3 Jan 18 – Gravity waves/rapidly strengthening jet max interacting with the tropopause

During the aftn/eve of 3 Jan 18, several mod-sev turb and/or wave action pireps (see below) were reported from NE ZTL into NE ZDC. Although reported as "mountain wave", these were not waves generated by the mountains. These were strong gravity waves generated by the strengthening jet max and its associated divergence, upward vertical motion and speed/directional shear as the jet max interacted with the tropopause. Note the layer of WAA and instability in the layer just below the tropopause on the 00 UTC (4 Jan 18) soundings for IAD and WAL below. Also note the ~ 50-70 kts of vertical speed shear/20-30° of directional shear in the layer where the turb was reported. That amount of speed/directional shear + ascent due to the strengthening jet max, instability and divergence likely accounts for the 300 ft/100 kt gains/losses & severity of the turb as aircraft flew through the gravity waves.

UUA /OV BZM342019/TM 1925/ FL330 /TP E75/ TB MOD-SEV/RM ROLLING ACTION, NO INJURIES OR DAMAGES
UUA /OV ORF090030/TM 2039/ FL340 /TP B738/ TB MOD-SEV 340
UA /OV LWB/TM 2101/ FL360 /TP A320/ TB MOD CHOP/RM MOUNTAIN WAVE / GAIN AND LOSS OF 300 FT OF ALTITUDE
UA /OV EKN190020/TM 2111/ FL400 /TP B737/ TB MOD CAT/RM MTN WAVE /+AND-300FT
UUA /OV ENO070023/TM 2259/ FL360 /TP B738/ TB MOD-SEV CAT
UA /OV SWL36050/TM 0011/ FL380 /TP B737/ WX WAVE EFFECT +-100KTS