



Examining the NZESM Cloud representation with Self Organizing Maps

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Several different cloud regimes are identified from MODIS satellite data and the representation of these regimes within the New Zealand Earth System Model (NZESM) is examined. For the development of our cloud classification we utilize a neural network algorithm known as self organizing maps (SOMs) on MODIS cloud top pressure - cloud optical thickness joint histograms. To evaluate the representation of the cloud within NZESM, the frequency and geographical distribution of the regimes is compared between the NZESM and satellite data. This approach has the advantage of not only identifying differences, but also potentially giving additional information about the discrepancy such as in which regions or phases of cloud the differences are most prominent.

To allow for a more direct comparison between datasets, the COSP satellite simulation software is applied to NZESM output. COSP works by simulating the observational processes linked to a satellite, within the GCM, so that data can be generated in a way that shares the particular observational bias of specific satellites. By taking the COSP joint histograms and comparing them to our existing classifications we can easily search for discrepancies between the observational data and the simulations without having to be cautious of biases introduced by the satellite. Preliminary results, based on data for 2008, show a significant decrease in overall cloud fraction in the NZESM compared to the MODIS satellite data. To better understand the nature of this discrepancy, the cloud fraction related to different cloud heights and phases were also analysed.