Summary of Day 1 discussions

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RO data for climate monitoring

- Discussion on the advantages and limitations of RO data. Advantages/disadvantages of an observational RO data record relative to reanalysis.

  Advantages of reanalysis: gives everything, everywhere. Each new generation of reanalysis model is improved. Provides framework for error characterization.

  Limitations of reanalysis: The assumption that RO is used in an optimal way in reanalysis does not hold everywhere (biases around 40 km where RO fights biased microwave data seems to persist). Bias changes as the data being assimilated changes with time.

  Advantages of RO relative to reanalysis: better control of the temporal stability, there is an expectation of smaller biases in the RO "core region", fundamental SI traceability

  Limitations of RO relative to reanalysis: lower spatial resolution, limits in coverage, short time series, difficult to characterize uncertainties.

Tentative recommendations to ROM SAF:

i) Continue provide RO-based CDRs independent of reanalyses (useful even in the long run as reanalysis models are improved)

Summary of Day 1 discussions

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RO data for climate monitoring

▪ Discussion on uncertainties, uncertainty characterization, importance and difficulty in validating stability of RO time series, usefulness of ensemble data sets.

It is generally acknowledged that uncertainty characterization is important. The value of that is lessened if we suspect that our uncertainties are not good, and that the actual errors are larger than the formal errors.

Provision of ensemble RO data sets from several RO processing centers is a way of quantifying a certain class of errors.

Important for CDRs to validate the stability in time. No other way to do that than to compare with other observational data sets or reanalysis. Some understanding of the uncertainties involved is required to interpret such comparisons.

Tentative recommendations to ROM SAF:

ii) Provide improved uncertainty characterization of profile data as well as gridded data.

iii) Contribute to generation of ensemble RO data sets in collaboration with other data providers.

Summary of Day 1 discussions

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RO data for climate monitoring

- Important to move towards higher spatial resolution in latitude and longitude, both for climate monitoring applications but also for climate model testing. May be required to provide several CDRs with different resolutions and with different lengths and/or spatial coverage.

- Tropospheric humidity is an important quantity from a scientific perspective. RO is not ideal for observing humidity but has undisputed advantages (vertical resolution, global coverage). There is an important potential for RO to contribute to the global observations of humidity.

- MSU/AMSU data: a lot of work to properly compute microwave brightness temperatures from RO data (steps requiring instrument-specific filter settings). A major advantage with RO data (the vertical resolution) is lost. An important application is as a source of calibration for the MSU/AMSU (and follow-on sounders) communities. Maybe not a task for e.g. the ROM SAF to provide brightness temperatures as data products.

Tentative recommendations to ROM SAF:

iv) Continue provide gridded data RO data. Extend the range of gridded products with higher-resolution data.

v) Provide tropospheric humidity CDRs. Continue work towards better handling of biases.

vi) Perhaps should MSU/AMSU brightness temperatures not be provided as an RO data product ?

Summary of Day 1 discussions

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RO data for climate model testing

- Important with data in well-defined gridded formats. Obs4MIPs is the preferred format for climate modellers. Currently there is one RO-based Obs4MIPs data set available (from JPL). ROM SAF plans for an Obs4MIPs data product based on the current grid types.

  There are around 30 climate models participating in CMIP projects. They use forward models ("simulators") to compute variables in observation space. We have such tools for RO data (an RO module in the COSP simulator at the Hadley Center) but sofar they have not been widely used.

  Difficult to convince climate modellers to run RO forward model as a part of their normal development of climate model data sets. What are the options?

- Not only the standard geophysical variables, but also bending angle and refractivity.

- Uncertainty characterization of gridded data need to be improved for wider use of RO data within the climate modelling community.

Tentative recommendations to ROM SAF:

vii. Develop Obs4MIPs data products, including bending angle, refractivity, and the standard geophysical variables and with associated uncertainty estimates

viii. Promote the use of RO-based Obs4MIPs data and RO "satellite simulators".

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