

7th Pacific Panel meeting, 29 April – 01 May 2012
– Noumea, New Caledonia.



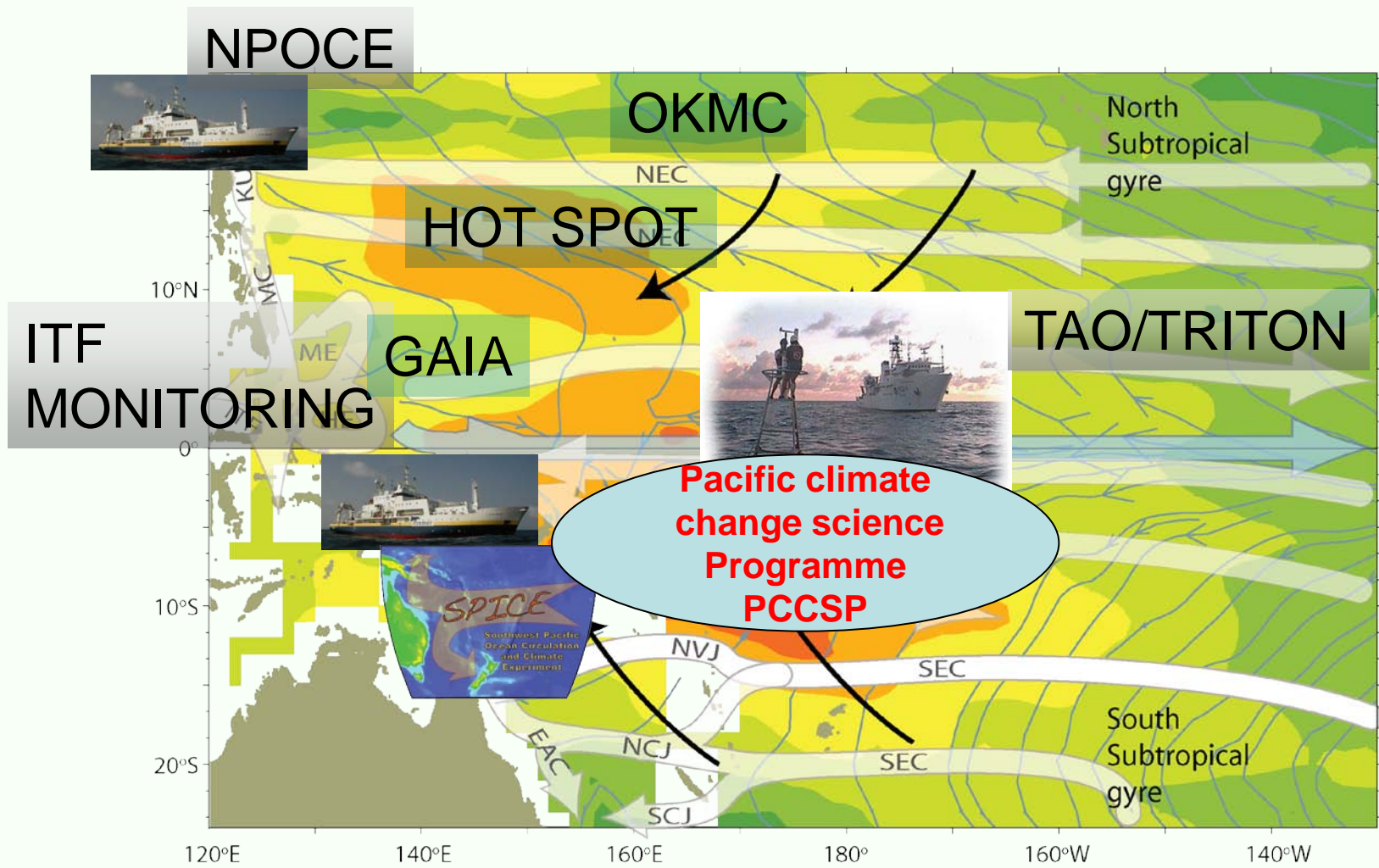
Wenju Cai








10 IC SHMO





-  Surface current (upper 100m)
-  Equatorial Undercurrent (50m-200m)
-  Surface velocity (upper 10m)
-  Trade winds

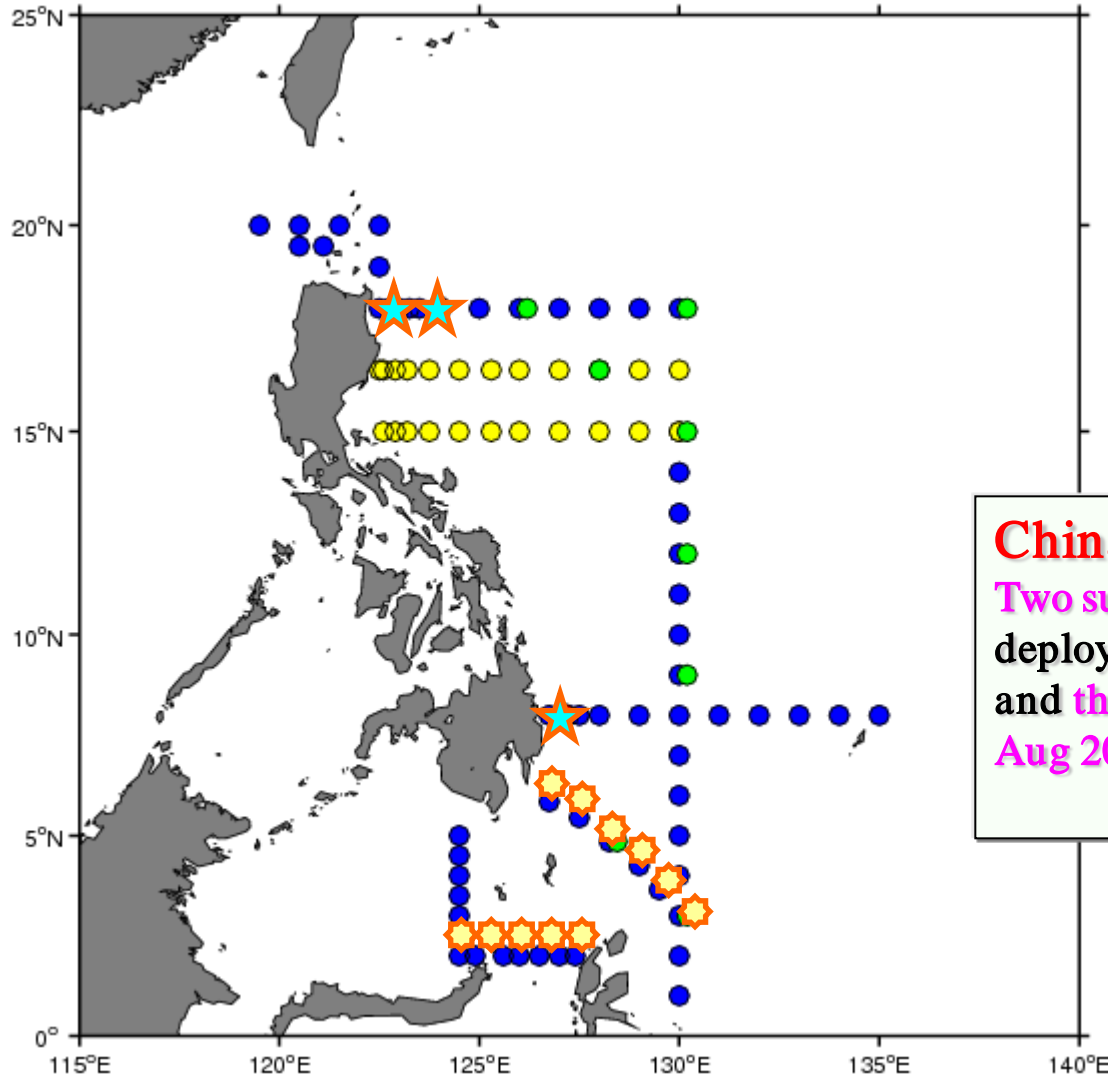


Welcome to new panel members: Ken Ando, Sang-Wook Yeh, Phil Willes

-
- **Session 1: Western boundary current: dynamics and impacts**
- 09:00 hrs - **NPOCE: progress and science highlights (Dunxin Hu)**
- 09:20 hrs - **SPICE: progress and science highlights (Alex Ganachaud)**
- 09:40 hrs - **TOCS (tropical ocean climate study) western boundary measurements (Ken Ando, JAMSTEC)**
- 10:00 hrs - **PANDORA: a multidisciplinary cruise in the Solomon Sea (Sophie Cravatte)**
- 10:20 hrs - **OKMC: progress and science highlights (Bo Qiu)**
- 11:00 hrs - **Glider observations (Billy Kessler)**
- 11:20 hrs - **Enhanced warming along WBSs (Lixin Wu)**
- 11:40 hrs - **Multi-Scale Air-Sea Interaction under the East-Asian Monsoon: A "Hot Spot" (Shoshiro Minobe)**
- 12:00 hrs - **Discussion: The role of the Pacific Panel in coordination of WBC activities**
-
- 12:30 hrs - **Lunch**



Chinese cruises (Nov. 2010-Aug. 2011) since NPOCE inauguration



- Mooring
- CTD & Bottles
- CTD & LADCP
- Argo Floats
- GPS Floats

China
Two sub. moorings (6100, and 3400m)
deployed Nov. 2010, retrieved July 2011
and three more deployed to be retrieved
Aug 2012; CTD, Argo, drifters, etc.



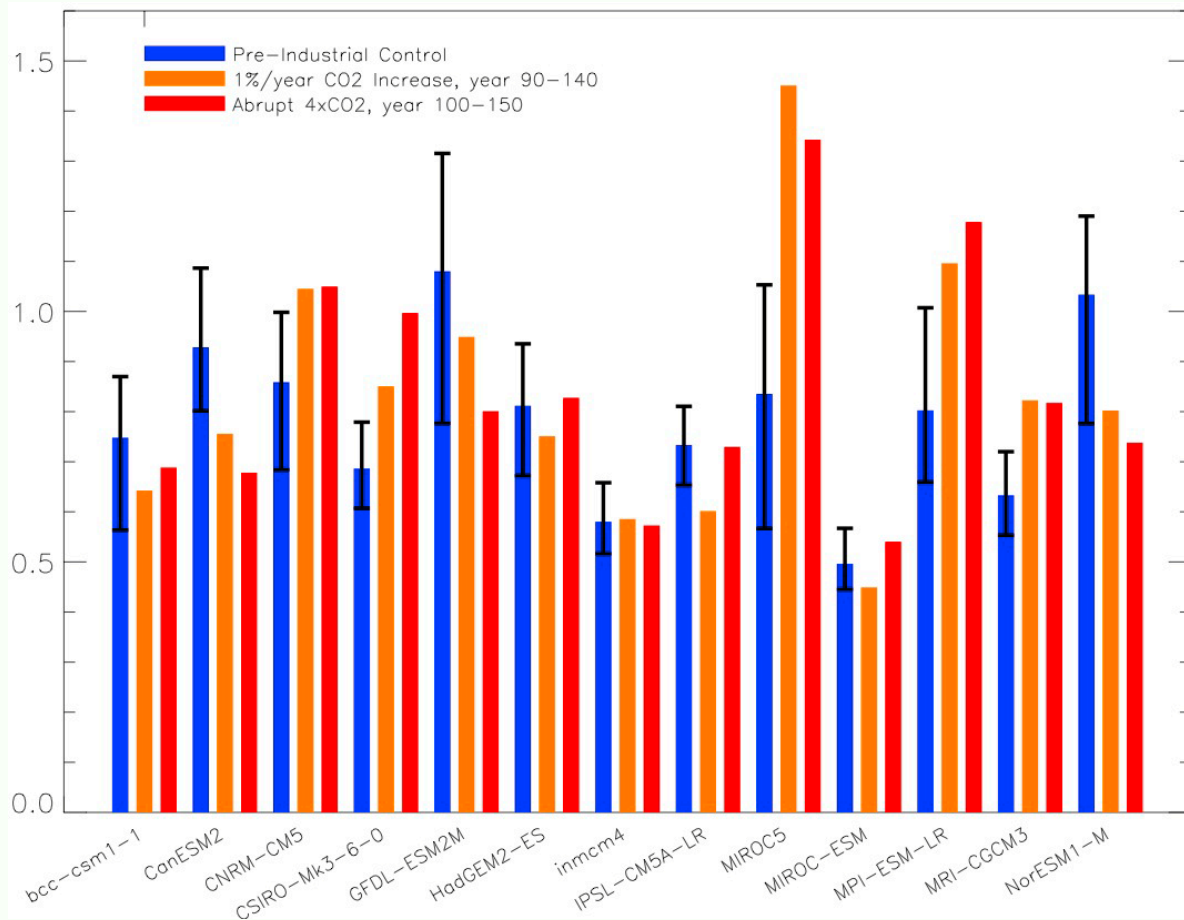
• **Session 2: Inter-basin linkages**

- 13:30 hrs - The ITF task team, outcomes of the first meeting (Janet Sprintall)
- 13:50 hrs - The ITF Gateway Program and GAIA (Jae Hak Lee)
- 14:10 hrs - AAMP activities (Matthieu Lengaigne)
- 14:30 hrs - [Collaboration between the IOC/WESTPAC and PP \(Wenxi Zhu\)](#)
- 14:50 hrs - Discussion: East Pacific research, where to start? (All)
- 15:10 hrs - Discussion: The role of PP in coordination of Inter-basin activities (All)

• **Session 3: ENSO**

- 15:50 hrs - TAO/TRITON ENSO observing system update (Ken Ando)
- 16:10 hrs - Recent ENSO research activities (Sang-Wook Yeh)
- 16:30 hrs - [ENSO in CMIP5](#) (Wenju Cai for Eric Guilyardi)
- 16:50 hrs - ENSO task team (all)
- 17:10 hrs - El Niño influence on tropical wave climate: Present and Future (Matthieu Lengaigne)
- 17:30 hrs - Report from MJO, WWB, and ENSO analyses (Yukari Takayabu)

The future of ENSO



From Eric Gualyardi

As in **CMIP3**, **CMIP5** CGCMs exhibit a range of behaviour for ENSO variability in the future simulations, some showing an increase, others a decrease and some no change (Collins et al. 2010, Vecchi and Wittenberg 2010).



- **Session 4: South Pacific climate circulation, change, and projection**
- 09:00 hrs - [Highlight from PCCSP](#) (Scott Power)
- 09:20 hrs - Climate projections in the South Pacific (Alex Sen Gupta)
- 09:40 hrs - French research Activities in the South Pacific (Christophe Menkes)
- 10:00 hrs - Regional ocean circulation around New Caledonia: AltiGlideX experiment - Frederic Marin
- 10:20 hrs - An update on the advancement of the project SPOT, South Pacific Ocean Time-series (Jerome Aucan)
- 11:00 hrs - South Pacific Research issues - Phil Willes
- 11:20 hrs - Cumulus convection and double ITCZ in CMIP3 and CMIP5 (Yukari Takayabu)
- 11:40 hrs - [Tropical cyclones in the Southwest Pacific](#) (Howard Diamond)
- 12:00 hrs - Discussion: The role of PP in coordination of activities in the South Pacific

TC Storm Intensities

Period	Total # of TCs	Total # of Major TCs	Total # of Category 5 TCs
1970-1990	298 (56%)	83 (27.9% of total)	3 (15%)
1991-2010	234 (44%)	86 (36.8% of total)	17 (85%)

The increased proportion of major TCs over the past 20 years is statistically significant with a t-test score of $p > .005$ (19 degrees of freedom)

Australian TC Intensity Scale <http://www.bom.gov.au/cyclone/about/intensity.shtml>

TC Category	Wind Speeds (knots)
Tropical Depression	< 34
Category 1	34-47
Category 2	48-63
Category 3*	64-84
Category 4*	85-106
Category 5*	> 106
* Considered Major	-

- **Session 5: Interaction with green programmes**

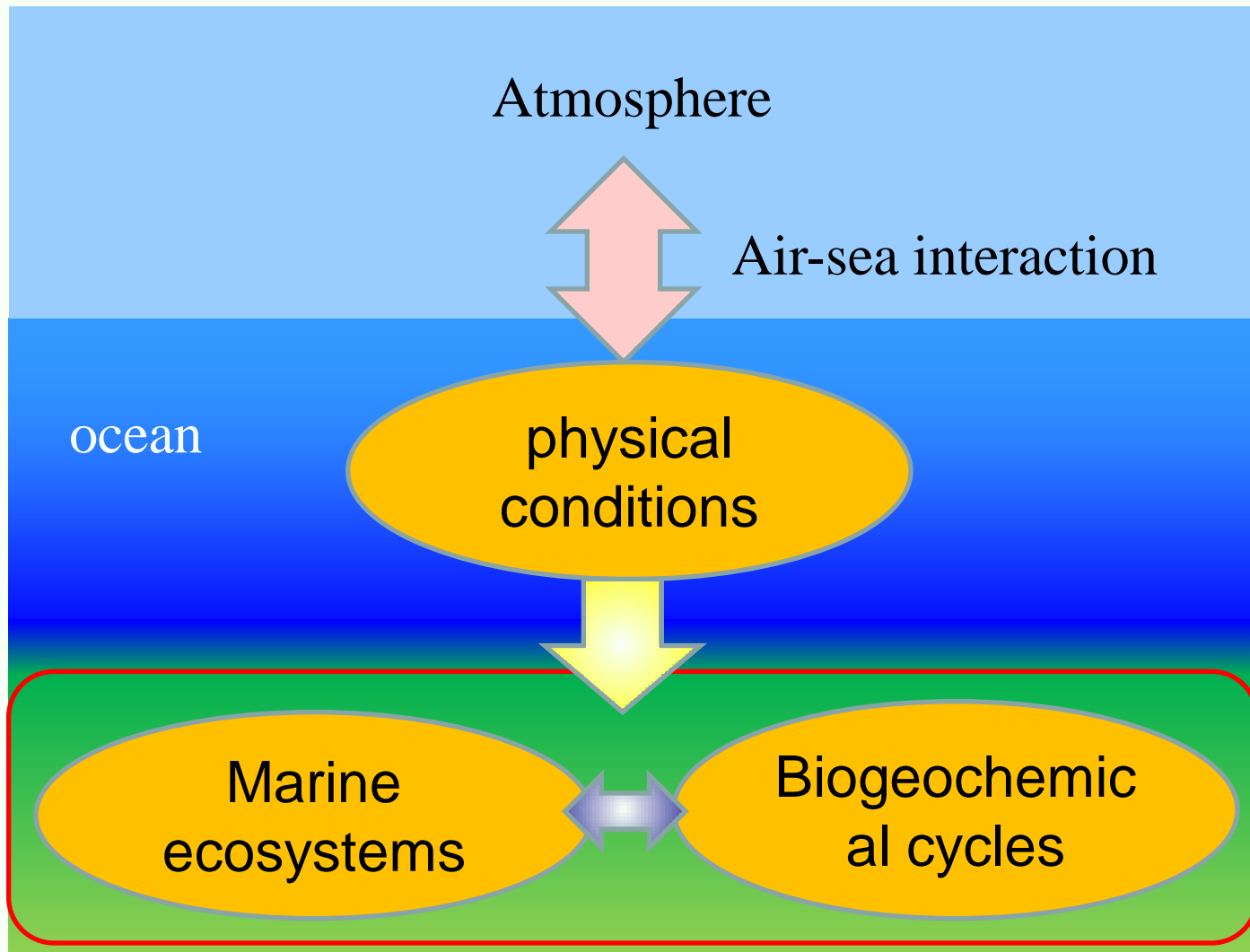
- 13:30 hrs - An introduction to IMBER and PICES – Hiroaki Saito
- 13:50 hrs - [A proposal for future collaboration between CLIVAR and PICES from a PICES WG \(Shoshiro Minobe\)](#)
- 14:10 hrs - Western North Pacific Integrated Physical-Biogeochemical Ocean Observation Experiment (INBOX) (Toshio Suga)
- 14:30 hrs - Discussion – Development of collaborative projects between PP/PICES/IMBER
-
- 15:00 hrs - Coffee break
-

- **Session 6: Panel business**

- Review papers
- Action items
- 17:00 hrs - Meeting closes



Two directions of importance of physical ocean



Important oceanic physical processes

For the on-going changes of **green ocean**, a number of physical processes are important:

- ocean vertical and horizontal **mixing** associated with the mixed layer
- horizontal and vertical **advection** due to **sub-mesoscale** and **meso-scale** phenomena
- the transports of **jets, striations and currents**
- **water mass formation and ventilation**
- **air-sea interaction** over SST fronts and eddies

Pacific Panel

Major activities since our last meeting

- Indonesian Throughflow Task Team (jointly with IOP) meeting, March 2012, Indonesia
- 7th Pacific Panel meeting, 29 April – 01 May 2012 – Noumea, New Caledonia.
- Strengthen links and develop activities with PICES and other “green” programmes
- ENSO in CMIP5
- Coordination of NPOCE, GAIA, ITF, OKMC, SPICE and PCCSP (PACCSAP), plus “MIXET” Gateway, hotspot



Pacific panel
Science Highlights

- **ENSO and climate change (two papers)**
- WBCs' response to global warming (Wu et al. 2012, Nature Climate Change, published)
- The South Pacific Convergence Zone under greenhouse warming (Cai et al, 2012, Nature)

- ENSO diversity : Different flavors of El Nino

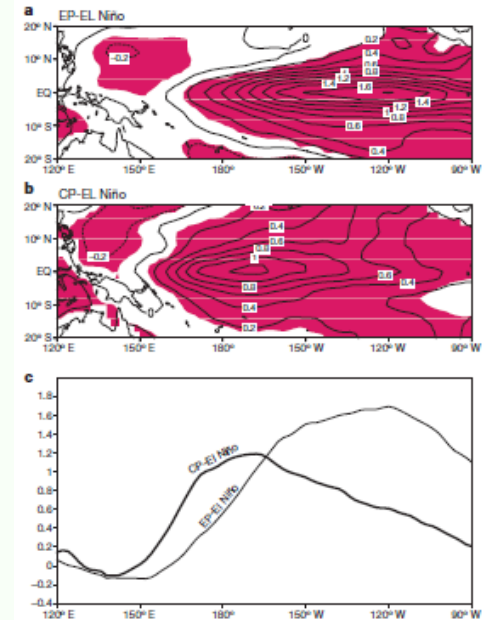
Vol 461 | 24 September 2009 | doi:10.1038/nature08316

nature

LETTERS

El Niño in a changing climate

Sang-Wook Yeh¹, Jong-Seong Kug¹, Boris Dewitte², Min-Ho Kwon³, Ben P. Kirtman⁴ & Fei-Fei Jin³



- Changes in ENSO properties under the global warming

nature
geoscience

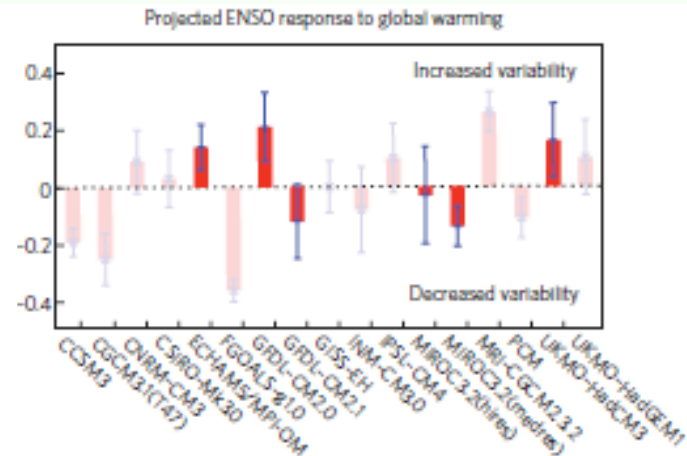
REVIEW ARTICLE

PUBLISHED ONLINE: XX JUNE 2010 | DOI: 10.1038/NGE0868

The impact of global warming on the tropical Pacific Ocean and El Niño

Prepared on behalf of the CLIVAR Pacific Panel

Mat Collins^{1*}, Soon-Il An², Wenju Cai³, Alexandre Ganachaud⁴, Eric Gullyard⁵, Fei-Fei Jin⁶, Markus Jochum⁷, Matthieu Lengaigne⁸, Scott Power⁹, Axel Timmermann¹⁰, Gabe Vecchi¹¹ and Andrew Wittenberg¹²



Pacific panel

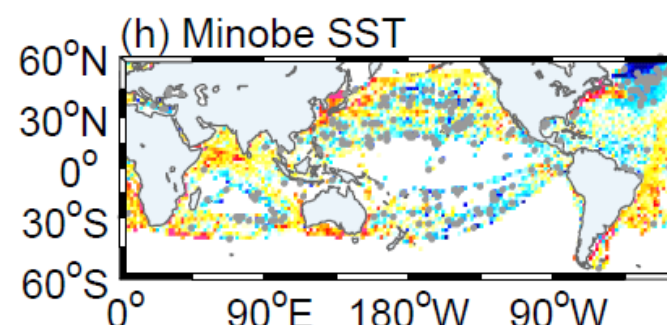
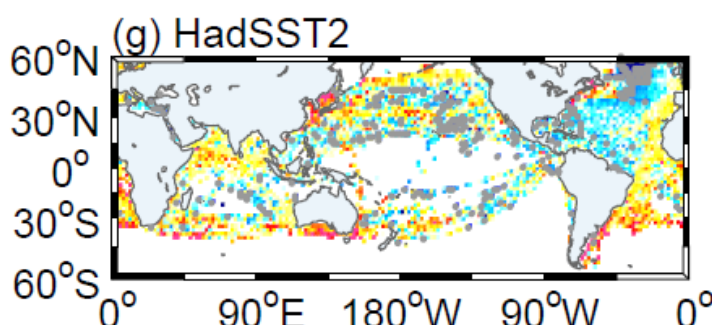
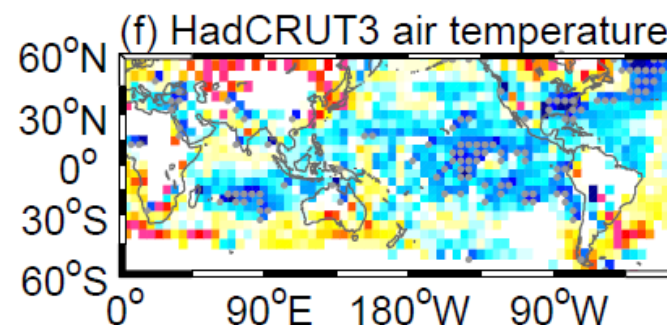
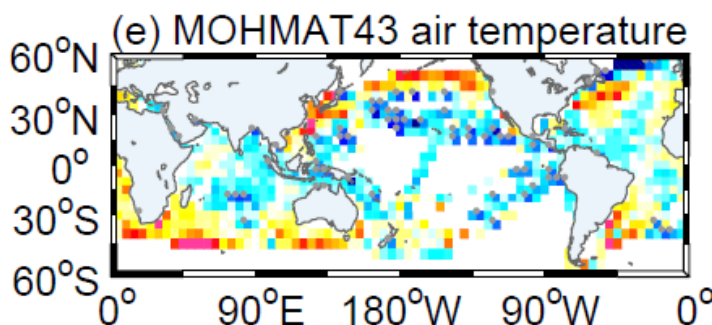
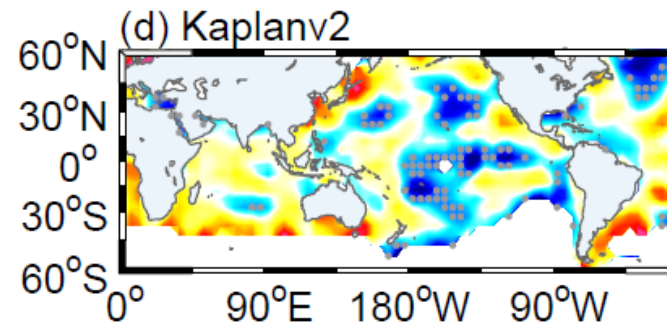
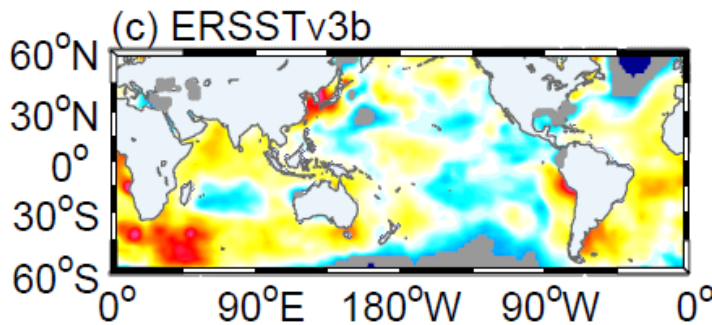
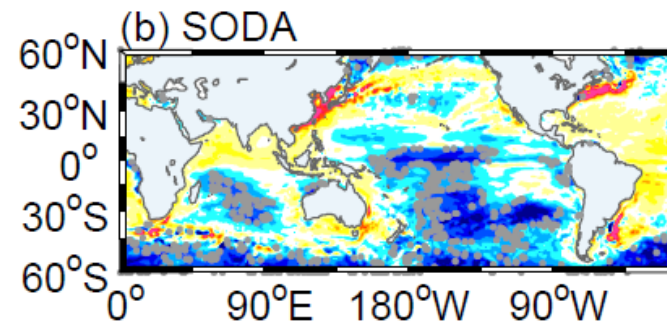
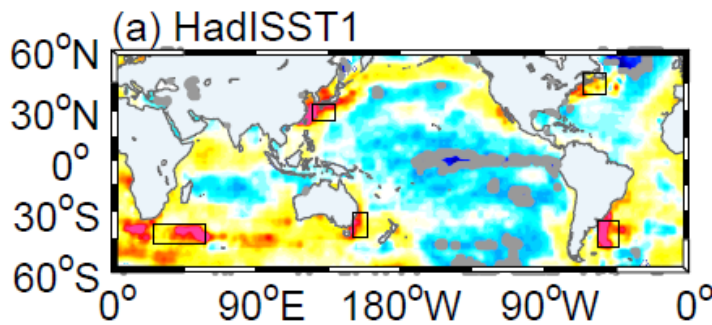
Science Highlights

- ENSO and climate change (two papers)
- **WBCs' response to global warming (Wu et al. 2012, Nature Climate Change, published)**
- The South Pacific Convergence Zone under greenhouse warming (Cai et al, 2012, revised)

Enhanced w western bou

Lixin Wu^{1*}, Wenju Cai²,
Michael J. McPhaden^{6, 1}
and Benjamin Giese⁹

- 1 Physical Oceanography
- 2 CSIRO Marine and
- 3 Department of Earth
- 4 International Pacific
- 5 Physical Oceanography
- 6 NOAA/Pacific Marine
- 7 NOAA/Earth System
- 8 Leibniz-Institut für
- 9 Department of Ocea.



Pacific panel Science Highlights

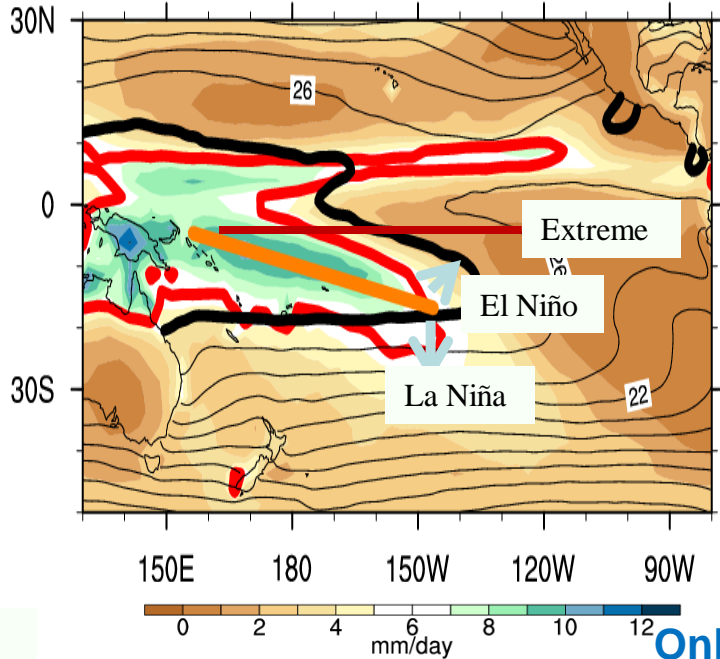
- ENSO and climate change (two papers)
- WBCs' response to global warming (Wu et al. 2012, Nature Climate Change, published)
- **The South Pacific Convergence Zone under greenhouse warming (Cai et al, 2012, revised)**



More extreme swings of the South Pacific Convergence Zone due to Greenhouse Warming

W. Cai, M. Lengaigne, S. Borlace, M. Collins, M. McPhaden, A. Timmermann, S. Power, J. Brown, C. Menkes, A. Ngari, E. Vincent, M. Widlansky

a GPCP 1979-2008

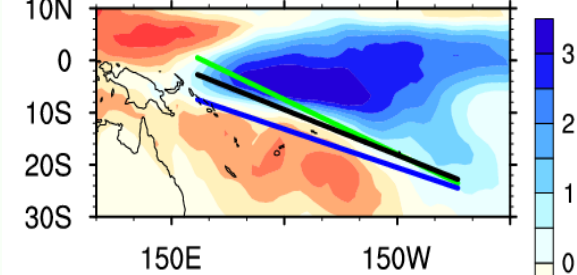


The nonlinearity can be represented by two EOFs

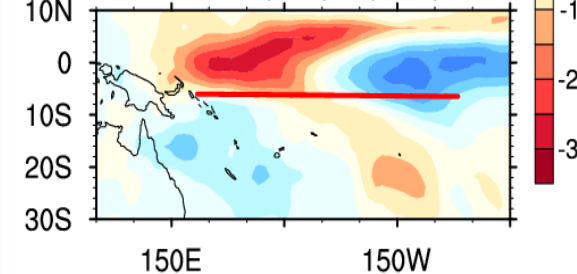
When the associated time series are both large and positive, the position of the SPCZ is zonal.

How will such zonal SPCZ events respond to climate change?

a GPCP first principal spatial pattern

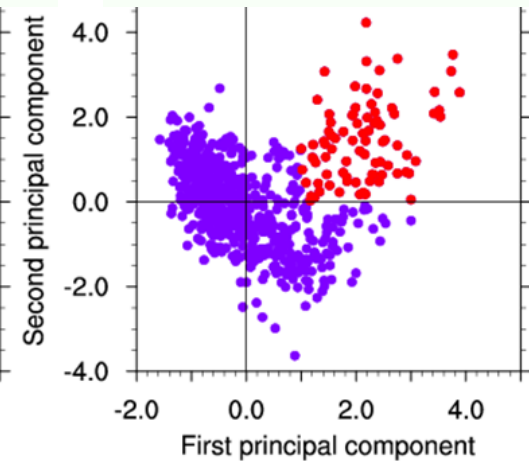
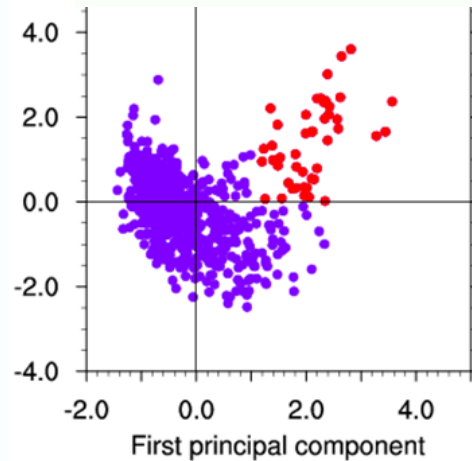
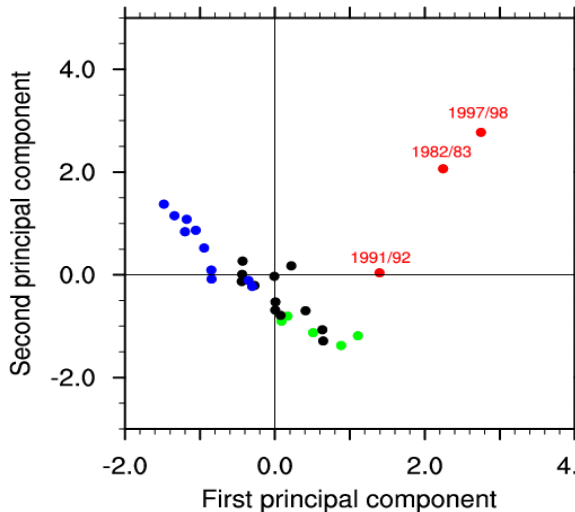


b GPCP second principal spatial pattern



Only eight out of 18 CMIP5 (RCP8.5) models produce the nonlinearity 1891-1990 1991-2090

c GPCP 1979-2008



Pacific panel
Major future plans/activities

- **ENSO task team, in discussion**
- **ENSO in CMIP5**
- **PP and IOC/WESTPAC collaboration/building regional capacity**



Pacific panel
Workshops/meetings planned

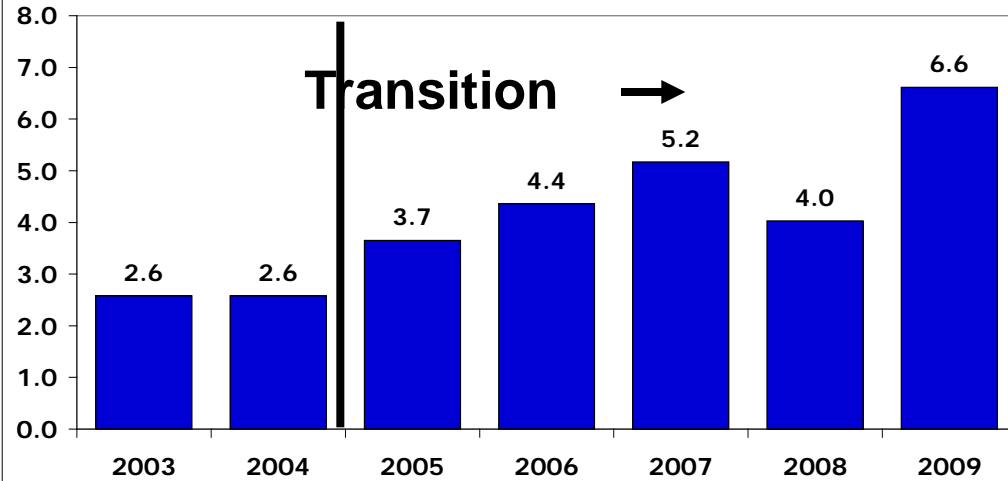
- **Decadal climate variability workshop, Qingdao, China, 3-7 Sept. 2012.**
- **NPOCE/SPICE open science meeting, Qingdao, China, 15-17 Oct. 2012.**
- **ENSO under climate change; and first ENSO task team meeting, Hobart, Australia, 21-23 January, 2013**



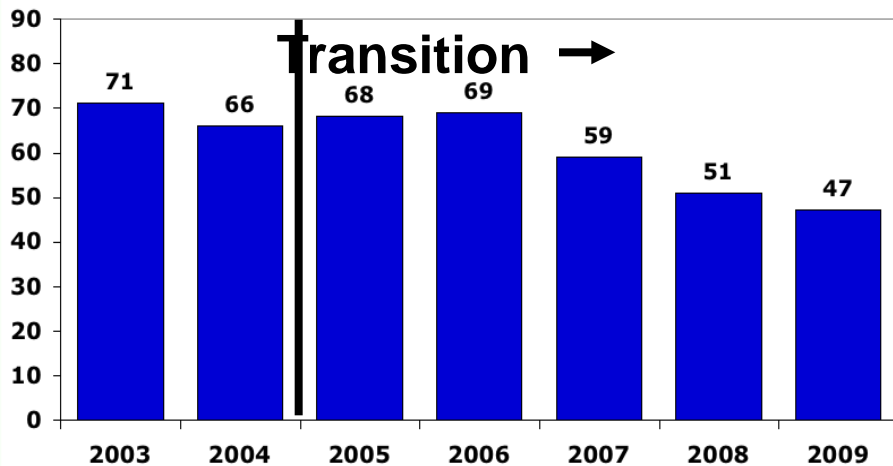
Pacific Panel
Issues and challenges (for input to JSC)

- **TAO return rate**
- **Formalise linkage with IOC/WESTPAC**

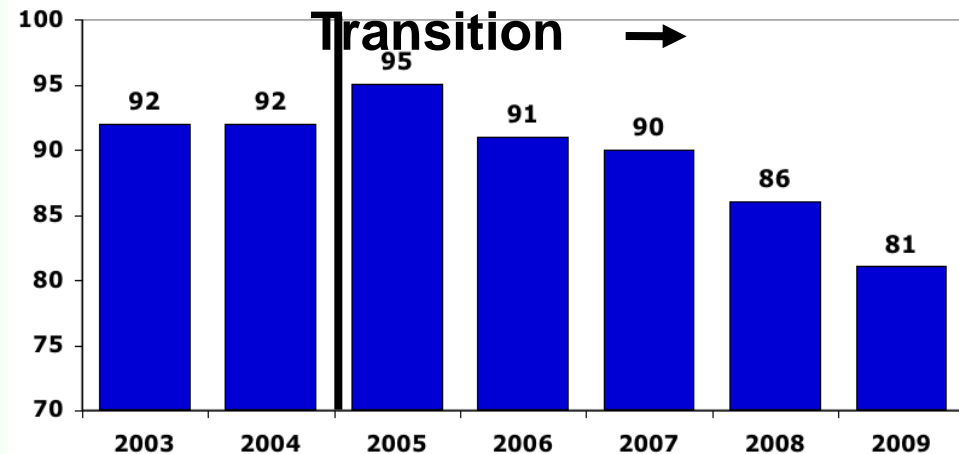
TAO budget requests (\$M)



TAO Moorings Serviced



TAO DATA Return (%)



NEWS

Whoops!

Buoy damage blurs El Niño forecasts

Missing data from the eastern Pacific Ocean may hinder predictions of this year's event.

More than half a dozen oceanographic buoys are missing in action in the eastern Pacific Ocean. The US National Oceanic and Atmospheric Administration (NOAA) has dispatched a ship to fix the malfunctioning buoys, which are part of the 55-strong Tropical Atmosphere Ocean (TAO) array that monitors the ocean and atmosphere.

But the data void has left climate modellers uncertain about the strength of this winter's El Niño — which occurs when warm waters shift east across the Pacific, bringing rain and extreme weather.

Fishermen, storms and boat collisions often knock buoys in this region out of commission. The upcoming El Niño adds "more urgency than usual", says Arun Kumar, branch chief at NOAA's Climate Prediction Center in Camp Springs, Maryland.

Among other things, the TAO array tracks the 20°C thermocline, a boundary between warm surface and cool deep waters that ranges from about 140 metres deep in the western Pacific to 40 metres deep in the eastern Pacific. Shifts up and down in the thermocline's location can indicate the magnitude of an incipient El Niño or a La Niña, the cold phase of the climate oscillation.

Because changes to the thermocline are more pronounced in the shallower waters of the eastern Pacific, the buoys there provide "an important chunk of data from a region where the signals tend to be very large during El Niño and where the models depend on the data to forecast accurately", says Michael McPhaden, an oceanographer at NOAA's Pacific Marine Environmental Laboratory in Seattle, Washington. "We are at a critical point in El Niño



The buoy array needs regular maintenance.

fish that gather there. Past repair trips have found sliced mooring lines, fishing nets tangled on the instruments and bullet holes on the buoys themselves — and sometimes, no buoys left at all, says Shannon McArthur, the TAO project manager at the National Data Buoy Center in Mississippi.

In one instance, a buoy stopped transmitting temperature and other data, but it contin-

Rica, probably taken aboard a ship. McArthur will describe this and other details of buoy vandalism at the Oceans '09 meeting in Biloxi, Mississippi, from 26 to 29 October.

Half of the 14 TAO buoys that are strung along two mooring lines, along the longitudes of 95° west and 110° west, have stopped transmitting in the past eight months. The research vessel *Wecoma* set off on 4 September from Newport, Oregon, to fix them — a job that could take a month. The cost of replacing or fixing buoys depends on their location and how much monitoring equipment they carry, says McArthur. NOAA spends an estimated US\$1 million each year to repair the array.

And although lines of buoys are scheduled for maintenance every six months, this year the swathe in the eastern Pacific slipped two months behind that schedule. McArthur says that repairs aren't late, but that financial and other logistical concerns can sometimes affect scheduled maintenance. A NOAA effort is under way to calculate costs for the buoy-operating community at large, he says, but it's difficult to quantify vandalism's impact on data.

Meanwhile, forecasters are scrambling to work out how the missing data will affect their El Niño predictions. In August, NOAA predicted a mild El Niño this autumn that will strengthen through the winter, but other models forecast a more extreme event.

"Because of the missing moorings, the forecasting system must now rely more heavily on the other observing systems," says Magdalena Balmaseda, a senior scientist at the European Centre for Medium-Range Weather Forecasts in Reading, UK, who has published on the lack of redundancy in data-collecting systems in

NOAA NATIONAL DATA BUOY CENTER

Nature, 24 Sept 2009

(the week of OceanObs09)

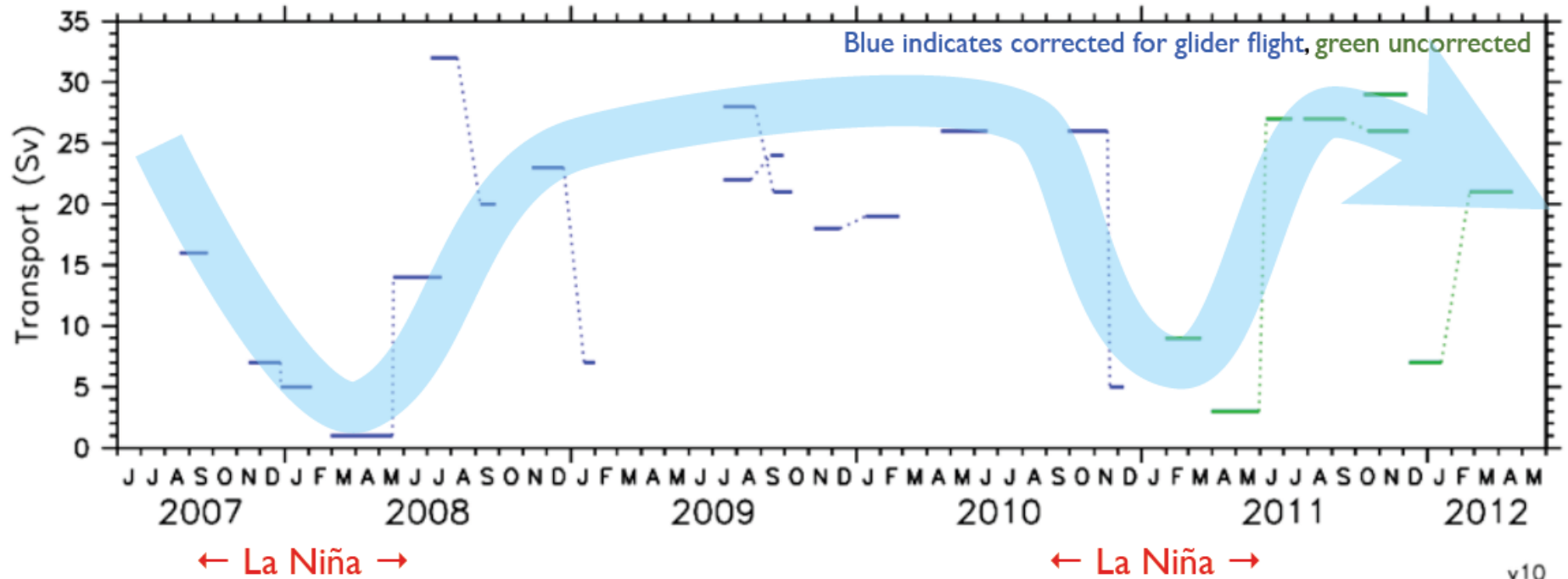


End



Solomon Sea transport measured by the Spray glider

Total transport between the Solomon Islands and Papua New Guinea



v10

- 0-700m absolute transport
- Coast-to-coast integral
- Strong decreases during La Niñas

Capacity building in PCCSP, 2009-2011

- 30 capacity building visits to “partner countries” conducted by 37 PCCSP staff to provide training in climate change, data management and climate analysis.
- Over 500 people reached through climate change science workshops in partner countries.
- 4 regional workshops, several attachments
- Publications, brochures
- Tools and training in:
 - data management
 - climate monitoring
 - climate change science

