

# GEWEX DATA ANALYSIS PANEL Report to WDAC

Presented by Chris Kummerow



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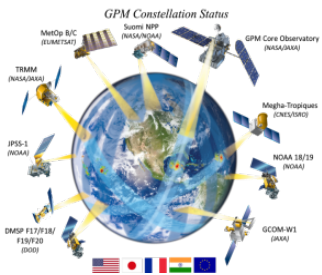
Tristan L'Ecuyer (UW-AOS) [tristan@aos.wisc.edu](mailto:tristan@aos.wisc.edu)

and the panel members

# The GDAP vision

Consistency as a way of life

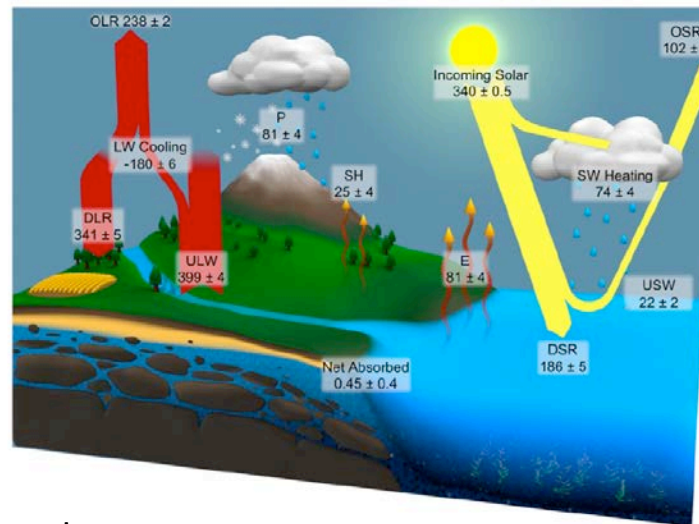
## Precipitation



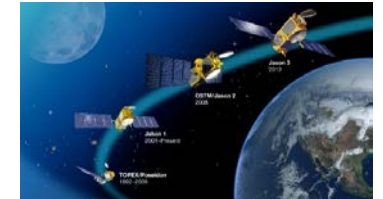
1 NOVEMBER 2015

L'ECUYER ET AL.

8335



## Sea level



## Radiation



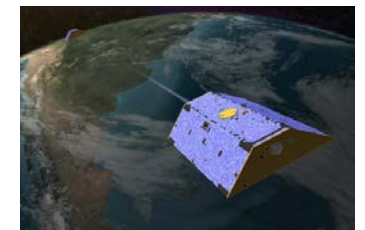
## Surface Flux



## Cloud



## Gravimetry



# Outline

- 1- Outcome of the GDAP annual meeting
  - Continuation of the Rescoping of GDAP
  - The integrated product
  - Status assessments & networks
- 2 – Focus Areas
  - Focus 1: Extreme precipitation
  - Focus 2: EEI
- 3-New initiatives

# GDAP Meeting outcome :general



2.5 days in Nov 2018 in Lisboa  
Hosted by Isabel Trigo, IPMA

Two days : open  
Half a day: panel members only

## **(re) Scoping of the panel activities and identity**

Identity emerges: research panel, observations centric, climate-oriented, consistency-driven, global and worldwide

- More science focused; consequence for the assessments and all new activities
- New format of the meeting in the future: 3.5 days (half a day for the panel affairs)
  - More science invited presentations , including agencies
  - Report from the related PROES
  - Era of sponsored production likely over
- Positioning with other bodies OK, like WMO/CGMS working group (cloud, surface, precip,..), WDAC, TIRA
- GCOS (cf last teleconf)

# GDAP Meeting outcome: the integrated product (1/2)

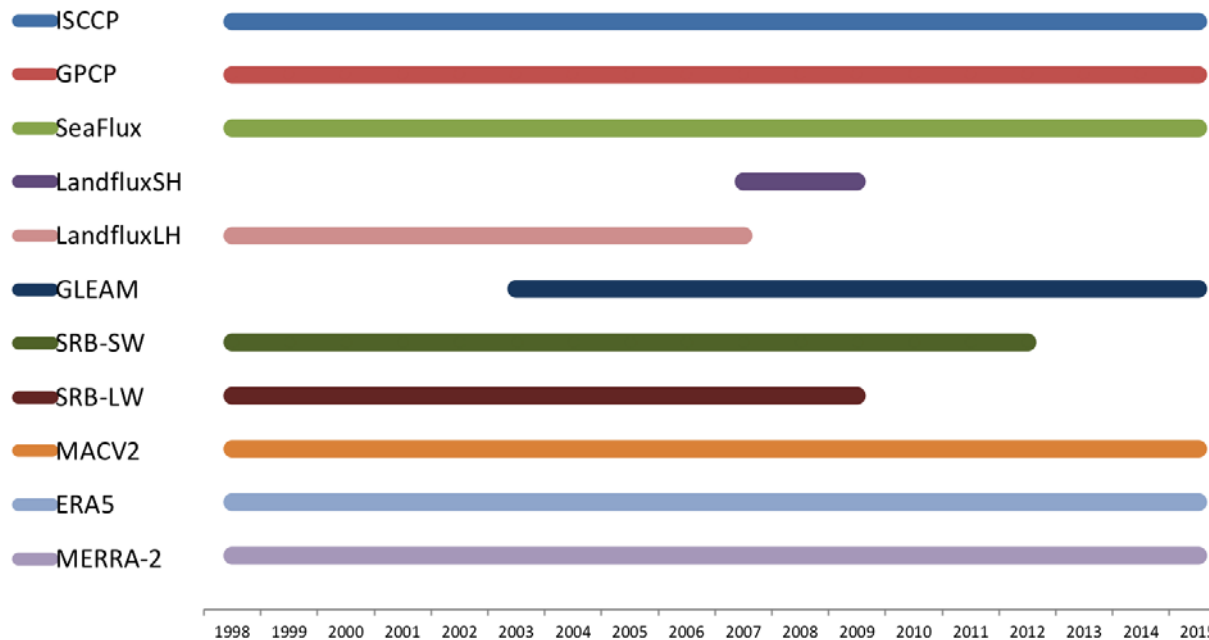
Long time project

Lead by C. Kummerow & P Brown from CSU

With inputs from NCEI, P Stackhouse, S. Kinne, B Alder, etc...

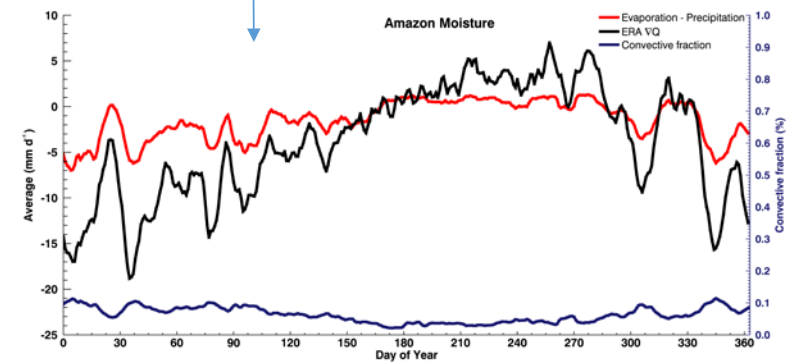
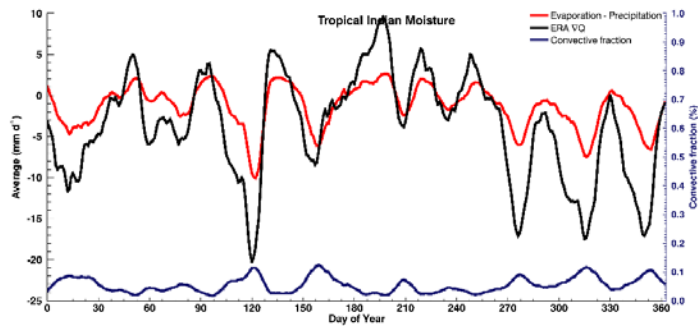
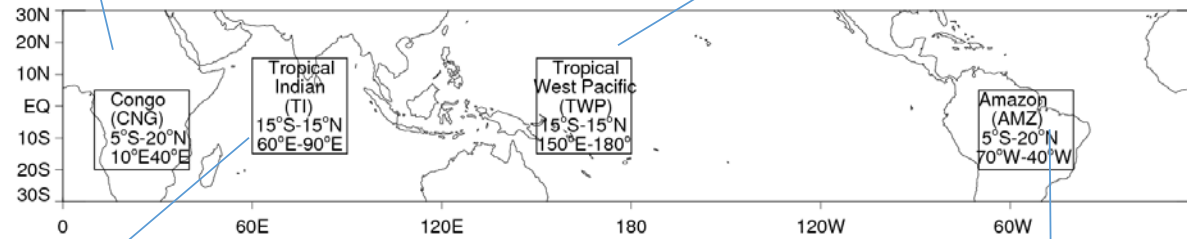
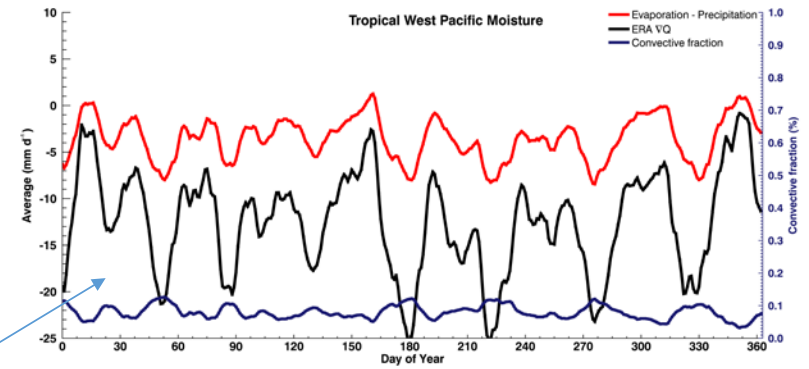
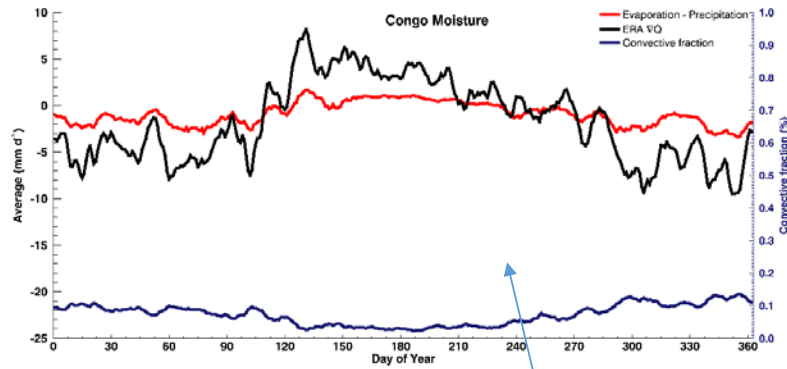
Yet a dataset with multiple sources that do provide a global water and energy « observational » perspective at the 1°x1° 3 hourly resolution over 15 years +

[ftp://rain.atmos.colostate.edu/pub/pbrown/GEWEX\\_IP\\_2019](ftp://rain.atmos.colostate.edu/pub/pbrown/GEWEX_IP_2019).



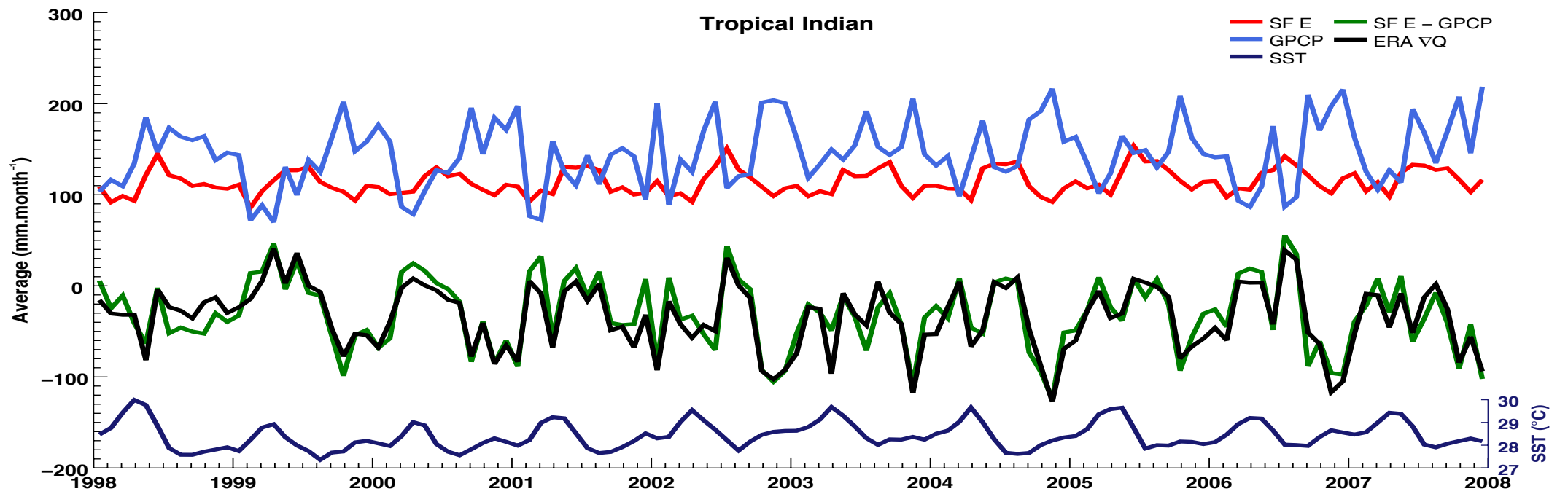
Production on going  
12 Years available so far  
1998-2010

# GDAP Meeting outcome: the integrated product (2/2) 2002

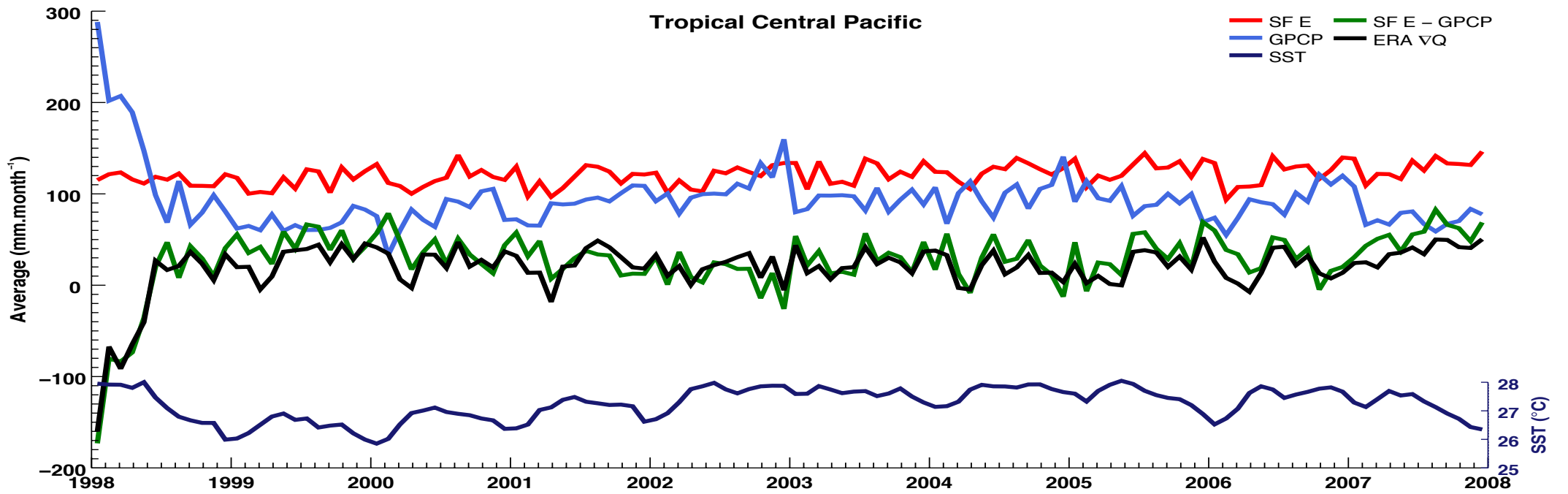


Courtesy P. Brown, CSU

# E, P and Div(Q) for Tropical Indian Ocean

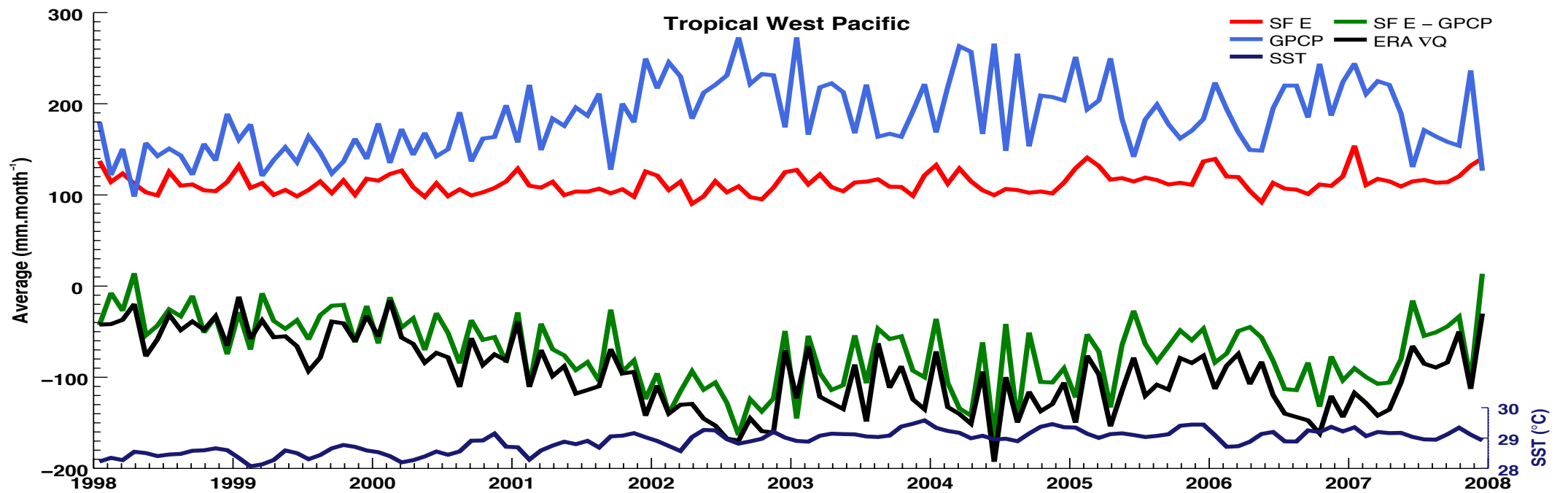


# E, P and Div(Q) for Tropical Central Pacific





# E, P and Div(Q) for Tropical West Pacific



# GDAP Meeting summary : scope of assessment

- New paradigm for assessment:
  - Assessments are meant to address science questions, particularly those related to climate.
  - They should be driven by underlying science questions **not just assessments for the sake of comparing data products**.
- A **focus on process** (for all assessments) aligns particularly well with new WCRP foci and GEWEX activities
- Should discuss **cross-cutting assessment activities** that address PROES
  - An example could concern connecting the trend in deep convective clouds (IR TB < 195 K) to the trend in area of high water vapor concentration
  - Such multi-parameter assessments better connect to processes and build upon existing assessments without being repetitive
- Assessments should **inform users, provide feedback to data producers, and provide guidance/make informed recommendations for future missions**
- Assessments must also **understand the cause of uncertainties** – goal is to be able to predict uncertainties in regions where you don't have in situ observations
- Ease** the access to the data (cloud, water vapor and precip)

# GDAP Meeting outcome: assessments

## Status of the assessments

### Aerosols **CANCELED**

No response from the leads; more than 10 years old; obsolete

### Clouds (lead: C. Stubenrauch) **ENDED**

Update to the database+ short paper to describe the updates

Next assessment in a few years

### Water vapor (Lead: M. Schroder) **RENEWED**

Phase 1 report and papers published

Phase 2 has been approved and is on going

### Precipitation (Lead: H Masunaga) **MERGED** with IPWG assessment

Good progress; publications in the pipe; participation to the July event on extremes

## New agreed assessments

Soil moisture (lead: W. Dorigo ) -> detail to be implemented in lines with the new paradigm

Aerosols (lead to be identified if we keep it) -> support to ACCP effort

EEI (leads B Meyssignac and T Boyer) already funded thanks to WCRP (15kE) **overseen by S. Kato**

# GDAP Meeting summary: surface networks

## BSRN (radiation)

New director **Christian LANCONELLI**

Looking for a Deputy director

15th BSRN Scientific Review Workshop

16-20 July 2018, Boulder, Colorado, USA

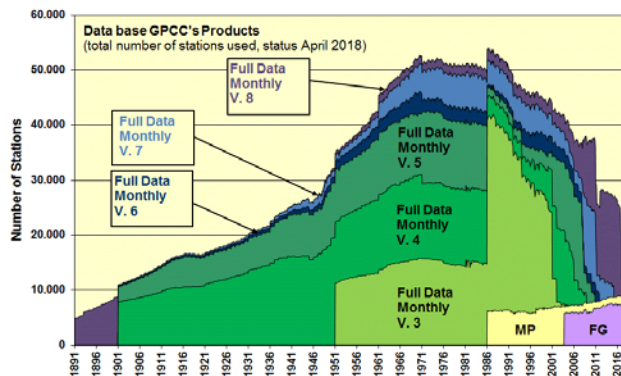
<http://www.gewex.org/resources/gewex-news/>

[https://www.wcrp-climate.org/WCRP\\_Reports/2018/WCRP\\_Report\\_20\\_2018\\_15th\\_BSRN\\_Meeting\\_Report.pdf](https://www.wcrp-climate.org/WCRP_Reports/2018/WCRP_Report_20_2018_15th_BSRN_Meeting_Report.pdf)

**76 scientists, station managers, and data users from 24 countries representing 49 different organizations presented 37 talks and 31 posters!**



## GPCC (Precipitation) New product: involved in the assessment



## IWSM (Soil Moisture)

involved in the design of the land flux new activity

## ARM (everything)

involved in the design of the land flux new activity



# GDAP Meeting summary :the ISSCP Next Gen

- Cloud properties constitute a core geophysical climate record
- Instruments and expertise exist to generate a calibrated, global, 10-channel, multi-parameter cloud at 3 km with 30 minute coverage
  - Heritage to deal with such data volumes also exists (e.g. AIRS and MODIS)
- Excellent opportunity for coordinated NASA and NOAA activity to maximize scientific benefits of new geostationary and low-earth orbiting satellites
- GDAP endorses the formation of a team to develop a unified analysis approach built around the current geostationary radiance data record augmented by MODIS/VIIRS and sounder cloud information
  - Agency support for a series of international workshops
  - Target 2021 for initial implementation
- A multi-institutional (multi-national) processing chain similar to ISCCP is encouraged
  - Individual satellite operators, collect, quality control, and sub-sample radiances and provide these data to an analysis center that would conduct a refined calibration and the quantitative cloud analysis.
  - Data products to be archived and distributed by existing data centers.

**Andy Heidenger is in charge of setting up a small scoping workshop**

**Late August 2019 at EUMETSAT**

**Support from NASA via Graeme & GEWEX (?)**

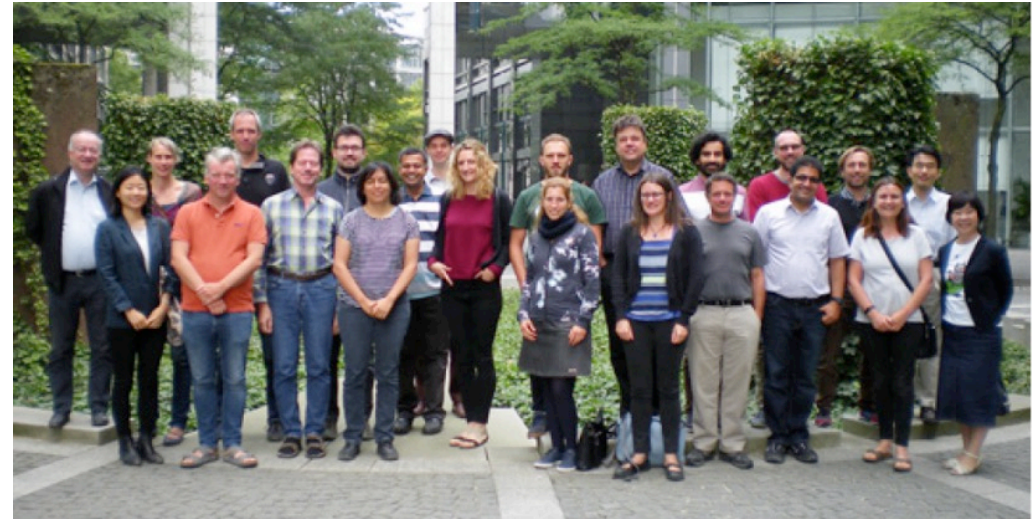
**Workshop announcement almost finished soon to be sent out**

# Joint GC Extremes and GDAP meeting (1/3)

WCRP Workshop with Lisa Alexander and Sonia Senevirante  
GDAP/IP WG and GC Extremes  
Hosted by CMSAF/DWD in Offenbach in July 2018

The workshop objectives were to:

- Identify the form of a new International Precipitation Working Group (IPWG)/GEWEX Precipitation assessment chapter on extreme precipitation, including the selection of chapter leads and other contributors
- Finalize a best practice guidance document for the WCRP Extremes GC on data use for assessing precipitation extremes, including the consideration of satellite-based measurements
- Integrate the efforts of the remote sensing community in the literature on precipitation extremes that will be assessed for the Intergovernmental Panel on Climate Change (IPCC) Sixth Assessment Report (AR6)



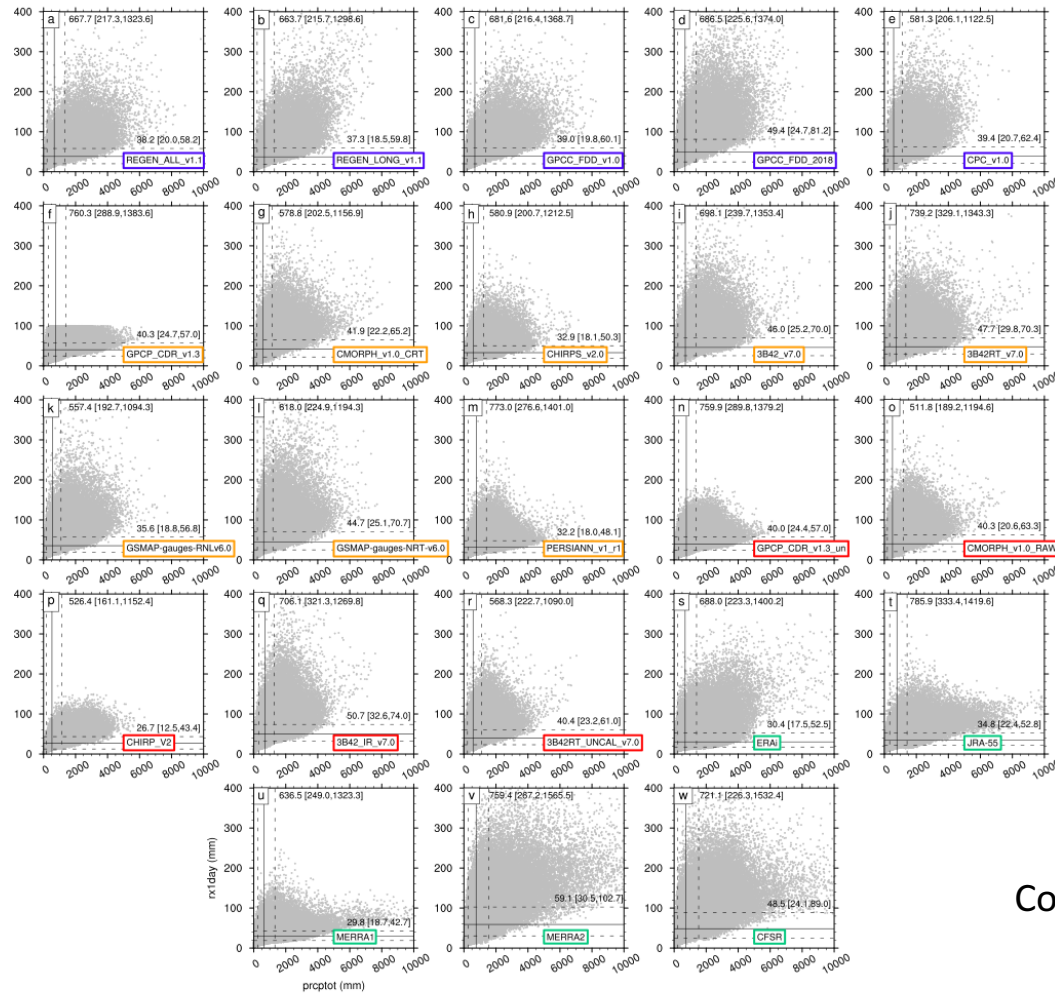
*Participants of the Precipitation Extremes Workshop*

<https://www.gewex.org/gewex-content/uploads/2018/08/Aug2018.pdf>

**A database with more than 20 gridded precipitation products**  
**A new chapter of the IPWG/GEWEX Precip Assessment**  
**A Special Issue ~12 papers**  
**Many feedbacks to data developpers**



# Joint GC Extremes and GDAP meeting (2/3)



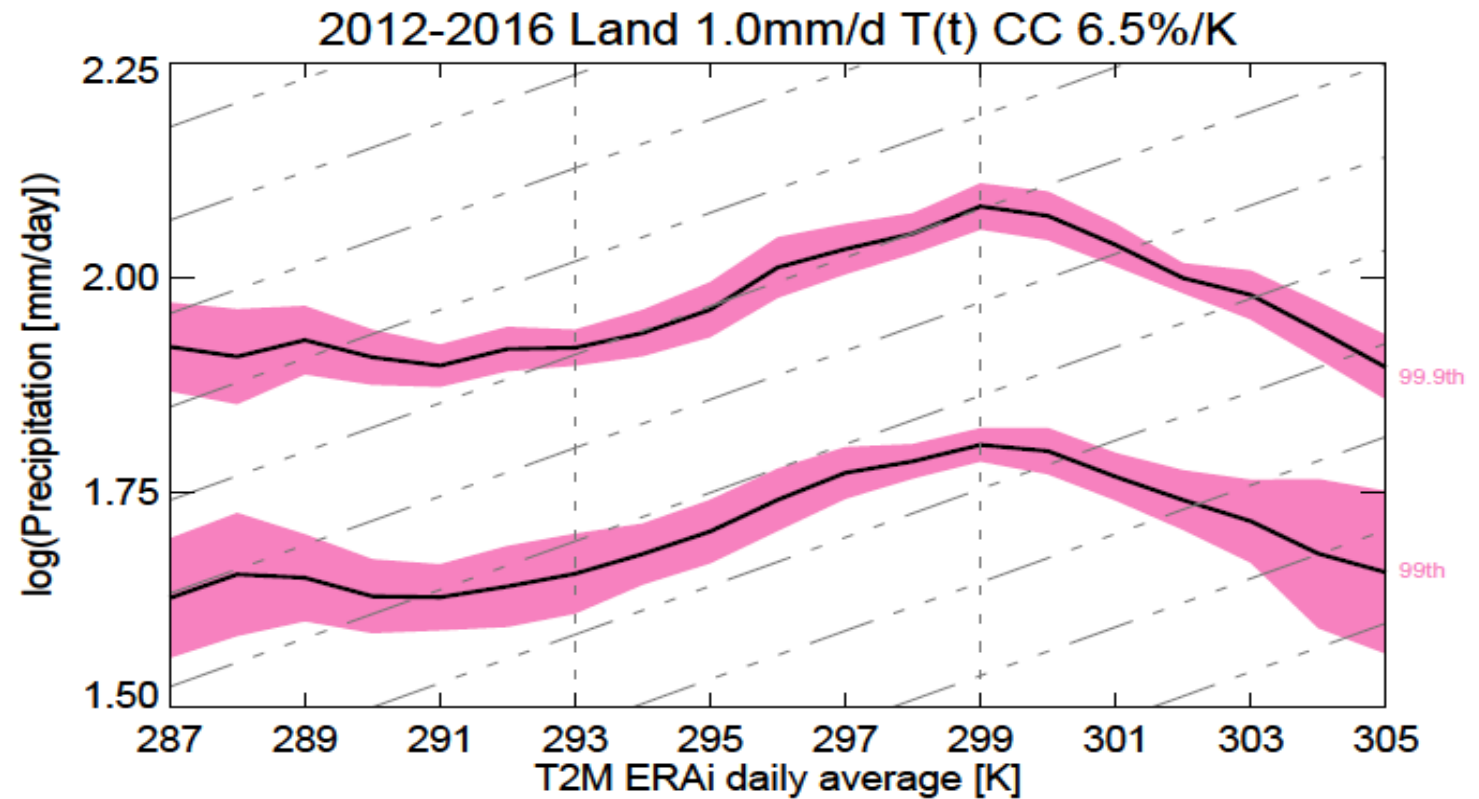
Quasi global (55S-55n)  
1°x1 / 1 day datasets  
2001-2013

Rx1day (annual maximum at each grid point)  
as a function  
Of the total annual amount (at the grid point)

Courtesy: Margot Bador, ARC Extreme, UNSW

# Joint GC Extremes and GDAP meeting (2/3)

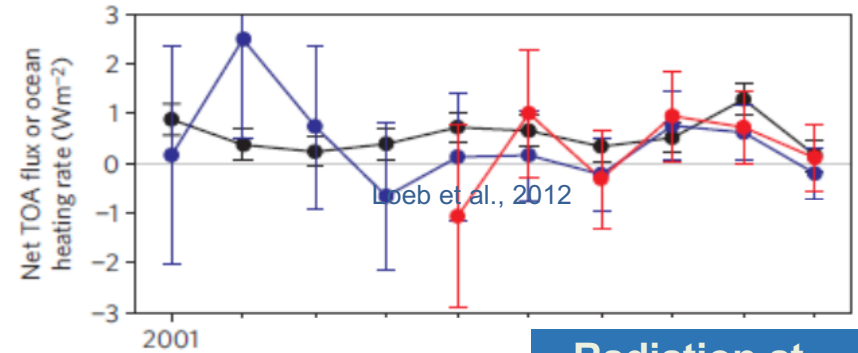
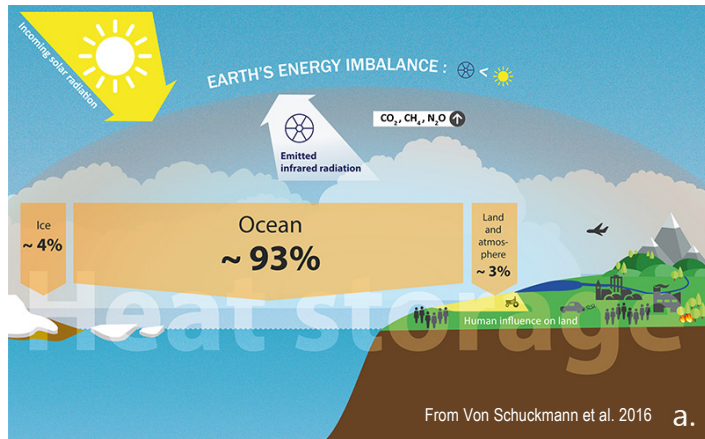
~6-7%/K



Ensemble of satellite precipitation data using the microwave constellation shows strong consistency with surf Temp confirms the theory for the tropics

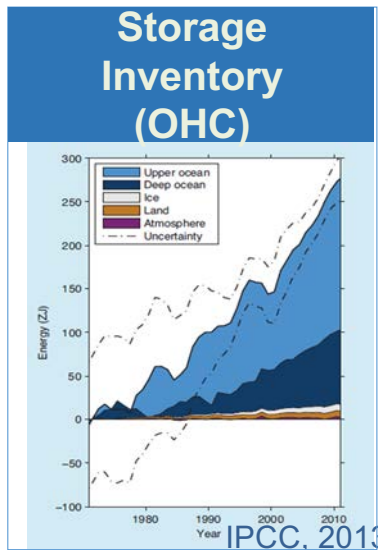


# WCRP/CLIVAR/GEWEX "EEI and its Implications" (1/3)

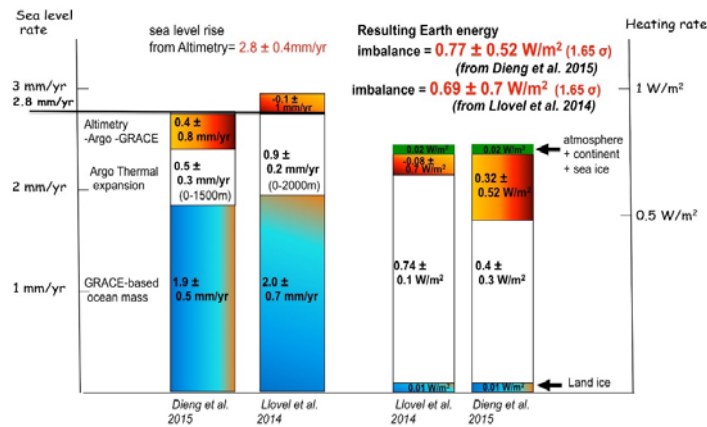


Radiation at TOA

Sea level budget



Sea level budget and Earth Energy imbalance : 2005-2013



# WCRP/CLIVAR/GEWEX “EEI and its Implications” (2/3)

- **Seiji Kato** NASA Langley Research Center Contributions from Fred G. Rose, Norman G. Loeb, and John T. Fasullo

## Satellite derived global annual mean energy fluxes

Flux <sup>1</sup>	Global mean (Wm <sup>-2</sup> )	Source
Surface net shortwave	164	Ed4 EBAF
Surface net longwave	-54	Ed4 EBAF
Latent heat fluxes = Precipitation	-78	GPCP version 2.3
Sensible heat	-23	SeaFlux, Princeton ET
Sum	9	
Ocean heating rate	Less than 1	0.68 Wm <sup>-2</sup> + 0.03 Wm <sup>-2</sup> (ice warming and melt + etc.)
Energy flux associated with mass (water) transfer	Less than 1	0.8 Wm <sup>-2</sup> over ocean

# WCRP/CLIVAR/GEWEX “EEI and its Implications” (3/3)

R.Roca, K. Von Schuckmann + Help from T. L’Ecuyer, b. Meyssignac

Proposed by Rémy at GDAP 2017, Boulder

## Goals and objectives of the workshop

The main objective of the workshop was to initiate a new WCRP-wide activity and to thus strengthen and extend the community on the Earth’s energy imbalance through a community wide discussion on links across all the WCRP Core Projects and relevant activities. The main goal was to identify research opportunities focused on the Earth’s energy imbalance, and synthesize the various aspects across WCRP, through:

The workshop took place over 3.5 days as an open event for all experts of related field on the Earth energy imbalance. A number of 75 experts have participated. The program had been organized under four sessions, which build on oral presentations (solicited & abstract submissions), posters and half-day working group activities under specified working topics to achieve the workshop goals. Those working groups had been animated by solicited working group chairs (Appendix. I).

**Day 1 EEI: in-situ cannot provide interannual var; need for standards**

**Day 2: OH transport: links unclear to EEI issue**

**Day 3: Climate models and Ice: far from the data world and energy budget**

Just submitted to WCRP



Final report on the WCRP workshop  
“The Earth’s Energy Imbalance and its implications”  
13 – 16 November 2018, Toulouse, France

Sponsors:



**Good participation of the GEWEX Scientists**  
**A lot of discussions : weak consensus**  
**Problem with IPCC positioning**  
**A special collection in J Climate is in the preparation**

**One consensual and validated outcome**  
**EEI assessment in GDAP (Meyssignac and Boyer)**

# GDAP Meeting summary :the land flux spin up activity

## “Towards consistency of land surface - atmosphere interactions from global Earth observations”

"The workshop seeks to better understand the benefits and limitations of the newly released GEWEX Global, 1 degree, 3-hourly Integrated Water and Energy products for use in understanding land surface - atmosphere interactions. The workshop will focus on both land surface properties and radiation measurements and their consistency with reported turbulent fluxes, as well as the turbulent fluxes, and their consistency with boundary layer structure and convective cloud structures. Talks are invited that report on this consistency both from the global satellite perspective, as well as existing ground based measurement sites such as ARM that can shed additional light on critical processes that at a local scale that the satellite should capture in order to help guide numerical model formulation and validation”



**Location: Toledo, Spain**

**Dates: Fall 2019. Exact dates TBD**

**Organisation team: C. Kummerow, I. Trigo, W. Dorigo, T. L'Ecuyer & J. Mather**