Review of "Application of tomographic algorithms to Polar Mesospheric Cloud observations by Odin/OSIRIS" by K. Hultgren et al.

General Comments: This paper presents algorithms for tomographic analysis of mesospheric clouds base on maximum probability techniques. Results are shown OSIRIS measurements, both for simulated data and from special tomographic data collections. Overall the paper is shallow and does not address the fundamentals of the algorithm performance. Using simulated data, differences are shown between the "true" atmosphere and the cloud. These differences are ascribed to the finite resolution of the input measurements and the horizontal structure. There is, however, no numerical quantization of the retrieval performance for simple cases without horizontal structure. A more comprehensive analysis of the algorithm performance is needed to assure the reader that the retrieval software is performing as expected.

Specific Comments:

1. Page 3696, line 2: The OS in OSIRIS is an Optical Spectrograph and yes it does collect only one line of sight per read-out. The other part of the name, IRIS, is the InfraRed Imaging Suite (or Sensor or System, depending upon who you ask) and it collects a vertical image (multiple lines of sight) per read-out. The as written description needs to be changed to only refer to the OS part of OSIRIS.
2. Section 2.1 is just a discussion about the vertical and horizontal grid used in the retrieval. I would not really call this a discussion about the model atmosphere.
3. Section 3: The discussion about the best vertical scan speed is short, but satisfactory. The discussion about the difference between the model and retrieval is lacking. It is not demonstrated that the code is working correctly. Maybe the offset is due to an index error. A more simplified case with no horizontal structure should be run to demonstrate that the computer code is operating correctly. There should also be a better quantification of the differences between the data and retrieved profiles.
4. Section 3: The algorithm discussion makes no mention of the actual source of the photons received by the OS. It is written in a general sense, with no words discussing the particular details of these particular OS measurements. The OS works in the ultra-violet, visible and near IR. Any "emission" by the clouds would be in the IR. The clouds scatter sun-light. This is not directly mentioned in the text. Page 3695, line 1 does say "…PMC scattering…" but does not specify scattering of sun-light or terrestrially emitted photons. The remainder of the page (3695) mentions airglow measurements used in past tomographic studies (not of clouds), but again nothing about the source of the photons evaluated in this dataset. Not until page 2703 does the reader learn that the data is scattered sun-light.
5. Related to comment #4, is there any allowance for the solar zenith angle and the single scattering angle from the sun to the sensor (OS in this case) to change during the orbit? Is the single scattering angle in the forward direction or the backward direction? The forward direction will be much more sensitive to the scattering angle for each volume.

6. To what accuracy are the measurements fit in the retrieval process? Is it the 1% of the peak PMC radiance mentioned at the top of page 3704? Only mention of the nominal number of iterations is given (30).
7. Page 3706, line 15: Is the spatial resolution of CIPS 25 m^2 or 25 km^2?