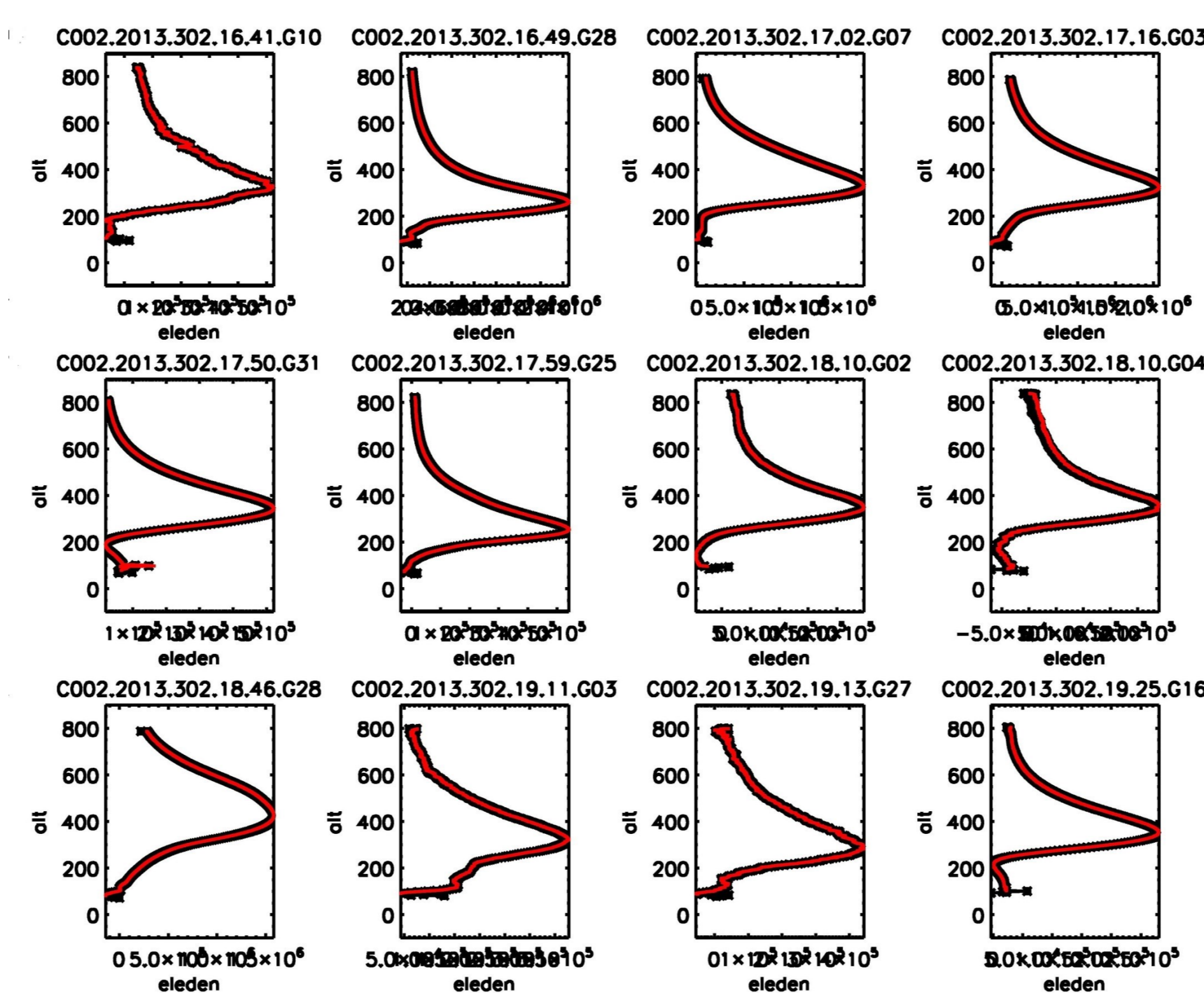
Some examples of the comparison between the retrieval electron density profiles of CDAAC (red lines) and TROPS (black lines) in DOY 302, 2013.
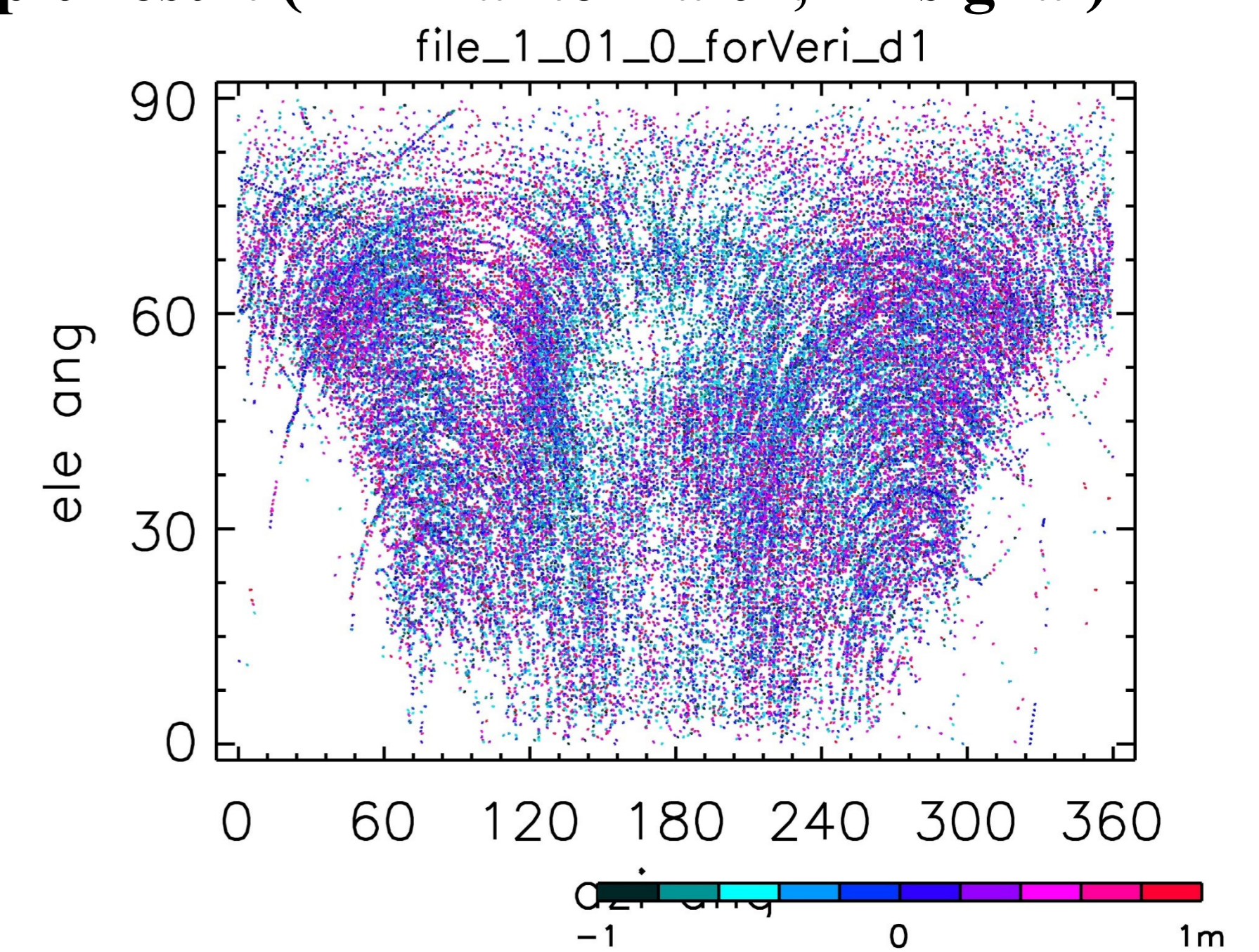
NmF2 & HmF2 comparison with CDAAC

The comparison of NmF2 (left) and HmF2 (right) between the retrieval results of CDAAC and TROPS in DOY 104-113, 2015. The red and black lines are the line with slope 1 and the range of one standard deviation, respectively.

Absolute total electron content retrieval process

Step 0: Calculate pre-multipath distribution of P1 and P2

Step 1: Calculate ambiguity of L1 and L2

Step 2: Find the consider range of the L1 and L2 profiles

Step 3: Calculate the median value of the ambiguity of L1 and L2 between the consider range

Step 4: Correct L1 and L2 by using the ambiguity calculated in Step 3

Step 5: Calculate the effect of L1 and L2 multipath

Step 6: Find the consider range of the L1 and L2 multipath profiles

Step 7: Calculate the median value of L1 and L2 multipath profiles between consider range

Step 8: Correct L1 and L2 by using the value from Step 7

Step 9: Calculate the vertical and horizontal boresight angle between GPS satellite and LEO antenna
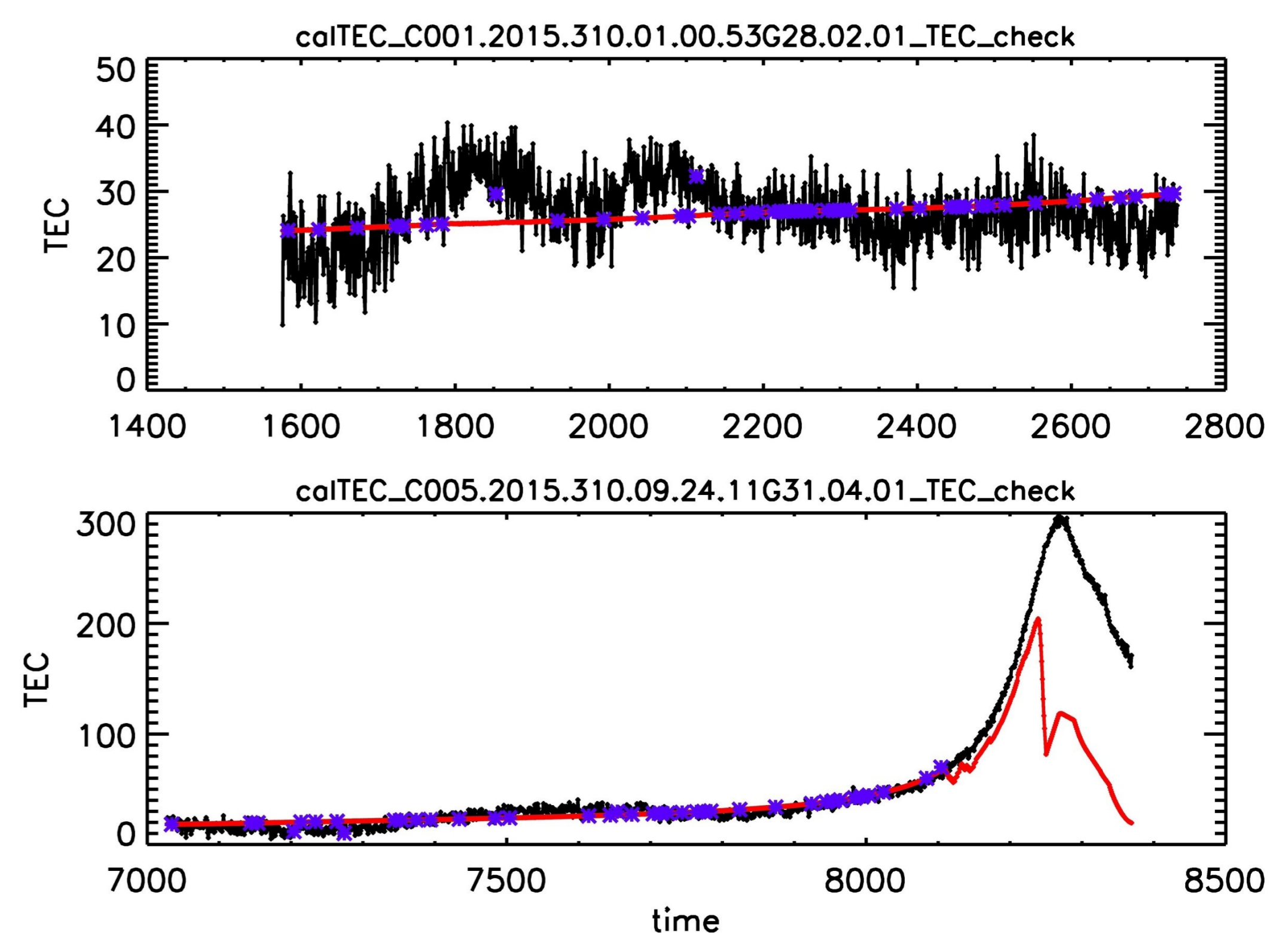
Absolute total electron content retrieval results

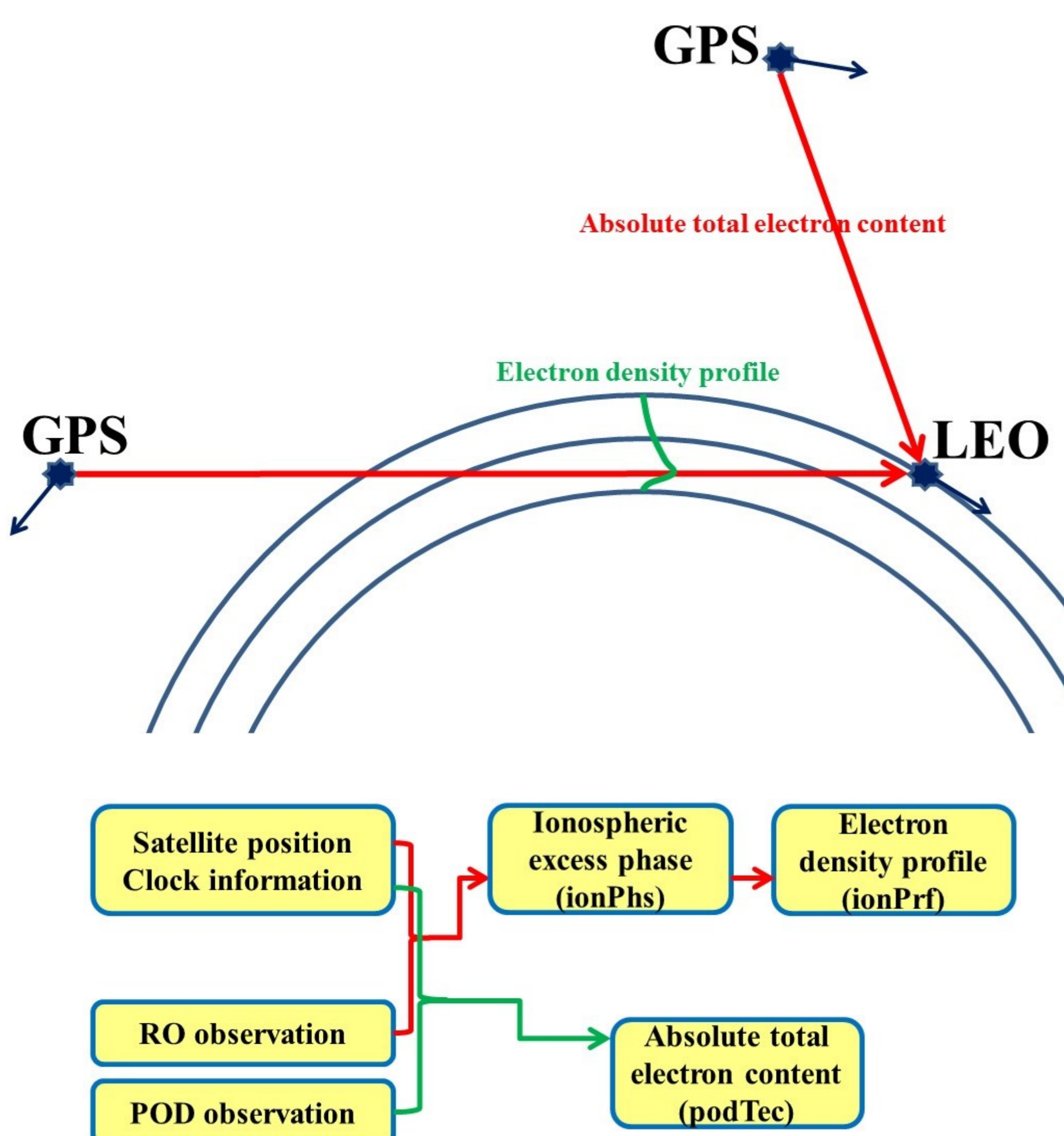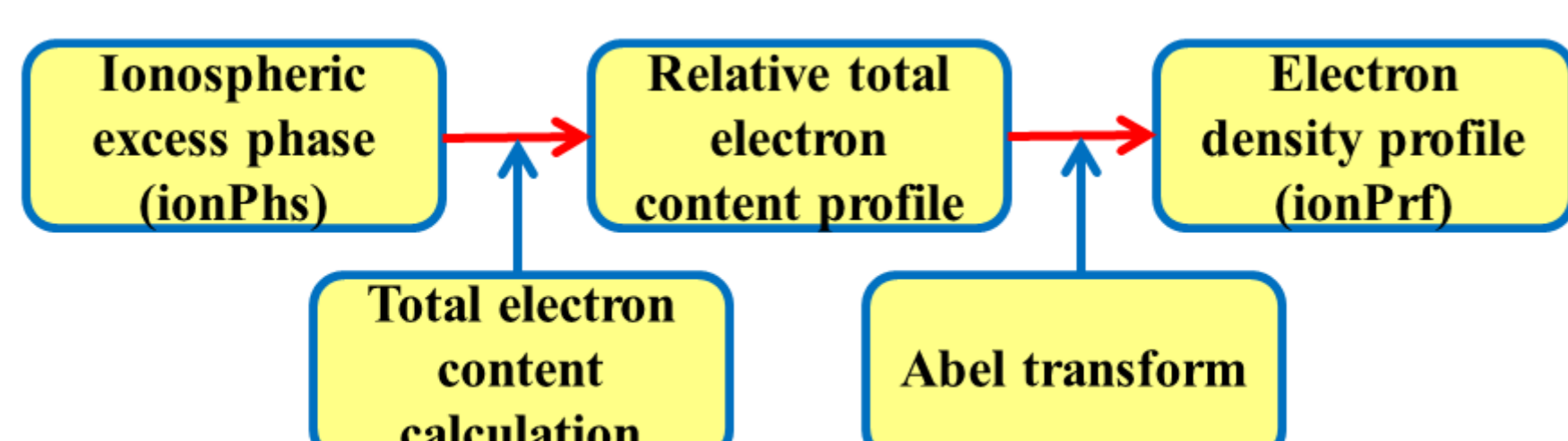### Step 0 result (FM 1 antenna 01, P1 signal)

Retrieval results

Black curves: TEC profile calculated by P1 and P2; purple dots: calculated TEC by using the results of step 0; red curves: TEC profile calculated by L1 and L2.