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The correspondence between thin Layers of ozone observed by HIRDLS in the extratropical UTLS and potential vorticity

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The HIRDLS data, because of their 1 km vertical resolution and 100 km along orbit sampling have the ratio $\Delta x/\Delta z = N/f$, uniquely providing the optimum sampling of atmospheric features. The data show double tropopause structures and the establishment of thin layers of low ozone extending from the tropical troposphere into the mid-latitude lowermost stratosphere, and return flows, at lower altitudes, of ozone and HNO₃-rich air into the extra-tropical troposphere. In certain plots along orbital tracks, PV contours are shown to closely match the contours of the ozone layers. A number of cross-sections are shown during the lifecycle of a baroclinic development, showing the correspondence between O₃ and PV during different phases of the lifecycle. This is confirmed by extension to additional cases. Criteria are developed for locating the positions where these structures are found.