Clean-up of Level-2 Data Products

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Purpose

• Determine if any science data parameters can be removed from the Aquarius Level-2 data products for V4.0.
• Determine any parameters that need to be added, either for evaluation or the official release.
Premise

- We can make different products (i.e., with different parameters) for any version of the data product.
- A number of parameters are included in the products to support the algorithm team’s evaluation activities that may not have any value to the general community.
- The official release products would be “cleaner” (i.e., easier to understand) if these parameters were not included.
- There will ALWAYS be a final evaluation version that will use the exact same algorithms as the official release, and can contain more parameters for evaluation.
- In addition, some quality flags are now obsolete and could be removed.
The current Aquarius Level-2 products contain:

- 68 Radiometer parameters total, 32 unique types.
- 28 Scatterometer parameters total, 11 types.
- 17 Ancillary data parameters

Radiometer parameters include multiple versions of some fields (e.g., Tb with and without land and roughness corrections).
- Parameters that are not used in the final validated SSS (e.g., those without land correction).
- Quality flags that were superseded in V3.0 but not removed.
• V3.4 added the radiometer SST bias emissivity correction.
• Others?
Backup Slides
Radiometer Parameters

- **rad\_TaX0, X = \{V, H, 3\}**: Radiometer antenna temperature
- **rad\_TaX, X = \{V, H, 3\}**: Radiometer antenna temperature corrected for instrumental errors.
- **rad\_Tfx0, X = \{V, H, 3\}**: Radiometer antenna temperature after RFI removal
- **rad\_Tfx, X = \{V, H, 3\}**: Radiometer antenna temperature corrected for instrumental errors and RFI removal.
- **rad\_toi\_X, X = \{V, H, 3\}**: Brightness temperature from the surface at the radiometer
- **rad\_toa\_X\_nolc, X = \{V, H\}**: Brightness temperature at the top of the atmosphere (TOA) without land contamination.
- **rad\_toa\_X, X = \{V, H\}**: Brightness temperature at the top of the atmosphere (TOA) with a correction for land contamination.
- **rad\_far\_TaH**: Faraday rotation angle determined from the ratio of the third and second Stokes parameters.
- **rad\_galact\_Ta\_dir\_X, X = \{V, H, 3\}**: Celestial background radiation at L-band impinging directly on the radiometer antenna
- **rad\_galact\_Ta\_ref\_X, X = \{V, H, 3\}**: Celestial background radiation at L-band after reflection from the Earth surface
- **rad\_galact\_Ta\_ref\_GO\_X, X = \{V, H\}**: Celestial background radiation at L-band after reflection from the Earth surface, derived from geometric optics with no empirical adjustment.
- **rad\_galact\_dTa\_X, X = \{V, H\}**: Empirical adjustment to the correction for reflected celestial background radiation at L-band.
- **rad\_solar\_Ta\_dir\_X, X = \{V, H, 3\}**: Direct radiation from the Sun.
- **rad\_solar\_Ta\_ref\_X, X = \{V, H, 3\}**: Reflected radiation from the Sun.
- **rad\_solar\_Ta\_bak\_X, X = \{V, H, 3\}**: Sun glint. Radiation from the Sun which is scattered from the ocean surface.
- **rad\_moon\_Ta\_ref\_X, X = \{V, H, 3\}**: Radiation from the Moon at polarization X after reflection from the Earth.
Radiometer Parameters (cont.)

rad_TbX, X = \{V, H\}: Brightness temperature at the surface prior to making a correction for roughness.
rad_TbX_nolc, X = \{V, H\}: Brightness temperature at the surface prior to making a correction for roughness but without the correction for land in the antenna sidelobes.
rad_TbX_rc, X = \{V, H\}: Brightness temperature at the surface after making a correction for roughness.
rad_TbX_rc_nolc, X = \{V, H\}: Brightness temperature at the surface after making a roughness correction but without making a correction for land in the sidelobes.
rad_Tb_consistency: Magnitude of the difference between the measured brightness temperature at the surface after all corrections (rad_TbX_rc) and the predicted values obtained using the derived SSS (not HYCOM) and a flat surface
rad_Tb_consistency_nolc: Same as rad_Tb_consistency but using the measured values before land correction
SSS: Retrieved sea surface salinity.
SSS_bias_adj: Retrieved sea surface salinity with SST adjustment.
SSS_error: Estimated uncertainty in SSS; not currently implemented.
SSS_nolc: Retrieved sea surface salinity with no land sidelobe correction.
rad_exp_TaX, X = \{V, H, 3\}: Model derived radiometer antenna temperature
rad_exp_TaX_hhh, X = \{V, H, 3\}: Model derived radiometer antenna temperature using the derived wind speed
rad_exp_TbX, X = \{V, H\}: Predicted brightness at the surface using the HYCOM salinity field.
rad_exp_TbX0, X = \{V, H\}: Brightness temperature of an ideal surface (i.e. flat, with no waves
rad_hh_wind_speed: Wind speed derived using the measured scatterometer sigma-0 and sigma-0 wind model function at HH-pol
rad_hhh_wind_speed: Wind speed derived using the scatterometer sigma-0 at HH-pol and the radiometer Tb at H-pol
Scatterometer Parameters

\textbf{scat\_X\_ant}, \(X = \{VV, HH, HV, VH\}\): Estimated normalized radar cross-section (NRCS, or sigma-0) at the antenna.
\textbf{scat\_X\_toa}, \(X = \{VV, HH, HV, VH\}\): Estimated normalized radar cross-section at the top of the atmosphere.
\textbf{scat\_tot\_toa}: Estimated normalized radar cross-section for the total power received by the radar for each beam.
\textbf{scat\_wind\_speed}: Estimated wind speed at the ocean surface.
\textbf{wind\_uncertainty}: Estimated uncertainty in wind speed at the ocean surface.
\textbf{scat\_esurf\_X}, \(X = \{V, H\}\): Excess surface emissivity due to wind.
\textbf{scat\_esurf\_X\_uncertainty}, \(X = \{V, H\}\): Estimated uncertainty in excess surface emissivity.
\textbf{Kpc\_X\_ant}, \(X = \{VV, HH, HV, VH\}\): Statistical uncertainty for the antenna sigma-0.
\textbf{Kpc\_X\_toa}, \(X = \{VV, HH, HV, VH\}\): Statistical uncertainty for the top-of-atmosphere sigma-0.
\textbf{Kpc\_total}: Statistical uncertainty for the total power sigma-0.
\textbf{scat\_X\_exp}, \(X = \{VV, HH, HV, VH\}\): Estimated normalized radar cross-section.
Ancillary Data Parameters

- **anc_wind_speed**: The wind speed from NCEP GFS GDAS at 10 m.
- **anc_wind_dir**: The wind direction over the ocean is obtained from the NCEP GFS GDAS 10 meter level.
- **anc_cwat**: The total columnar liquid water above the viewed location.
- **anc_swe**: The snow water equivalent from NCEP GFS GDAS.
- **anc_surface_temp**: The surface temperature over the ocean is the NOAA OISST (Reynolds) product.
- **anc_surface_pressure**: Atmospheric pressure is obtained from the NCEP GFS GDAS.
- **anc_subsurf_temp**: The subsurface temperature over the land from the NCEP GFS GDAS for the layer (0-10 cm).
- **anc_SSS**: The reference sea surface salinity used for computing `rad_exp_TbX`.
- **anc_trans**: A measure of attenuation through the atmosphere.
- **anc_Tb_up**: A measure of the upwelling radiation from the atmosphere at L-band.
- **anc_Tb_dw**: A measure of the downwelling radiation from the atmosphere at L-band.
- **anc_sm**: The soil moisture content when over land
- **anc_swh**: The significant wave height data from NCEP.
- **rad_land_frac**: The gain weighted land fraction.
- **rad_ice_frac**: The gain weighted fraction of sea ice in the radiometer footprint.
- **scat_land_frac**: The gain weighted fraction of land in the scatterometer footprint.
- **scat_ice_frac**: The gain weighted fraction of sea ice in the scatterometer footprint.