Fig.1. Locations of the European magnetic stations (asterisks) with the name abbreviations. The names of the stations, data from which are used to compute the European MPB index are surrounded by ellipses.

Fig.2. Interplanetary and geomagnetic conditions from 12 UT on 21 March 2013 to 06 UT on 23 March 2013 (left panel) and from 21:30 UT on 22 March 2013 to 01:30 UT on 23 March 2013 (right panel). The straight vertical lines indicate the time of the substorm onset.

Fig.3. Magnetic field variations from 20 UT to 24 UT on 22 March 2013 at different stations: a) the PPN-NAL chain magnetic field, given by the IMAGE database. The ellipse marks the substorm disturbanses; b) X variations computed by our method for some stations from the PPN-NAL chain; c) X variations for stations at lower latitudes; d) X variations for stations at different geomagnetic longitudes and at near geomagnetic latitudes. The X series are arranged from up to down by the station locations from East to West, i.e. by decreasing geomagnetic longitudes. The vertical lines in panels b), c) and d) indicate three typical times of the substorm development, 23:16 UT, 23:27 UT and 23:40 UT, at which X had a maximum at different stations.

Fig.4. Maps of the X variations distributions in the range 38° - 73° LAT and 10° - 32° LON at 23:16 UT (left panel), 23:27 UT (middle panel) and 23:40 UT (right panel).

Fig.5. Maps of the Y component distributions in the range 38° ÷ 55° LAT and -10° ÷ 35° LON at 23:16 UT (upper panel), 23:27 UT (middle panel) and 23:40 UT (bottom panel).

Fig.6. Latitudinal profiles of the X perturbations (upper row) and longitudinal profiles of the X and Y perturbations (middle and bottom rows) at 23:16 UT (left column), 23:27 UT (middle column) and 23:40 UT (right column).

Fig.7. European MPB index on 22 March 2013. The substorm onset determined by our results and the onsets, given by Newell and Gjerloev [20] are indicated by vertical dashed-dotted lines and by arrows.

Table 1. Midlatitude positive bays extent and some characteristics.