Referee comment on "Analysis of a saline dust storm from the Aralkum
Desert – Part 1: Consistency between multisensor satellite aerosol products"
by Xin Xi et al.

The authors' revisions to the paper are substantial and worthwhile, adding to the analysis
MISR multiangle visible AOD retrievals and multiple infrared AOD retrievals from IASI, as well
as dust aerosol height retrievals from both MISR and IASI. It is now an extensive multisensor
inter-comparison study with its focus on the Central Asian region, which makes for a more
compelling paper overall. An advantage of including the MISR retrievals is that alongside the
AOD the MISR retrieval algorithm also estimates the non-spherical dust contribution, the
fine mode fraction, and the single scattering albedo, all of which provide additional insights
when considering dust activity in the vicinity of the Aralkum where it is to be expected that
saline dust may contribute to the overall dust burden. In general it seems to be a well-
argued response by the authors to the reviewers' and the commenter's points.

The MISR AOD analysis in the new Figure 9 seems to me to be a substantial extra
contribution in this updated manuscript version. Figure 9 addresses very effectively my main
critiques of the previous version as to an apparent shortage of investigations of the aerosol
type (i.e. saline dust) and of dust retrievals in the immediate vicinity of the Aralkum. In
particular it is very interesting to see the performance of the Research Aerosol algorithms
with respect to the operational retrieval output that is more widely used.
The addition of the IASI AOD and altitude retrievals, as well as the MISR altitudes, is also a
positive contribution to this updated manuscript. Including infrared retrievals highlights
further the wider range of available satellite dust aerosol retrieval algorithms, and in Figure
14 these appear to display potential advantages over the Aralkum region.

As a more specific comment/question to Figure 9, it looks to me as though the RA retrievals
are being performed over some of the water bodies in the vicinity of the Aral Sea?
Comparing with the satellite image in Figure 19 it looks as though there are RA retrievals
over the remaining waters of the South Aral Sea (west and east) and over the lake on the
border between Uzbekistan and Turkmenistan. The main areas without retrievals appear to
be the areas of the Aral Sea lakebed in the immediate vicinity of the remaining lake. In any
case, the RA retrievals appear to be a clear improvement over the operational product in
this region.

Response: Thank you for the positive feedback. If I understand the reviewer correctly, the final
comment is about the spatial coverage/availability of MISR RA retrievals. Particle properties are
retrieved everywhere (same as AOD retrieval), but reported only for large AODs since the
information content is low under aerosol loadings. The RA algorithm uses solely MISR NDVI for
land/water discrimination, and also relies on MAIAC for the prescribed surface. If there is no
prescribed surface from MAIAC we can't run that portion of the algorithm. Additionally, the NDVI
for bright salt flats in the immediate vicinity of the lake is very low, which can make land/water
discrimination challenging for an instrument with only limited spectral reach (446-865 nm).
Because of potential biases in the land/water discrimination, Fig. 9 shows some discontinuity
(and biases) of particle property retrievals over the remaining water bodies of Aral Sea and the

Sarygamysh Lake. Another factor is that the AI/ML model is currently trained only over land (using MISR RA geophysical output) but applied everywhere, including water.