[EE] Evening Poster | A (Atmospheric and Hydrospheric Sciences) | A-AS Atmospheric Sciences, Meteorology & Atmospheric Environment

# [A-AS04]Towards integrated understandings of cloud and precipitation processes

convener:Kentaroh Suzuki(Atmosphere and Ocean Research Institute, University of Tokyo), Yukari Takayabu(Atmosphere and Ocean Research Institute, the University of Tokyo), Hirohiko Masunaga
Tue. May 22, 2018 5:15 PM - 6:30 PM Poster Hall (International Exhibition Hall7, Makuhari Messe)
Clouds and precipitation are among the largest uncertainties in weather predictions and climate projections. To overcome this difficulty, substantial progresses are required in understandings of cloud and precipitation processes and their interactions with large-scale environment. Such progresses, however, have been hampered by historical separation of the science community into two, namely, one for clouds and the other for precipitation, despite the fact that clouds and precipitation are inseparable phenomena.
This session aims to integrate various studies of clouds and precipitation across the two communities over different spatial and temporal scales. A particular focus is placed on better understandings of fundamental processes governing the cloud and precipitation phenomena and their multi-scale interactions with environment through dynamical, thermodynamical and radiative processes. A wide variety of studies with theoretical, modeling and observational approaches are solicited in this session to seek a novel way for combining different methodologies to obtain unified, holistic understandings of the cloud and precipitation systems. The solicited area of research includes but is not limited to cloud microphysics, cloud-radiation interaction, convection dynamics, meso-scale phenomena and various multi-scale interactions including tropical aggregation of clouds, by means of a breadth of approaches encompassing in-situ and satellite observations, theoretical process studies and numerical modeling. Through discussion of presented papers, the session is also intended to enhance collaborations among different disciplines and communities for substantially advancing our understandings of cloud and precipitation processes.

# [AAS04-P07]Cloud properties over Arid and Semi-arid regions and their seasonal and diurnal variability from Meteosat satellites

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Keywords:Clouds, Meteosat, Arid and semi-arid regions

A year-round (2017-2018) cloud properties retrieved from Meteosat Second Generation (MSG) geostationary satellites operated by the European Organisation for the Exploitation of Meteorological Satellites (*EUMETSAT*) will be presented. The relatively high spatial and temporal scanning of these instruments with their distinct spectral channels is capable of providing a continuous survey of cloud properties (cloud type, cloud phase, cloud microphysical properties) over a broad region of the Earth including Europe, Africa, Middle East, North and South Atlantic and Indian Oceans. However, this analysis is restricted to arid and semi-arid regions focusing the United Arab Emirates (UAE) and adjoining regions in support of the UAE Research Program for Rain Enhancement Science (UAEREP). The seasonal and diurnal cycle of cloud properties is determined by the relocated Meteosat-8 to 41.5$^{o}$E for the continuation of the Indian Ocean Data Coverage. Further, an assessment of cloud properties between the Meteosat-8 and Meteosat-10 is also compared in this study to better characterize the uncertainties of

satellite cloud measurements. Nevertheless, the Meteosat-8 has advantages with respect to the biases related to angular view and spatial resolution, relative to other geostationary satellites, over the UAE and adjoining regions.

The seasonal cycle of cloud amount over the UAE and adjoining regions are subjugated by two distinctly different meteorological regimes in winter and summer by the extra-tropical and tropical forcings, respectively. This is clearly reflected in the cloud occurrence where the percentage of high- and mid-level clouds is relatively high during winter than summer due to a strong influence of extra-tropical circulations in the upper troposphere, while the low-level cloud amount is relatively high during the summer. However, the occurrence frequency of clouds is high along the Al Hajr Mountains located in the eastern part of the UAE and the Oman region irrespective of season indicating orography-generated clouds. We also discussed the diurnal variation of the clouds with respect to the liquid water path. The diurnal cycle shows two peaks: one in the morning and other in the late afternoon and post-sunset periods. This indicates a bimodal distribution of occurrence of clouds. Further, the bimodal distribution is independent of the season, implying a strong influence of local factors (sea breeze, winds, topography, solar radiation etc.) for the existence of the bimodality. Finally, we also discuss the microphysical properties of precipitating and non-precipitating clouds over these arid and semi-arid regions.