

6.155 Influence of the weather pattern on the photochemical ozone production of Lima, Peru.

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Abstract:

Radiosondes launched in Lima (77°W, 12°S) since 1973 to 2014 at 7:00 am (local time), distinguish a period, between January and April, where surface inversions are more abundant due to the displacement of the semi-permanent high-pressure system to high latitudes. On the other hand, during winter and spring, the strengthening of the anticyclone leads to increasing subsidence inversions over Lima. The high-pressure condition also favors the upwelling of the cold Humboldt Current, whose interaction with the air generates a thick layer of cold and humid air, which covers the city. Therefore, this stratus cloud deck inhibits the thermal inversions due to the lack of solar radiation able to reach the surface.

In general terms, the weather pattern constrains the strong photochemical ozone production within a couple of months. Also, the precursors deposition seems to keep limited the ozone concentration as well. In 2010, the official monitoring network was established in Lima, currently an attainment area, where levels of ~50 ppbv (MDA8) are often reached in summer especially in downwind locations. VOC (C6-C12) campaigns performed in 2015 to complement existing surface observations, also indicate to the northern and northeastern part of the city as locations with relatively high photochemical production. For instance, the low ratios xylene:benzene reached at noon, show the impact of aged air masses arriving from upwind locations during this period: 5 (7:00) / 3 (12:00) / 5 (18:00). Further, during this year photochemical campaigns and atmospheric structure analysis will be conducted to gain insight into this upwelling region.