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The ORACLES (ObseRvations of Aerosols above CLouds and their intEractionS) campaign is taking place in the SouthEast Atlantic during the Austral Spring for three consecutive years from 2016-2018. The study area encompasses one of the Earth's three semipermanent subtropical Stratocumulus (Sc) cloud decks, and experiences very large aerosol optical depths, mainly biomass burning, originating from Africa. Over time, cloud optical depth (COD), lifetime and cloud microphysics (number concentration, effective radii R_{eff} and precipitation) are expected to be influenced by indirect aerosol effects. These changes play a key role in the energetic balance of the region, and are part of the core investigation objectives of the ORACLES campaign, which acquires measurements of clean and polluted scenes of above cloud aerosols (ACA). Simultaneous retrievals of aerosol and cloud optical properties are being developed (e.g. MODIS, OMI), but still challenging, especially for passive, single viewing angle instruments. By comparison, multiangle polarimetric instruments like RSP (Research Scanning Polarimeter) show promise for detection and quantification of ACA, however, there are no operational retrieval algorithms available yet. Here we describe a new algorithm to retrieve cloud and aerosol optical properties from observations by RSP flown on the ER2 and P3 during the 2016 ORACLES campaign. The algorithm is based on training a NN, and is intended to retrieve aerosol and cloud properties simultaneously. However, the first step was to establish the retrieval scheme for low level Sc cloud optical properties. The NN training was based on simulated RSP total and polarized radiances for a range of COD, R_{eff} , and effective variances, spanning 7 wavelength bands and 152 viewing zenith angles. Random and correlated noise were added to the simulations to achieve a more realistic representation of the signals. Before introducing the input variables to the network, the signals are projected on a principle component plane that retains the maximal signal information but minimizes the noise contribution. We will discuss parameter choices for the network and present preliminary results of cloud retrievals from ORACLES, compared with standard RSP low-level cloud retrieval method that has been validated against in situ observations.