

GEWEX Working group

PROcess Evaluation Study on Upper Tropospheric Clouds and Convection

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and Graeme Stephens, NASA JPL, USA

Recently GEWEX-initiated working groups on Process Evaluation Studies (PROES) will provide observational based metrics for a better understanding of physical processes.

One of the WCRP Grand Challenges is to determine the role of convection on cloud feedbacks. The GEWEX UTCC PROES working group aims to gain a better understanding of the interconnection between the convection and the heating induced by the outflowing anvils. By widening the focus on the role of all cirrus clouds (link to SPARC), another key question arises: how large are the relative cirrus contributions, in occurrence and in radiative heating, originating from convection and from in situ freezing driven by large-scale forcing?

At present the working group includes about 30 scientists. The first workshop was held on 16 Nov 2015 in Paris. 20 participants presented and discussed feedback hypotheses and the resources to tackle the scientific questions:

- 1) cloud systems and atmospheric environment from observations,
- 2) Lagrangian transport to determine cirrus origin and life cycle,
- 3) process modelling and large-scale parameterizations and
- 4) radiative transfer.

Other informal meetings were held in April 2016 during the IRS conference in New Zealand and in Paris.

For a short overview, see the presentation from the GEWEX Data and Assessment Panel meeting in 2016:

http://www.gewexevents.org/wp-content/uploads/GDAP2016_UTCC_PROES.pdf

GEWEX Upper Tropospheric Clouds & Convection PROcess Evaluation Study meeting

28 – 29 March 2017

City College of New York

Day 1

CUNY Advanced Science Research Center

9 :00 Welcome, Logistics

Johnny Luo

9 :10 GEWEX update, why PROES

Graeme Stephens

9 :30 GEWEX Aerosol Precipitation initiative

Susan van den Heever

9 :45 UTCC PROES update & goals for this meeting

Claudia Stubenrauch & Graeme Stephens

10.00 Convective Updraft Speeds : A Correlate to Climate Sensitivity?

Leo Donner

10:30 discussion + coffee break

Observational analyses (20 minutes each)

11:00 Coupling tropical convection to anvil properties using a cloud system approach

Sofia Protopapadaki, Claudia Stubenrauch (presenter)

11:25 Relationships between convective strength and anvil development based on AIRS-CloudSat

Hanii Takahashi, Sofia Protopapadaki, Claudia Stubenrauch, and Z. Johnny Luo

11:50 Level of neutral buoyancy, Deep convective outflow, convective core and entrainment rates: New insights from 5-years of CloudSat data

Hanii Takahashi, Z. Johnny Luo (presenter) and Graeme Stephens.

12:15 Identifying organized convection in GPM satellite data

Tony Del Genio and Greg Elsaesser

12:45 lunch

Heating of convection and UT clouds (20 minutes each)

14:15 Convective vs anvil heating structures and their impact on the large-scale circulation

Courtney Schumacher

14:40 Re-assessing the Role of Ice Clouds in Earth's Radiation Budget

Tristan L'Ecuyer

15:05 Determining Radiative Heating Rates of UT cloud systems

Claudia Stubenrauch, Sofia Protopapadaki, Artem Feofilov

15:30 Discussion : summarizing observational advances and potential diagnostics for comparison to models

16:00 coffee break

Process studies (20 minutes each)

16:20 Diagnosing Cloud Microphysical Process Information from Remote Sensing Measurements; A Feasibility Study Using Aircraft Data : Tropical Anvils Measured during TC4

Jay Mace and Sally Benson

16:45 Life cycle of ice crystals detrained from deep convection from airborne measurements

Eric Jensen

17:10 Diurnal variations and organization of convective systems over South China Sea during summer monsoon onset, Wei-Ting Chen, Chien-Ming Wu, Wei-Ming Tsai, and Peng-Jen Chen

17:35 discussions

adjourn 18 :00

Day 2 Shepard Hall

Process studies continued (20 minutes each)

9:00 Satellite data analysis of convective and UT cloud variabilities

Hiro Masunaga

9 :25 Water balances of convective systems

Rachel Storer

9 :50 The Characteristics of Deep Convection over Varying SSTs

Susan Van den Heever

10:15 Discussions on potential of process studies

10:35 Coffee break

Parameterizations and model diagnostic studies (20 minutes each)

11:00 Towards representing the impact of convection on cirrus in a large scale climate model

Ulrike Burkhardt

11:25 In situ vs liquid-origin cirrus in ECHAM-HAM GCM

Blaz Gasparini

11:50 Improved diagnostics for UT cloud assessment in the LMDZ climate model

Marine Bonazzola, Sofia Protopapadaki, Claudia Stubenrauch (presenter)

12:15 lunch

14:00 Discussion

bring obs and models together, what and how and next steps :

Preparation of synergetic data to be in a form that could be adopted to start evaluating relations between UT clouds and convection in models.

- outline what we have data wise
- investigate what specific new diagnostics can be used for evaluating modelling at different scales (CRM which resolve convection and GCM which use parameterizations)
- discuss data analysis methods to be investigated to take into atmospheric flow (separate cirrus originating from convection and in-situ) and system evolution

Adjourn 15 :30

Participants

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