

# A History of VOCALS

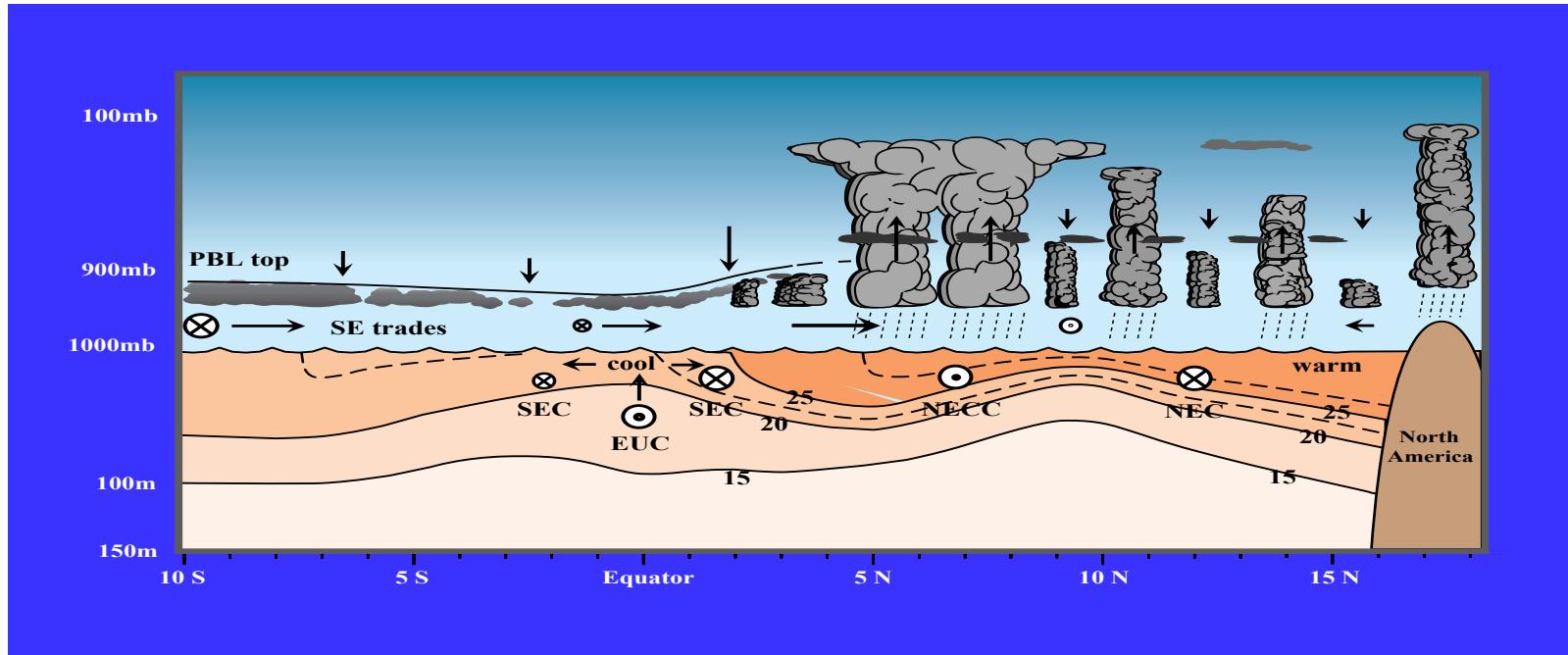
We made it!



As told by  
a Survivor  
(so far...)

Arica, Chile, November 2008





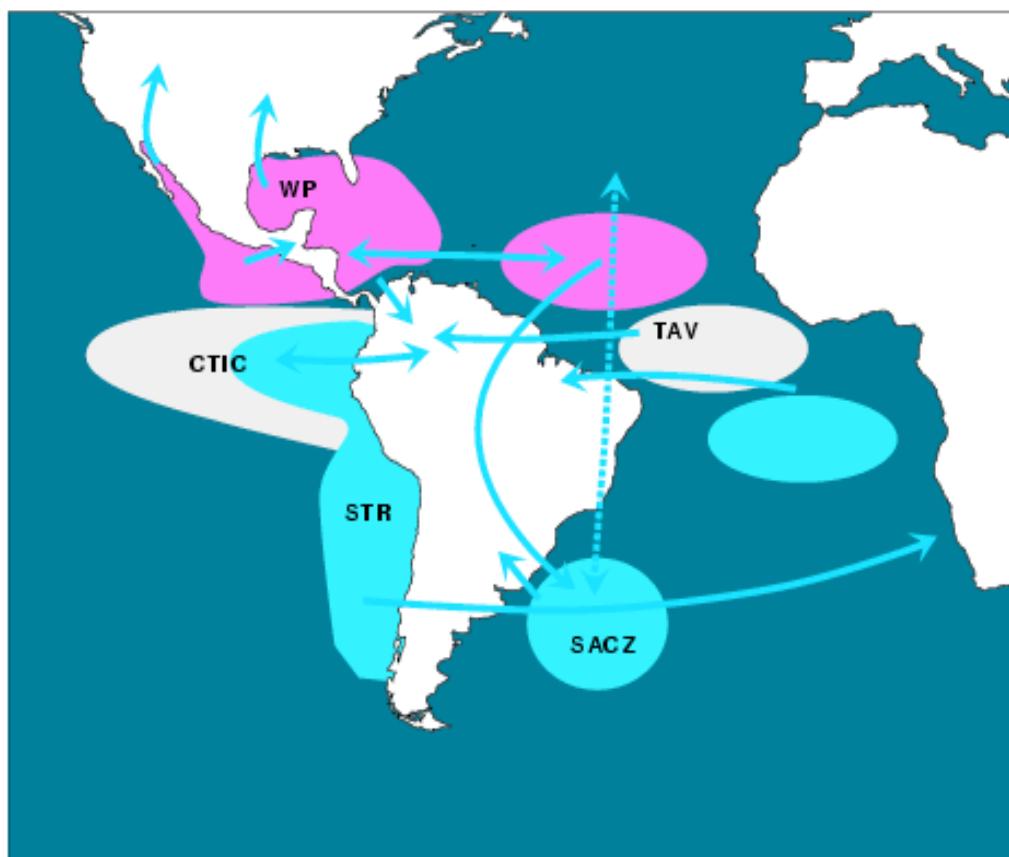
## And at the beginning (late 90's) there was EPIC

Eastern Pacific Investigation of Climate (1999-2003)

- EPIC was a joint program of the Pan American and Pacific panels of US CLIVAR funded through NSF and NOAA, and a contribution to VAMOS and international Pacific CLIVAR.
- The overall goal was to observe and understand the feedbacks between the atmosphere and upper ocean in the Eastern Pacific cold tongue/ITCZ region and the SE Pacific stratocumulus cloud regime.
- EPIC had three components: 1) enhanced monitoring and empirical studies, 2) EPIC 2001, and 3) model testing and improvement.

# EPIC started in PACS, which also set the stage for VAMOS

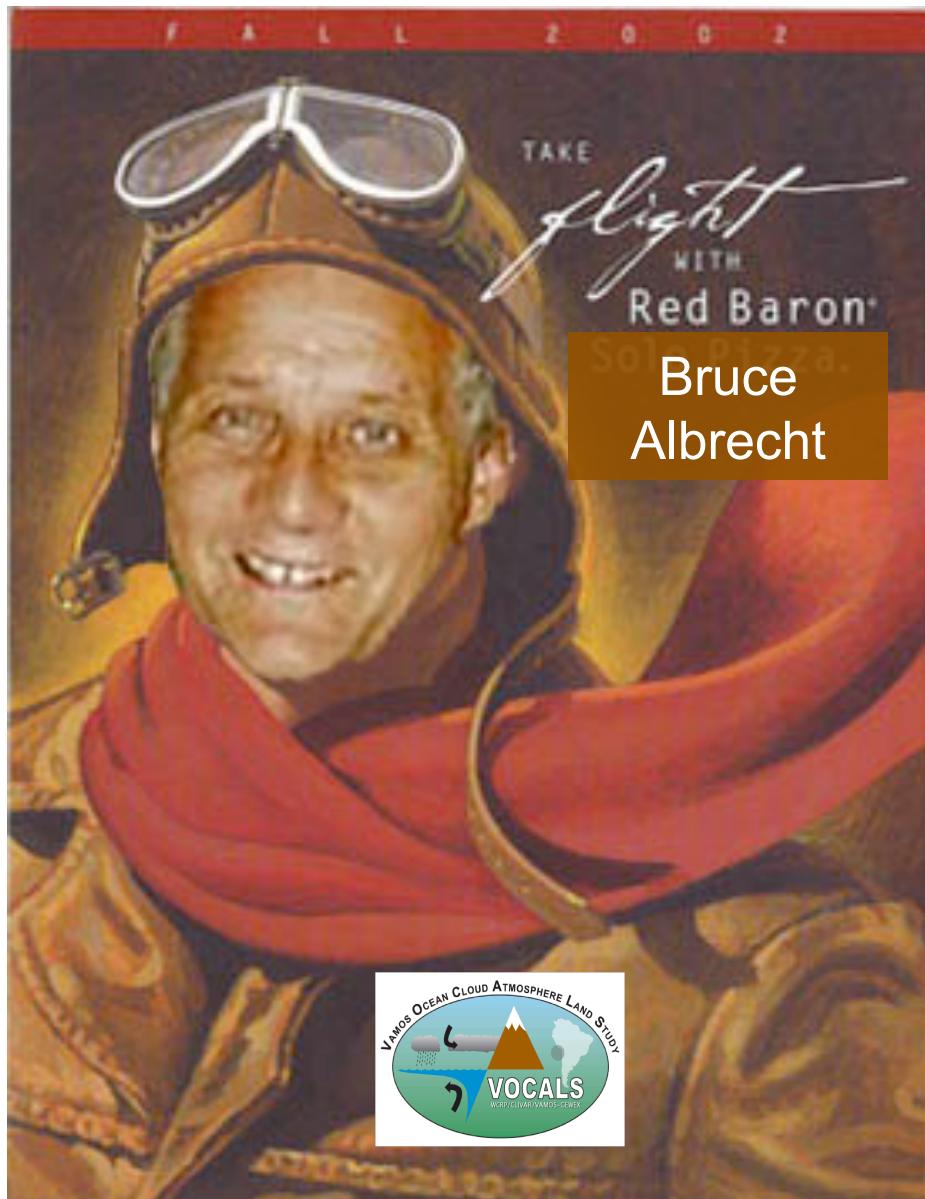
## The World in VPM1



High priority regions for VAMOS ocean-atmosphere field programmes.

CTIC, STR, TAV, SACZ and WP refer respectively to the cold-tongue/ITCZ, eastern Pacific stratus regime, tropical Atlantic variability region, South Atlantic Convergence Zone, and Interamerican warm pool region. Arrows indicate hypothesized interactions with other regions.

Steve Esbensen, April, 1998



## The Pioneers

**B. Albrecht (Chair),  
Rene Garreaud  
David Rogers,  
Pepe Rutllant,  
Hector Soldi,  
Bob Weller**



**The Veteran Chilean  
Warrior: Jose Rutllant**

## **Regional Support was Outstanding**

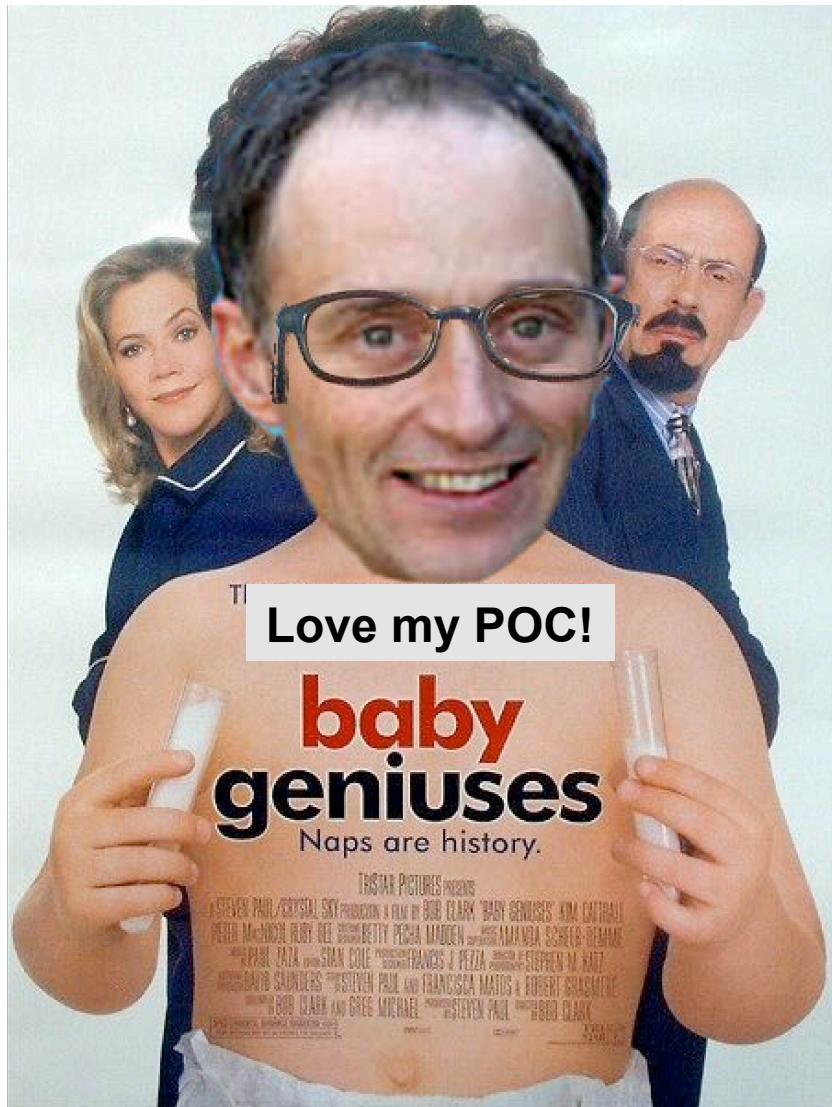


Later to be joined by powerful  
Peruvian Ladies  
Carmen Grados

## VPM2 - VPM3 - VPM4

- VPM2, in Mar 99, decided to develop a VAMOS Stratus/ Stratocumulus Field Programme (MASC).
- One year later, VPM3 decided to expand membership of the VAMOS Stratus/Stratocumulus Working Group by recruiting a 'Blue ocean' oceanographer and a large-scale modeller. *VPM3 also decided to develop a better acronym for MASC.*
- In 2001, at VPM4, MASC became the VAMOS East Pacific Investigation of Climate (VEPIC), and a new leader emerged.

# The new leader and partners



Chris Bretherton\*

Ben Felzer\*

Rene Garraud

Pablo Lagos

José Meitin\*

Rodrigo Núñez

José Rutllant\*

Steve Esbensen

Bjorn Stevens\*

C. Roberto Mechoso\*

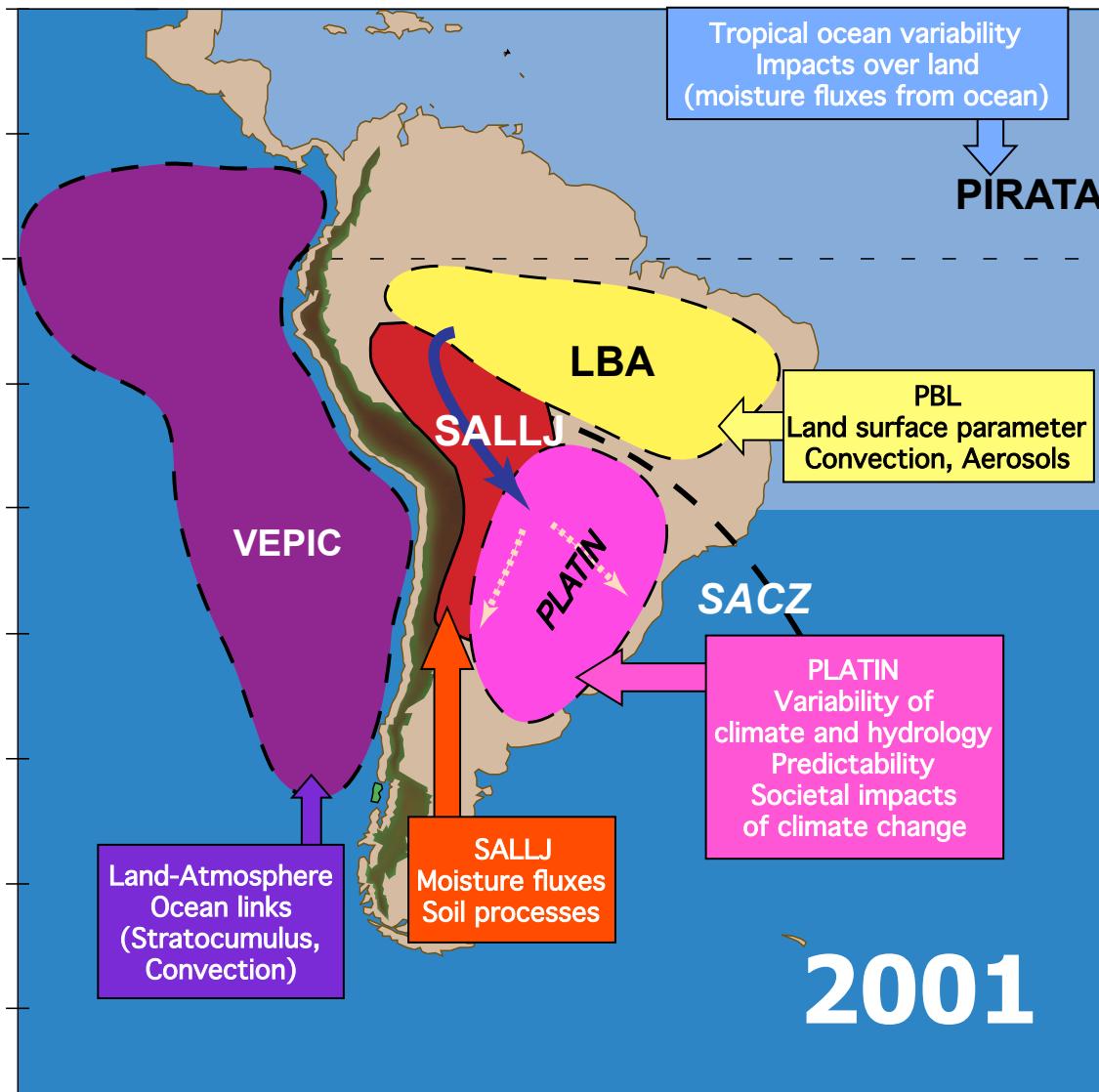
Pedro Silva Dias\*

\* Participated in part of the meeting.

\* Co-Chairs

\* Rapporteur

# VEPIC in VPM4



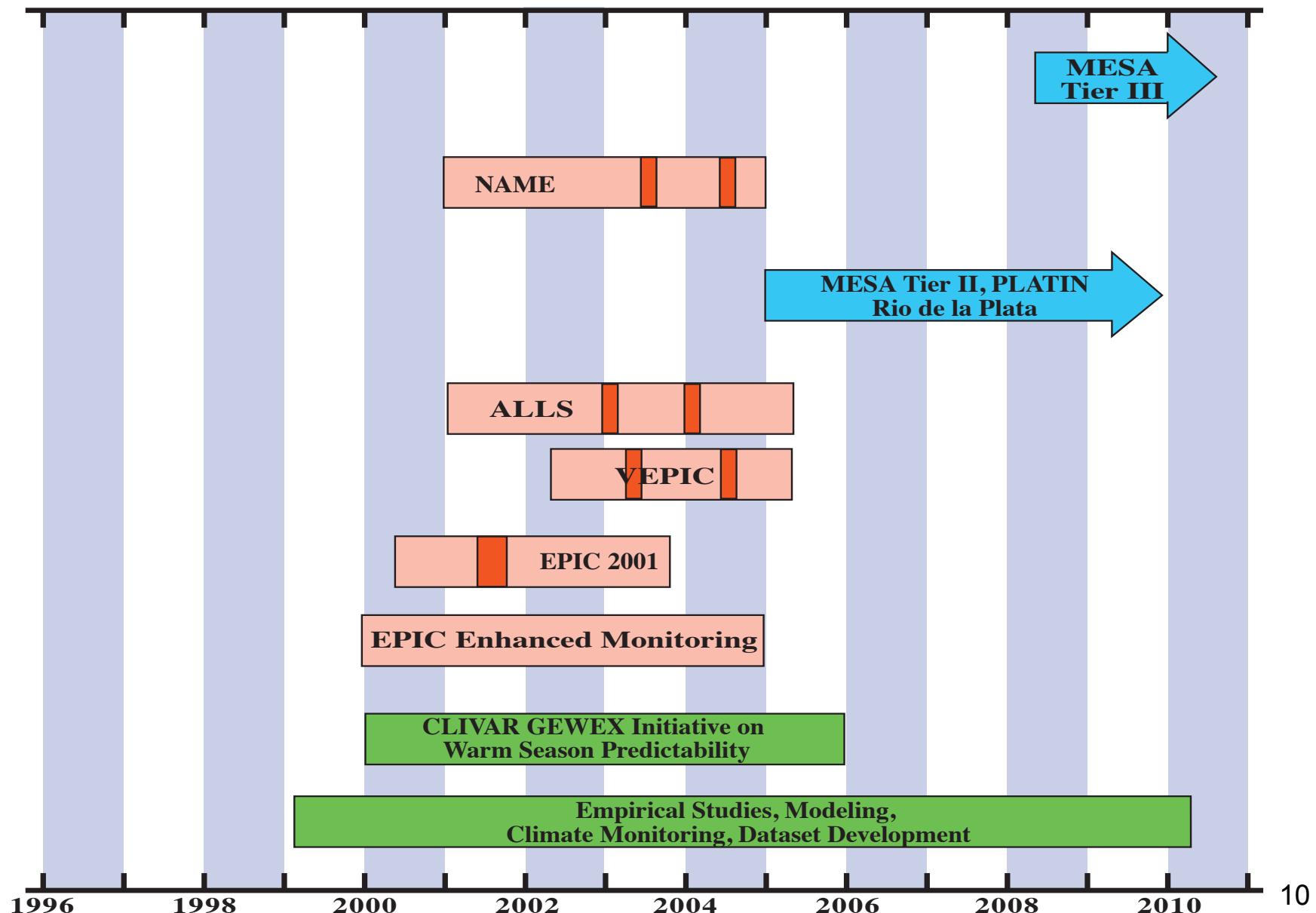
Enhanced Monitoring and Pilot Studies Designed to Capitalize on Unique Physical & Infrastructural Features of South East Pacific Stratus Region On Diurnal and Longer Timescales.

# VEPIC in VPM4

- **VAMOS-EPIC:** A joint effort of VAMOS and International Pacific CLIVAR (Pan American and Pacific groups), currently in its planning stages.
- **Science focus:** Interaction between climate over South America and low cloud/circulation over the SE Pacific on all timescales: a) diurnal (coastal/mountain circulations), b) synoptic (coastally trapped waves; Altiplano convection), c) seasonal (feedbacks with monsoon), d) interannual variability (ENSO).
- **Motivation:** Low clouds, sharp topography, and deep convection are all serious global and NWP modeling problems.

# VAMOS Timeline

2001



## VEPIC - Scientific Goals

- Drizzle – Entrainment & Cloud Liquid Water Path.
- Upper Ocean Coupling & Feedbacks and their relation to ENSO.
- Relation to Continental Convection – Including Slope Flows.
- Higher Order Statistics – Particularly Synoptic & Diurnal Rectification.
- Comparative Climatology.
- Aerosol Effects & Characterization in Marine Boundary Layer (MBL).

## VEPIC - Modelling

- Simple model interpretative studies.
- Evaluation of ECMWF and NCEP column data.
- Satellite product evaluation and synthesis.
- Climate model evaluation.

## VEPIC - Infrastructure

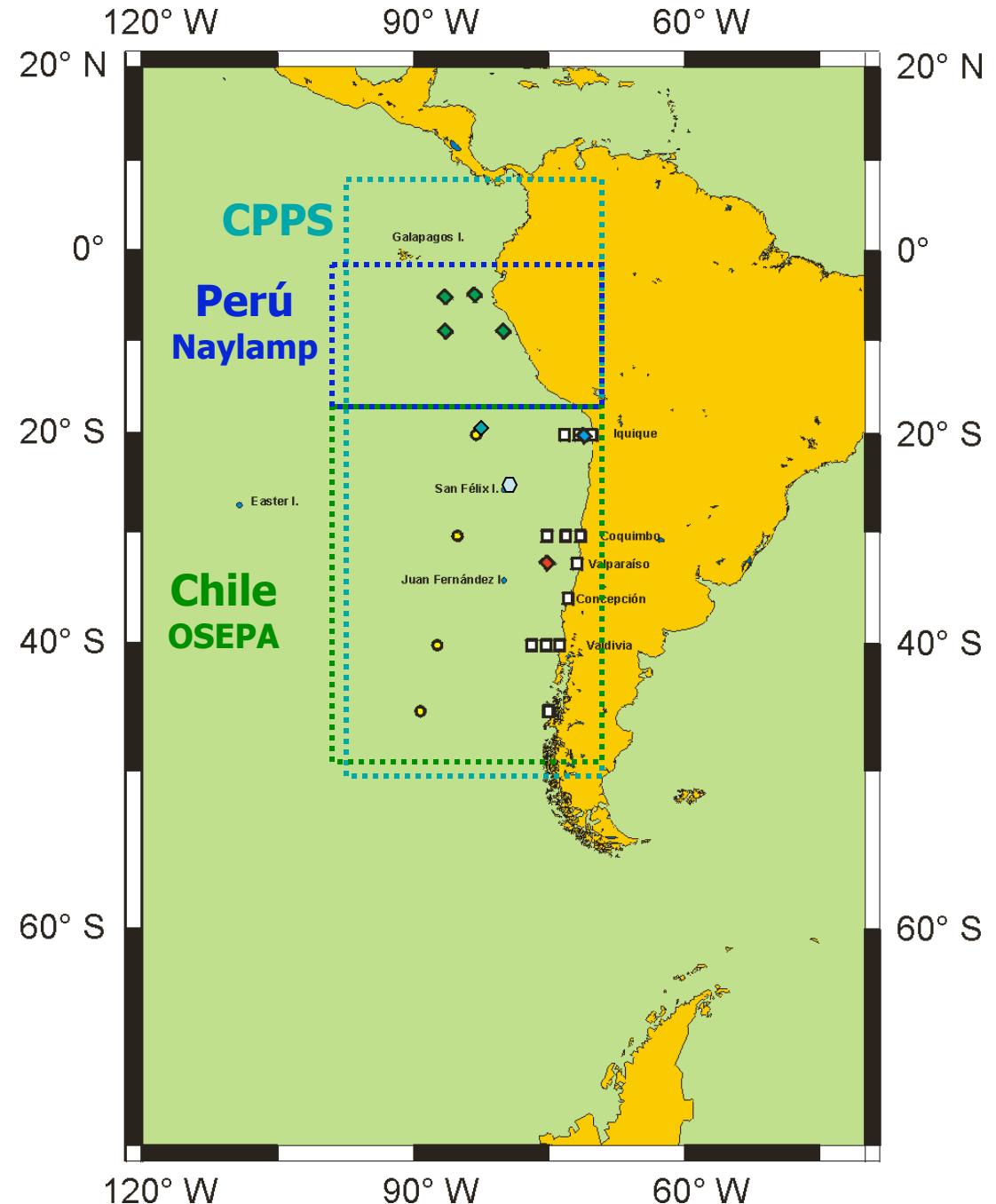
- Extensive Buoy Array.
- Coastal Meteorological Network.
- San Felix Island.
- Regional Interest.

## Timeline

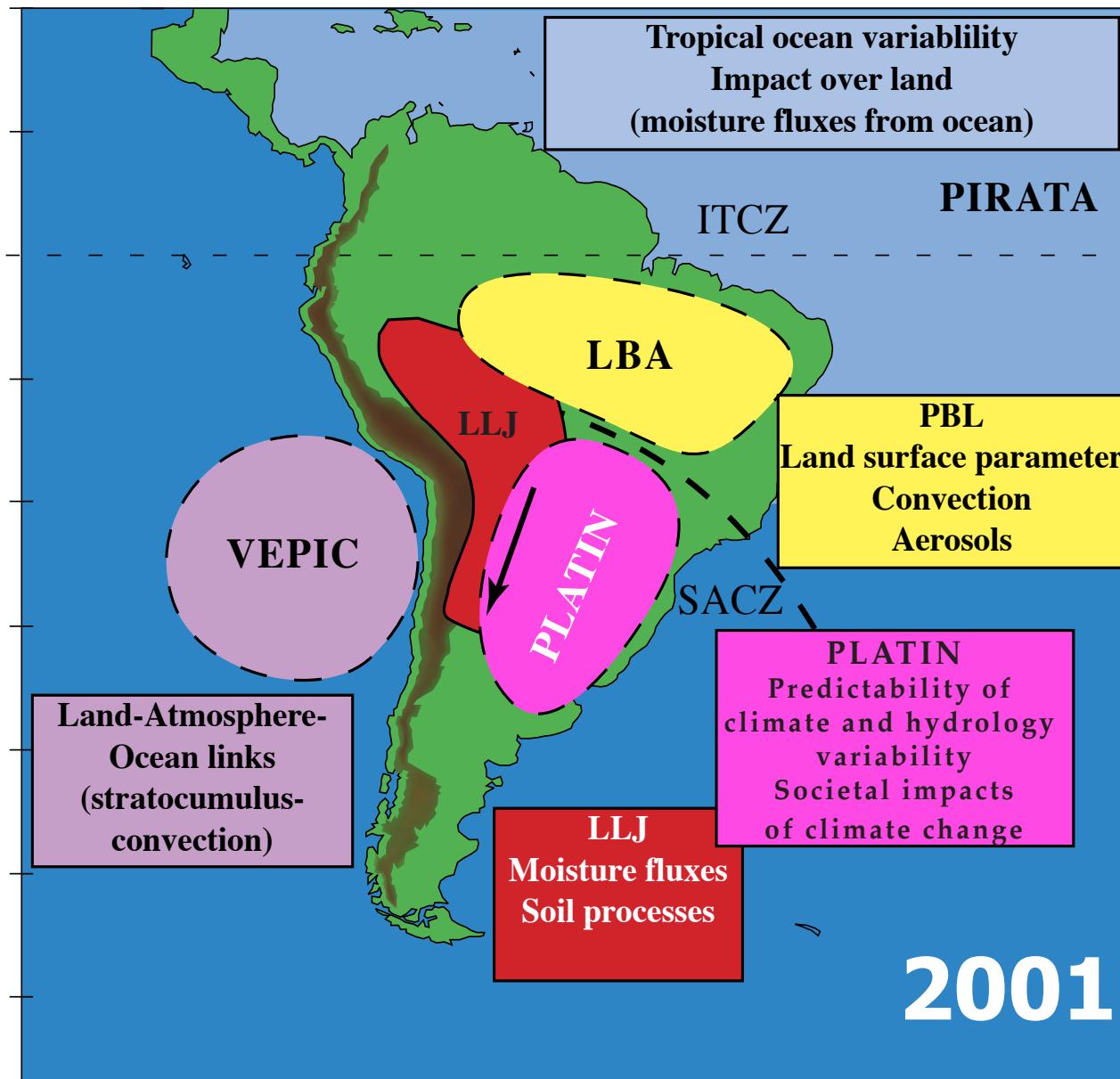
- Installation of Instrumentation on San Felix Island (July 2002).
- Deployment of Chilean Buoys (latitudes 33° S and 20° S), second semester 2001.
- 1st. VEPIC SOP Sep-2002 to Jan-2003.
- 2nd. VEPIC SOP Sep-2003 to Jan-2004.
- Possible intensive field phase Oct-2005 (or 2006).
- VEPIC panel will meet at VPM5.

# Chile and Peru, Great Partners

## National and Regional Initiatives



# VEPIC in VPM5, with reinforcements...



# JOSE MEITIN PROVIDES NCAR/EOL FIREPOWER



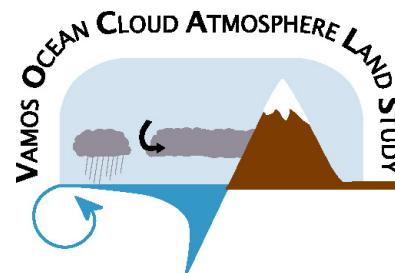


**Chris Fairall  
brings his  
Field  
Experience.**

**(Note the big  
finger)**

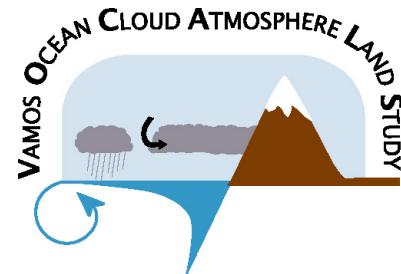
## VPM5 and VPM6: VOCALS is Born and is Endorsed - Scientific Issues

- Time and space scales of Cloud-Topped Boundary Layer (CTBL) - continent interaction.
- Regional seasonal/interannual feedbacks between stratocumulus clouds, surface winds, upwelling, coastal currents and SST in the Eastern Pacific.
- Feedbacks of Eastern Pacific cloud topped boundary layer properties on overall tropical circulation and ENSO.
- Climatic importance of aerosol-cloud interactions.

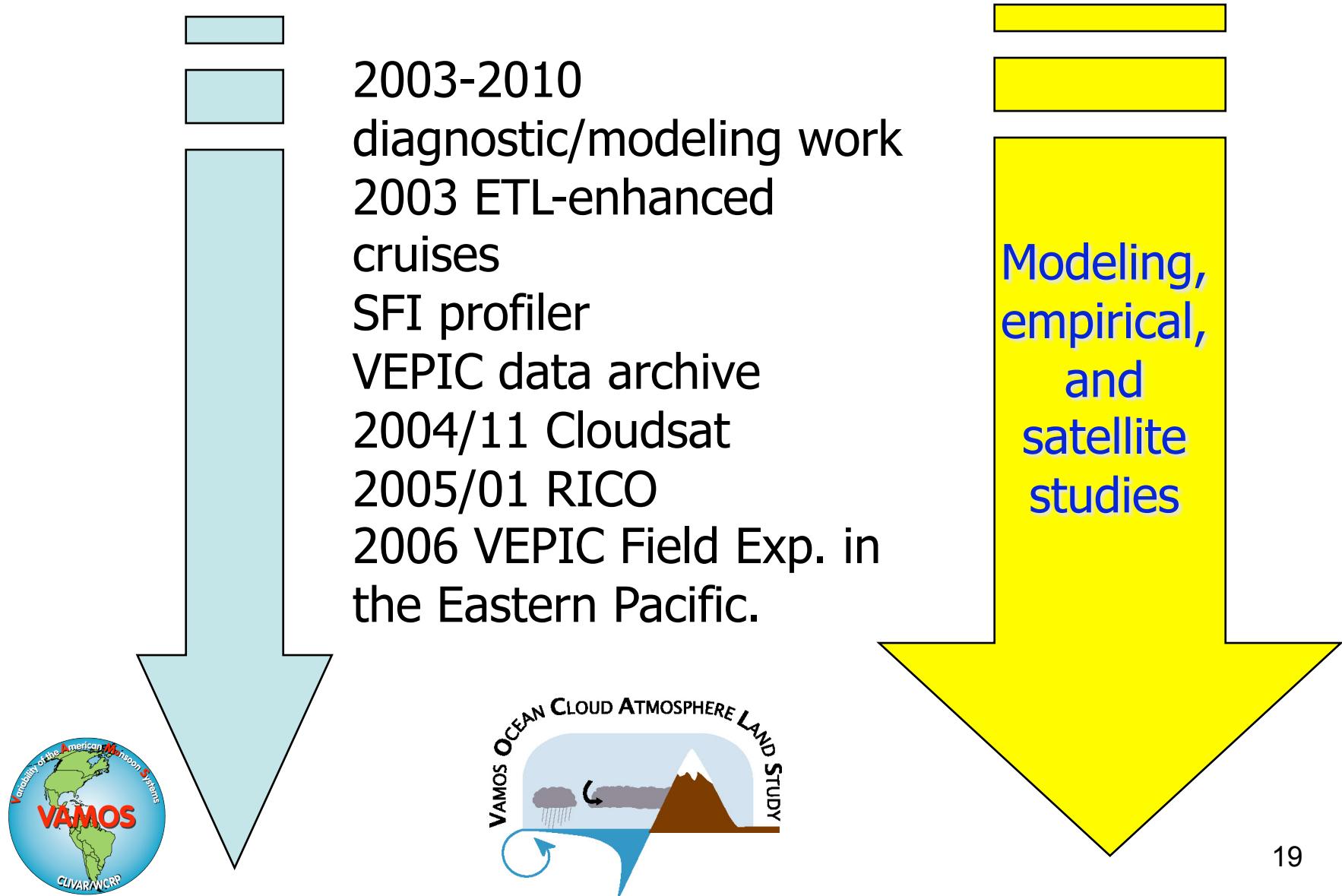


# VOCALS short-term implementation

- Augment San Felix Island instrumentation with wind profiler, radiation, microwave LWP, and aerosol sampler.
- NOAA/ETL sfc/remote sensing instrumentation on Pacific and Atlantic buoy maintenance cruises, and at RICO (funded).
- Develop VOCALS data set through distributed satellite/ model/ in situ data archive at UCAR/JOSS. Archive ECMWF and NCEP hi-resolution column data at WHOI buoy and San Felix Island locations, in co-ordination with CEOP (some funding).
- Work with cloud-climate sensitivity Cloud Process Team (CPT) to feed into coupled model development.



# VOCALS Timeline





Admiral Robert Weller

## New Leader

Bob Weller assumed VOCALS leadership at VPM7 in 2005.

VPM7 VOCALS participants:  
US (Bretherton, Fairall, Mechoso, Weller)  
Chile (Garreaud, Ruttland, Pizarro)  
Uruguay (Terra)  
Ecuador (Cornejo)

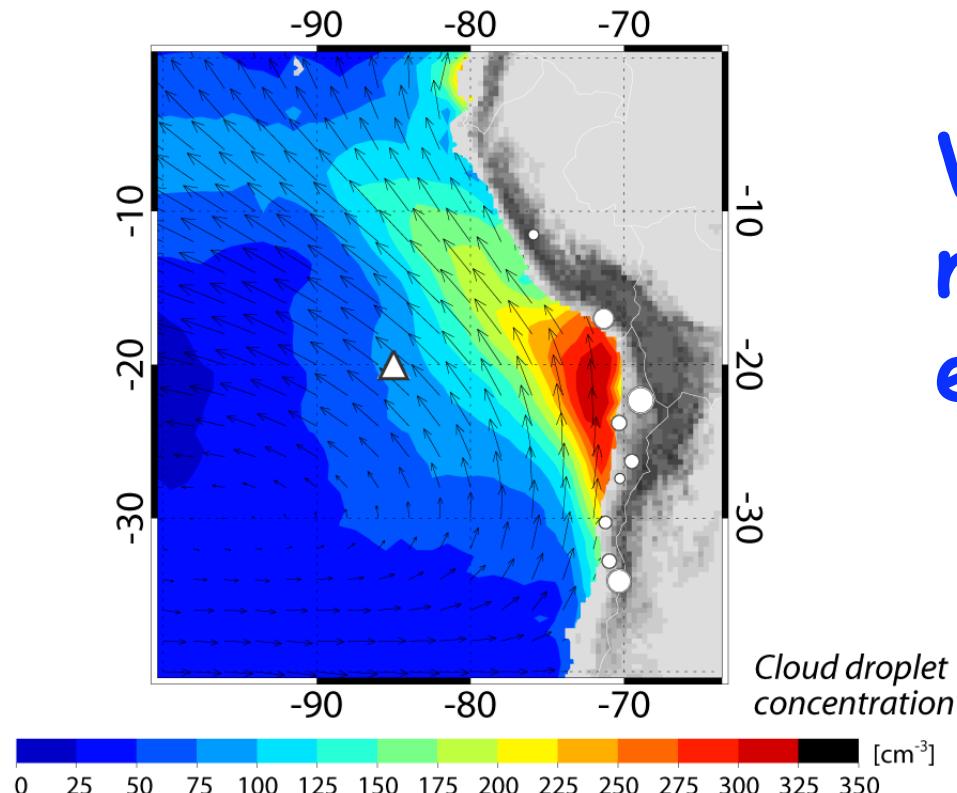


**“Admiral” Weller provided strong leadership for two years. As VOCALS became ready to fight for funding, a veteran strategist was called into action in 2005:**

**Lord Roberto Mechoso.**

**He is shown here on “Double ITCZ”, in his celebrated crossing of the Andes**

In drawing the battle plan, it became evident that air support was needed. A young scientist at the U. Washington had been wondering about the ear-stagnation zone at  $18^{\circ}\text{S}$  and its collocated with maximum in CDC. He spoke in tongues about issues such as: Topographically induced? How deep? Sometime flush?



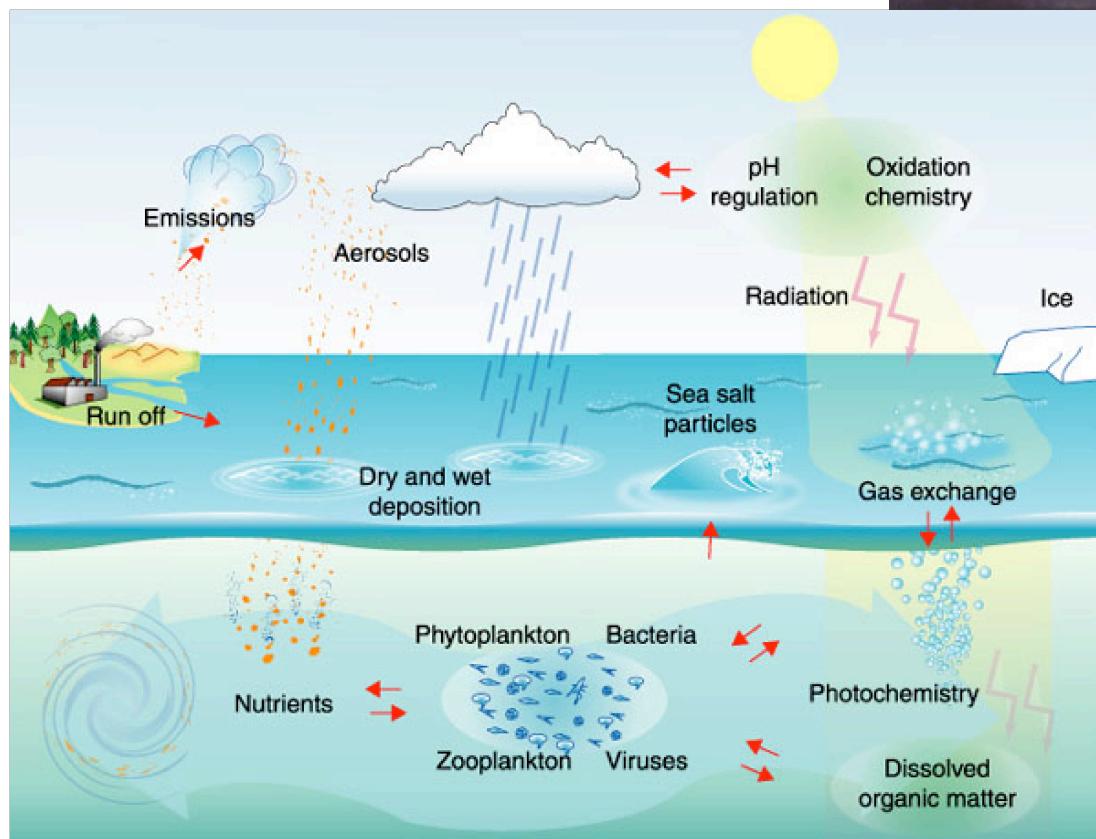
**VOCALS**  
needed a flush  
expert and...

# Rob Wood became VOCALS Air Marshall



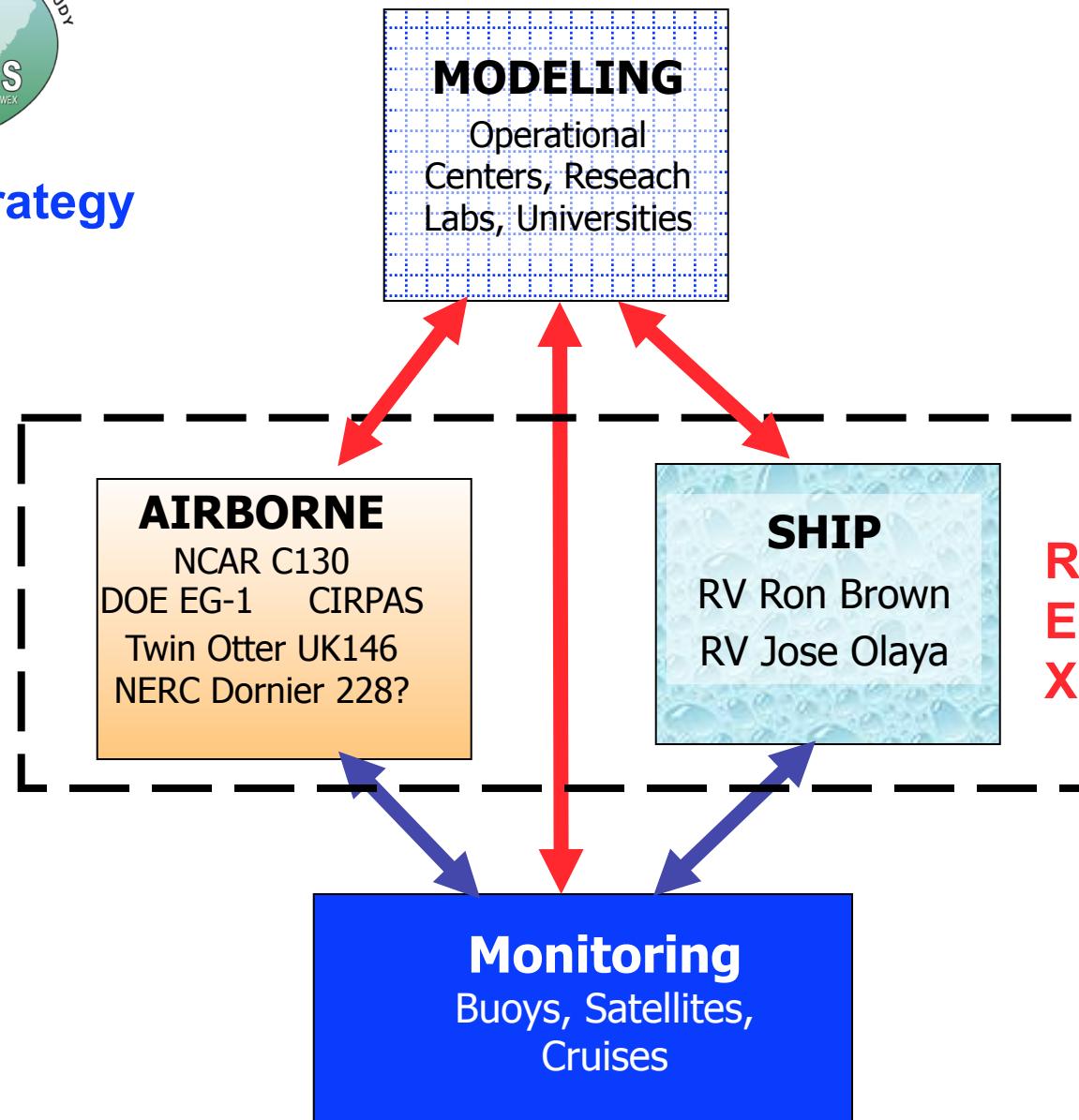
Barry Huebert brought  
gas exchange, ocean  
nutrients, bacteria,  
viruses, etc. He also got  
some fish.

Thank you, Barry





## VOCALS Strategy



# The rest is present day history

- **Proposal submitted to NSF/NOAA** (R. Wood PI; C. Bretherton, B. Huebert, C. R. Mechoso, R. Weller): **1 Sep 06**
- **NSF/NOAA decides that "VOCALS is GO": 6 Dec 06**
- **VOCALS Workshop at VAMOS VPM10, Santiago, Chile: 3-4 April 07**
- **First Modeling Workshop at NCAR: 18-29 May 07**
- **First Rex Preparatory Workshop at NCAR: 11-12 June 07**
- **NCAR EOL Facility Request: 1 Jul 07**
- **NSF deadline for VOCALS proposals: 15 Jul 07**
- **VOCALS-UK Consortium Planning Meeting, Reading, England: 27 Jul 07**
- **NOAA deadline for VOCALS proposals: 21 Sep 07**
- **Joint NSF/NOAA Panel on VOCALS 15-16 Oct 07**
- **VOCALS-UK Proposal Submitted to NERC: 30 Nov 07**

# Julia and Hugh

VOCALS will bestow upon you the greater share of honour.

For the best hope I have. O, do not wish one more!

This day in April is call'd the NERC's Review.

If you outlive this day, and bring the money home, Will stand a  
tip-toe when this day is nam'd, Will yearly on the vigil feast your  
colleagues, And say "To-morrow is NERC's Review Day."

Then you will strip your sleeve and show your scars, And say "These  
wounds I had on NERC's Review Day."

You two, Julia and Hugh, you VOCALS-UK leaders; This day shall  
gentle your condition; And climatologists in England then-a-bed  
Shall think themselves accurs'd they were not there, And hold their  
laptops cheap whiles you speak About your fight on NERC's Review Day!

# The funds come...

- **NSF/NOAA funding decisions in late 07**
- **NERC provides funding for UK-VOCALS**
- **IMARPE Peru funds Filamentos Cruise**
- **Chile funds Paposo station**
- **DOE and NASA commit airplanes. . .**
- **...and VOCALS has new heroes...**



**Our NOAA  
Monitor:**

**Jin Huang**

**She sold her  
jewels to fund  
the Ron Brown**



**Our NSF Monitor:  
Walter Robinson  
Shown here  
getting ready to  
campaign for the  
C 130 in VOCALS**

# Roberto and Rob in early 2008



# Institutions Collaborating in VOCALS

## University

Arizona State  
Concepción, Ch  
CSU  
Drexel U.  
Hawaii  
Manchester UK  
Miami  
North Carolina State  
Oregon State  
Reading  
U. Arizona  
U. Chile  
UCLA  
U. Colorado  
UCSD  
U. Leeds UK  
U. Washington  
U. Wyoming

## Research Labs

Brookhaven Nat.  
COLA  
CNRS/LMD France  
IMARPE  
IPRC  
LEGOS  
NASA GSFC  
NCAR  
NOAA/CIRES  
NOAA/GFDL  
NRL  
Pacific Northwest  
Woods Hole

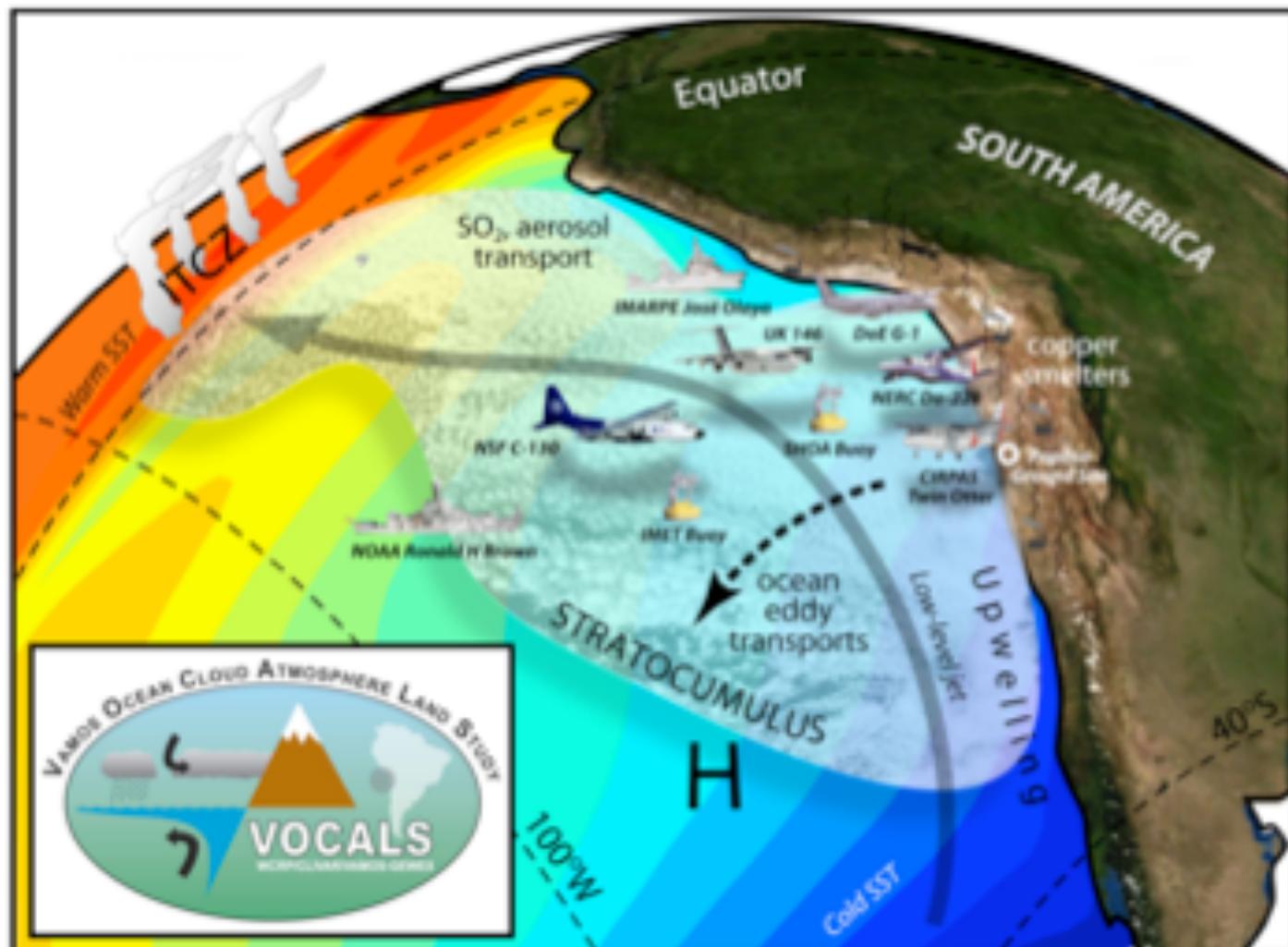
## Operational Centers

BMRC Australia  
CPTEC Brazil  
ECMWF Int.  
JMA Japan  
NCEP US  
UKMO UK

Funding \$25M+

Logistic Support: UCAR JOSS

# And here we are...



And when the burning moment breaks,  
And all things else are out of mind,  
And only Love-of-Discovery takes  
Scientists by the throat, and makes them blind,

Through joy and blindness they shall know,  
Not caring much to know, that still  
There are more mysteries to unravel, so  
That it be not the Destined Will.

But today, they have Hypotheses to test,  
And as the low level jet moans and sings;  
Scientists craft papers with strong hands,  
And Nature will acclaim their findings.

VOCALS history is Just Beginning,  
and YOU are Writing It...