Observations & Enhanced monitoring

Observations and monitoring Working Group

(+ input from other interested parties)

summary by Michael Douglas

Twelfth Annual Meeting of the WCRP/CLIVAR/VAMOS Panel (VPM12)
San Juan, Puerto Rico, USA 3-5 June 2009

Basic questions...that need answers (from Art Douglas)

1. What is the region of interest?

2. What phenomena are going to be investigated in IASCLIP?

3. How will models benefit from diagnostic studies of the any possible observations?

4. What types of observing systems do we need to accomplish these goals?

advice from... Jin Huang...

....the IAS group needs to identify the scientific and observation gaps to justify the need for a field campaign including the contributions to FY12-16 themes and NOAA climate services.

After that, the group needs to identify priorities and timeline.

Experience/lessons from previous field campaigns will be helpful.

By the way, what are the interests from other US agencies and the involvements from nearby countries?

Climate Goal Priorities from FY11-15 (<u>not in priority order</u>)

1. Verification and Quantification of Climate Forcing Emissions and their Impacts
    a. Global carbon cycle
    b. Short and long-lived radiative species
    c. Links to air quality
    d. Impacts such as ocean acidification

2. Climate Services Infrastructure
    a. Integrated observing system design and implementation
    b. Supercomputing
    c. Data stewardship/data records

3. Sector Assessment and Application
    a. Issue- and user-focused research, assessment, application development for various sectors
        i. coastal resilience
        ii. urban planning
        iii. ecosystems
        iv. water resources

4. Regional Applications of a Climate Service
    a. Arctic

5. Advancing Predictions and Projections of High Impact Phenomena

a. Prediction and projection of weather and climate extremes across spatial and temporal scales
    i. Drought
    ii. Hurricanes/tropical storms
    iii. High-frequency precipitation
    iv. Sea level rise
    v. Storm surges

b. Abrupt change

some science requirements...

Establish profiles of wind and humidity in the LLJs, Quantify the flux components, at both the air-sea interface and Warm Pool base, that govern SST anomalies in this region

Weaknesses of operational data include lack of trustworthy vertical structure information in key locations; unresolved or uncalibrated depictions of phenomena near complex geography; inaccuracy of measured fields and fluxes; and lack of microphysical (including aerosol and chemistry) characterization and profiles.

IALLJ features depicted by the global reanalysis (Fig. 11) have yet to be validated against in situ observations.
Notice that there are no in situ sounding observations near the core of the CLLJ.
Most vexing is the fact than when the warm pool heating is greater, the IALLJ weakens but the moisture content of the exported air is greater, hence it is not clear how the moisture flux (q•V) is affected in the aggregate.

Recent studies (Wang et al. 2006, 2007) suggest that the moisture export decreases but we don't know whether this conflictive relationship is predictable.

The reason for the comparatively low rainfall over the Caribbean, compared with comparable warm water regions elsewhere, is not fully understood. This characteristic is apparently not properly simulated by many models. Although the paucity of ocean- and surface-based observations in the Caribbean makes exact assessment difficult.

Ocean models are presently challenged by large uncertainties in the surface fluxes and mixing representations, by the complexity of the land-ocean-atmosphere interactions in the IAS region, and by the need to resolve important mesoscale processes such as ocean current jets, coastal upwelling and eddy motion...

International requirements

Comments in the IASCLIP Science and Implementation Plan:

"The IAS region is a unique location in the world where so many countries are affected by the same set of climate phenomena."

"International collaboration is pivotal to the success of any climate research program for the IAS region. By the same token, a successful climate research program for the IAS region would yield broad international benefits. "

"Identify the broad IASCLIP community. This would start from interested scientists from the IAS region. They will contact other interested parties in the region. (ii) The IASCLIP Alliance will be organized mainly through communications via emails and electronic newsletters. Workshops and special sessions at major international conferences can be considered to convene alliance members on specific issues." *(my opinion: this won't work...)*

therefore...

We need more representation and outreach to International community!

Outreach needs to include main oceanographic and atmospheric players, even if they are not climate research community.

Who would be impacted by improved climate forecasts?

Who would be impacted by improved climate monitoring - even if forecasts didn't improve perceptibly?

Who could use data from real-time climate monitoring sites for their own, shorter-range, purposes?

Pos	Country	Population
1	Cuba	11,382,000
2	Dominican Republic	9,183,394
3	Haiti	8,528,000
-	Puerto Rico (United States)	3,955,000
4	Jamaica	2,651,000
5	Trinidad and Tobago	1,305,000
-	Guadeloupe (France)	448,000
-	Martinique (France)	396,000
6	Bahamas	323,000
7	Barbados	279,000
-	Netherlands Antilles (Netherlands)	183,000
8	Saint Lucia	161,000
9	Saint Vincent and the Grenadines	119,000
-	United States Virgin Islands (United States)	112,000
10	Grenada	103,000
-	Aruba (Netherlands)	99,000
11	Antigua and Barbuda	81,000
12	Dominica	79,000
-	Cayman Islands (United Kingdom)	48,000
-	Bermuda (United Kingdom)	64,000
13	Saint Kitts and Nevis	43,000
-	Turks and Caicos Islands (United Kingdom)	26,000
-	British Virgin Islands (United Kingdom)	22,000
-	Anguilla (United Kingdom)	12,000
-	Montserrat (United Kingdom)	4,000
		39,606,394

Name of territory, with flag	Area (km²)[1]	Population (July 2007 est.)[1]
Belize	22,966	294,3
Costa Rica	51,100	4,133,8
El Salvador	21,040	6,948,0
Guatemala	108,890	12,728,1
Honduras	112,090	7,483,7
Nicaragua	129,494	5,675,3
Panama	78,200	3,242,1
Total	**523,780**	**40,545,7**

Colombia	44,379,598
Ecuador	13,755,680
Venezuela[6]	26,023,528


The potential IASCLIP community
~ 100 million
35 million
4 million
40.5 million
83 million
total non-Mexico: 162 million
Gulf Of Mexico
North Atlantic Ocean
North Pacific Ocean
South Pacific Ocean
Caribbean Sea
Houston
San Antonio
New Orleans
Tallahassee
Jacksonville
Monterrey
Reynosa
Torreon
MEXICO
Ciudad Victoria
San Luis Potosi
Guadalajara
Guanajuato
Morelia
Ciudad de Mexico
Colima
Puebla
Acapulco de Juarez
Oaxaca
Villahermosa
Tuxtla Gutierrez
Campeche
Merida
BELIZE
San Pedro Sula
Guatemala
San Salvador
NICARAGUA
Managua
COSTA RICA
Panama
PANAMA
Havana
CUBA
Santiago de Cuba
THE BAHAMAS
HAITI
DOMINICAN REPUBLIC
PUERTO RICO
JAMAICA
ANTIGUA AND BARBUDA
GUADELOUPE
DOMINICA
MARTINIQUE
ST. LUCIA
Kingstown
BARBADOS
GRENADA
TRINIDAD
Barranquilla
Maracaibo
Caracas
Valencia
Barcelona
Cucuta
Bucaramanga
VENEZUELA
Georgetown
GUYANA
Medellin
Pereira
Cali
COLOMBIA
Quito
ECUADOR

Extreme hydro meteorological events affect entire region

....many related to hurricanes

....but largest disaster in entire region was associated with a cool season event (Vargas, Dec. 1999)

...so expect varying perspectives of what is important to study across the region...

from CPPA draft plan: IAS "Deliverables..."

Short term

• Produce and maintain a central data archive structure at NCAR/EOL either housing or linking to observations and model outp for each CPPA field program. CPPA investigators will be expected to submit to this archive (the contents of which will be made publically available within a few years of execution);

• Produce one or more integrated datasets for each CPPA field program that can be used as a toolbox for model and parameterization development and assessment. These are synthesis and value-added products that are distinct from the centr archive;

• Produce a preliminary multi-model intercomparison for the VOCALS region to provide guidance and context for the VOCALS-REX field program;???

• Develop metrics for assessing model deficiencies (e.g., MJO and tropical biases), and develop observational requirements fo eastern Pacific and IAS climate processes;

• A synthesis report summarizing what has been accomplished from past CPPA Air-Sea Interaction projects;

Longer term (global wish-list of solving everything...)

• Comprehensive in situ observational data sets for eastern Pacific and IAS region;
• Improvements in global, NARR and ocean (e.g., SODA) reanalyses through assessments and improved monitoring;
• Improved understanding of cold tongue, stratocumulus layer dynamics, ITCZ convection, WHWP, and their coupling;
• Improvements to cumulus and cloud-topped boundary layer parameterizations
• Predictive understanding and modeling of summer rainfall in the U.S.;
• Measurably improved climate models that have significant summer predictability when initialized with data from the previous fall-winter;
• Measurable improvements in model simulations of eastern tropical Pacific and IASclimate and prediction of El Nino/Southern Oscillation and its influence on the Americas;

• *Recommendations for optimal global climate observing systems*

climate themes...

1) Regional climate change (RCC), in general covering all space and timescales. (this covers everything on IAS domain scale)

2) Extremes in a changing climate, from regional to global. (hurricane variations, extreme rainfall events in n'rn S America...)

3) Intraseasonal-to-interannual climate variations and change. (is our monitoring adequate? what is needed?)

4) Attribution of observed climate variations and change. (explaining observed variations...)

5) Assessments of climate science and extending to assessment of impacts due to climate change (?)

6) Geo-engineering (?)

7) Climate applications to several sectors (?)

Note that 1), 2), 3), and 4) require accurate monitoring on many spatial and temporal scales...

What do we want to do?

Develop an adequate monitoring capability for research (and operational) needs for the next decade...

possible timeline

2009: Make contacts/arrangements for collaboration, web development.

2010: Start long term monitoring activities - island raingauge networks, limited surface observations, some adaptive soundings and key sites / ships.

2011: Full "long-term monitoring" array established...

2012: First summer EOP measurement campaign

2013: Cool season measurements in Winter-Spring, second followed by second summer EOP

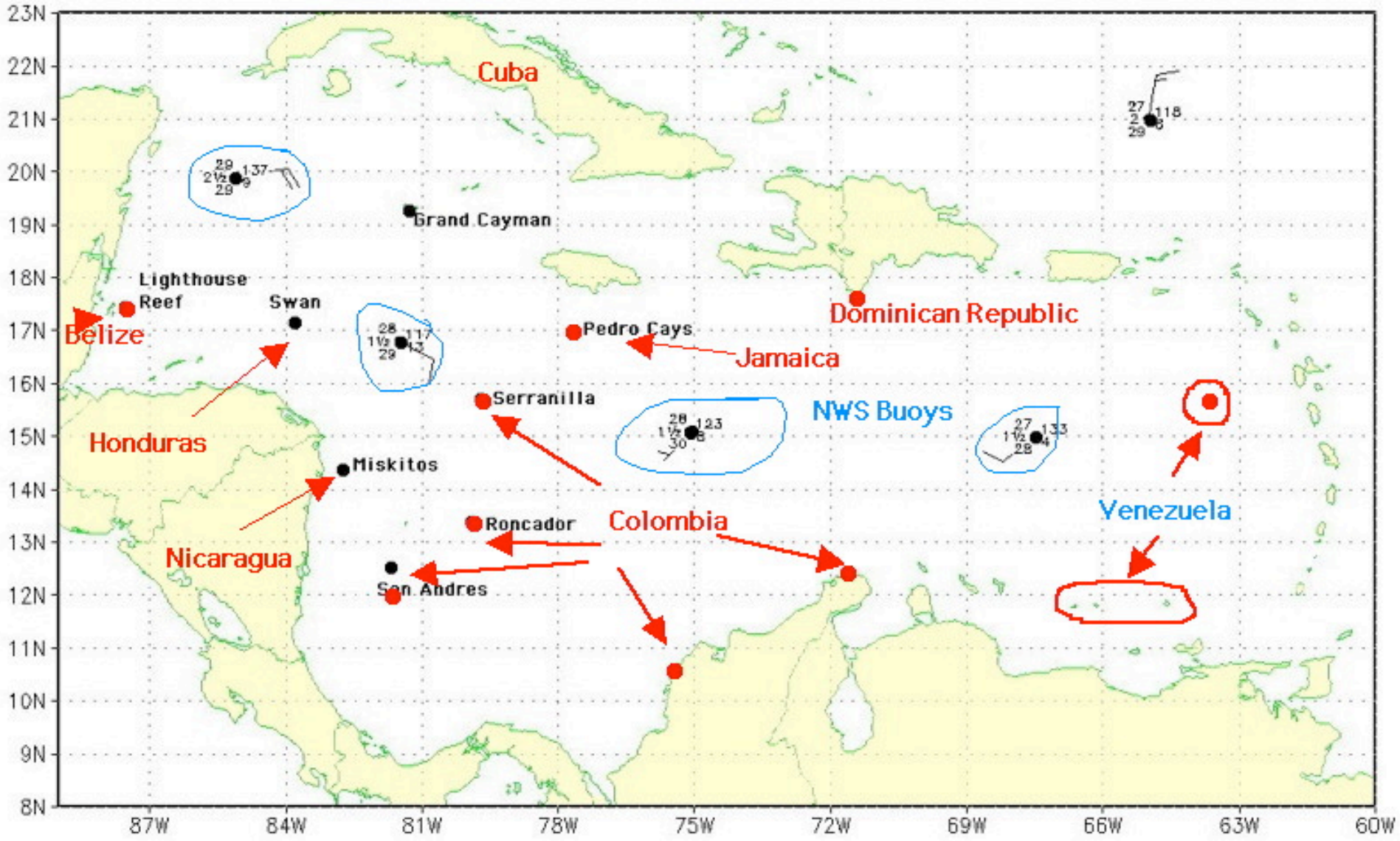
metrics for success

where do we want to be in 5 years?

"Do-able": Establish robust and routine monitoring of key atmospheric and oceanic quantities, with acceptable spatial and temporal resolution supported by the international community.

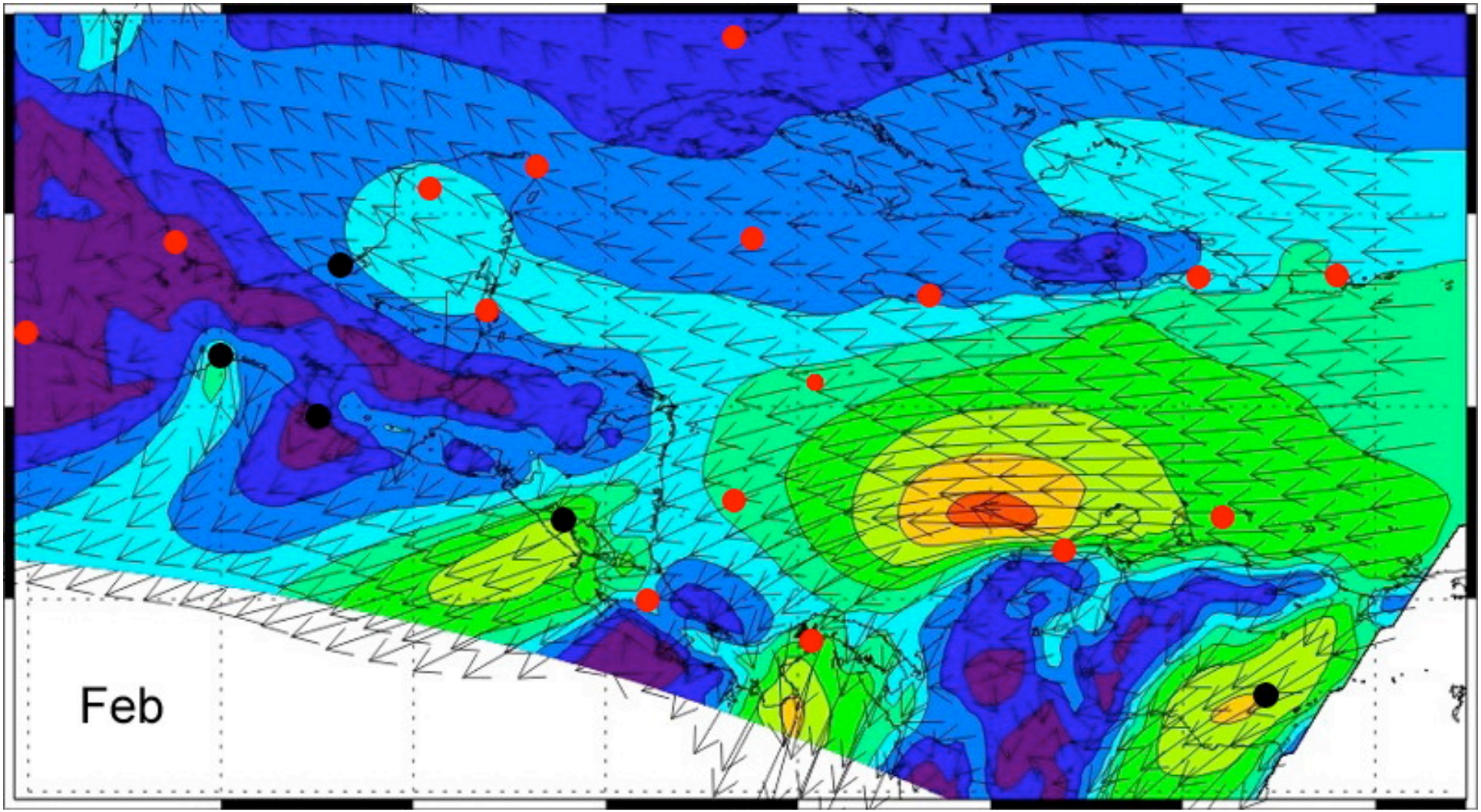
"Unpredictable and not-guaranteeable": progress in any aspec of basic research... but we can still have a wish list:

basic geography and political links for islands and other sites

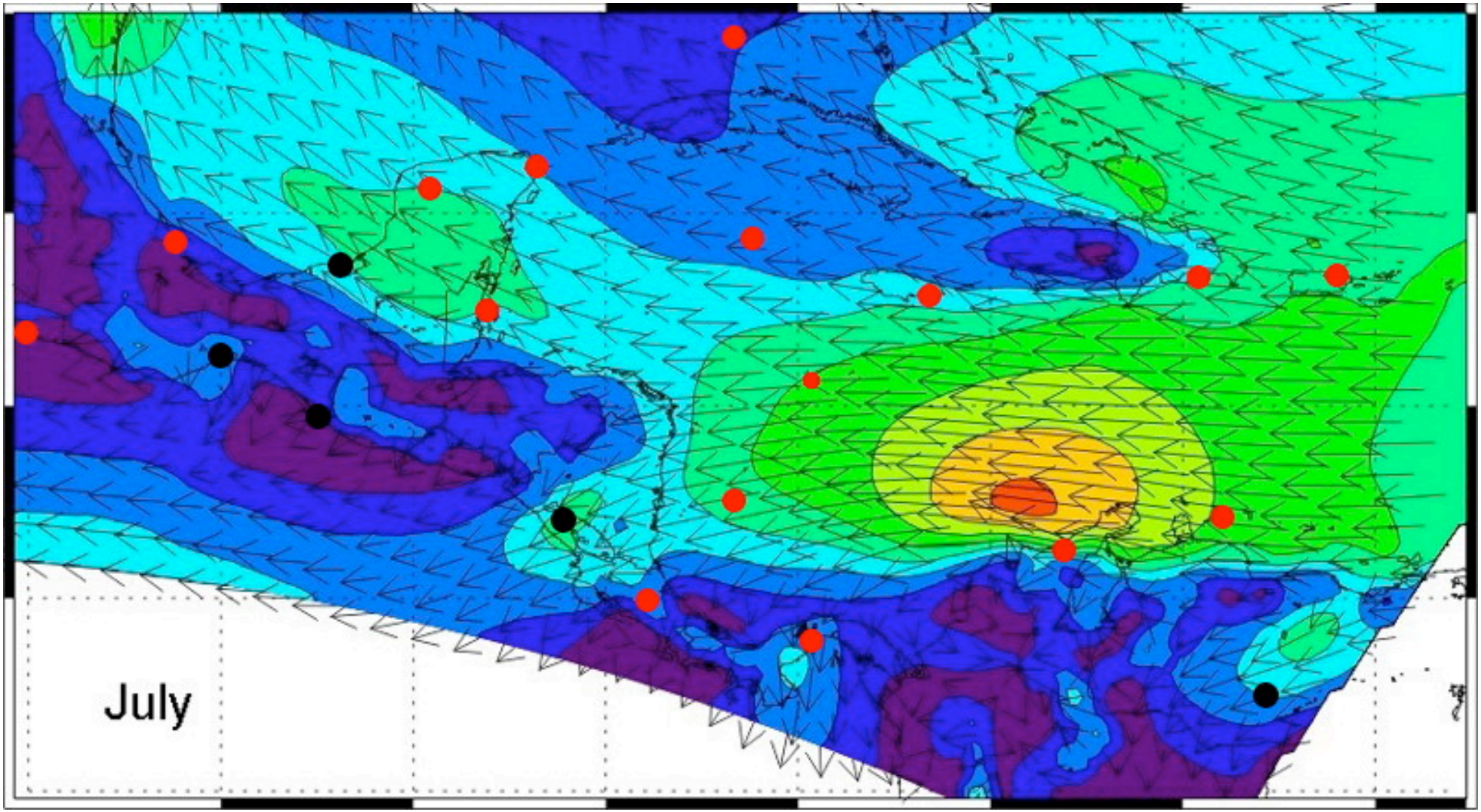


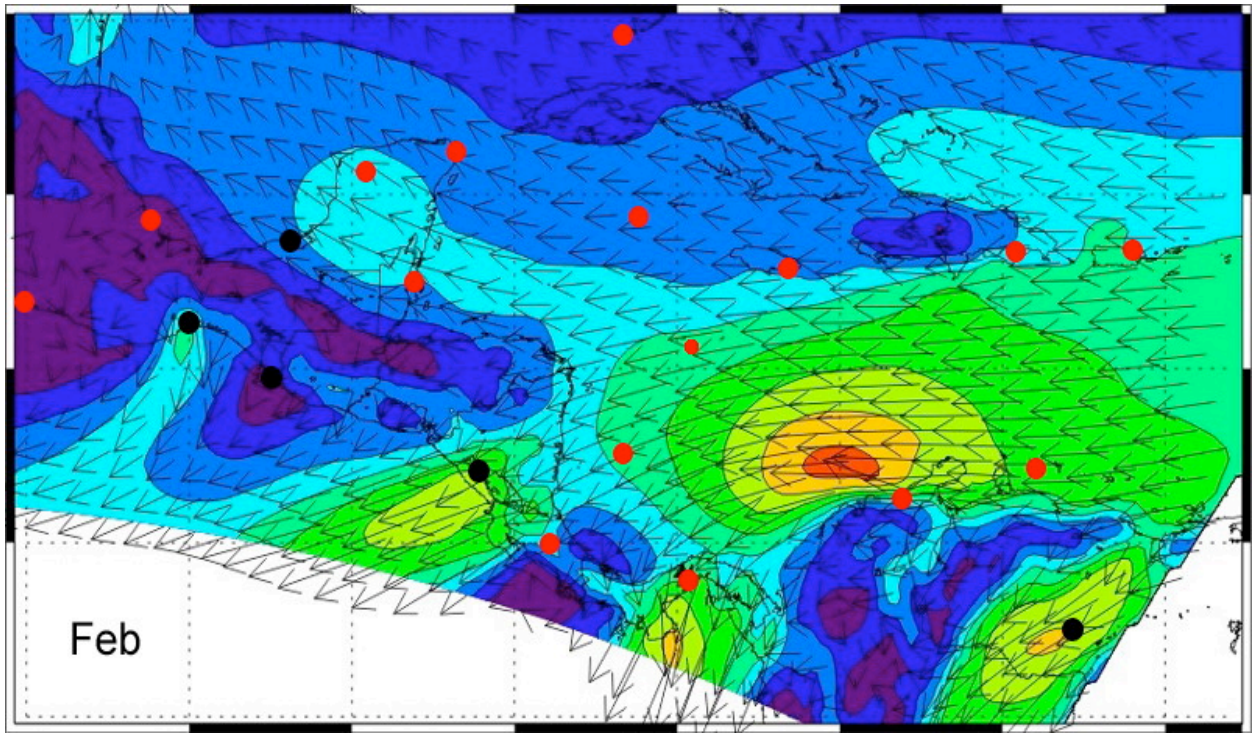
IASCLIP larger than Caribbean Sea

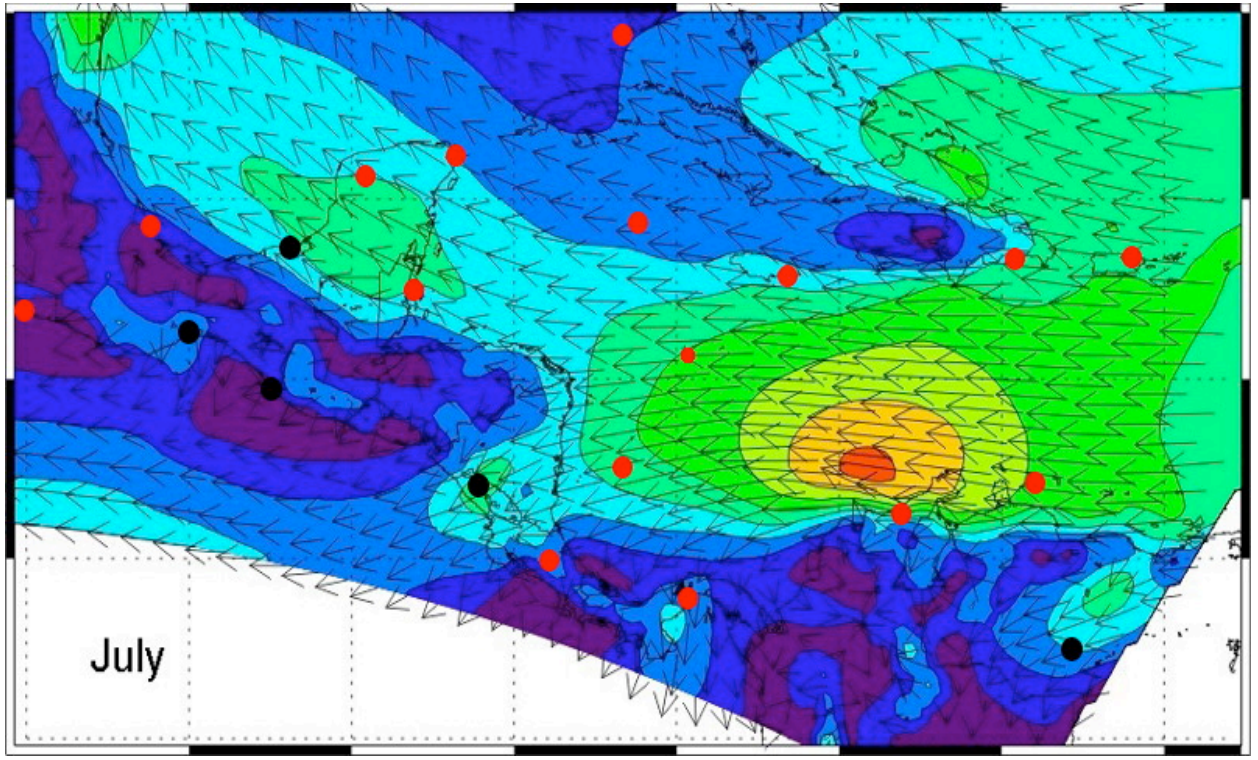
Where are the observations?



are the soundings where we want / need them?




Feb


July

Alternative analyses

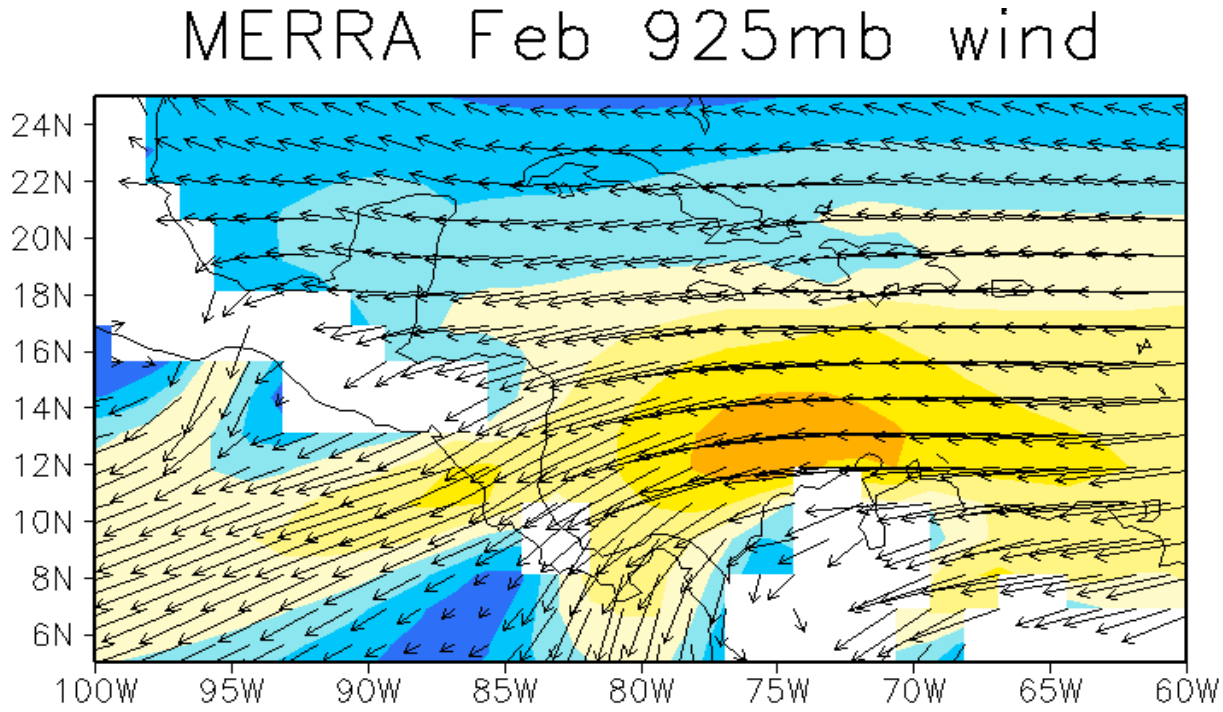
Better than NARR?

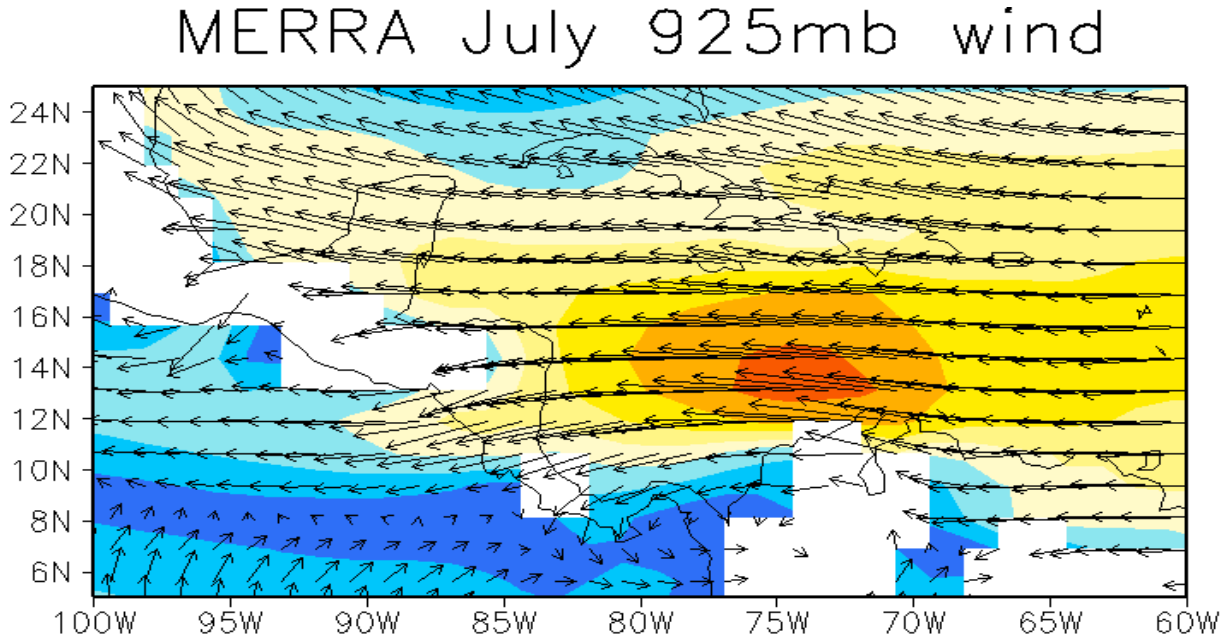
Can we tell?

MERRA 925 mb winds

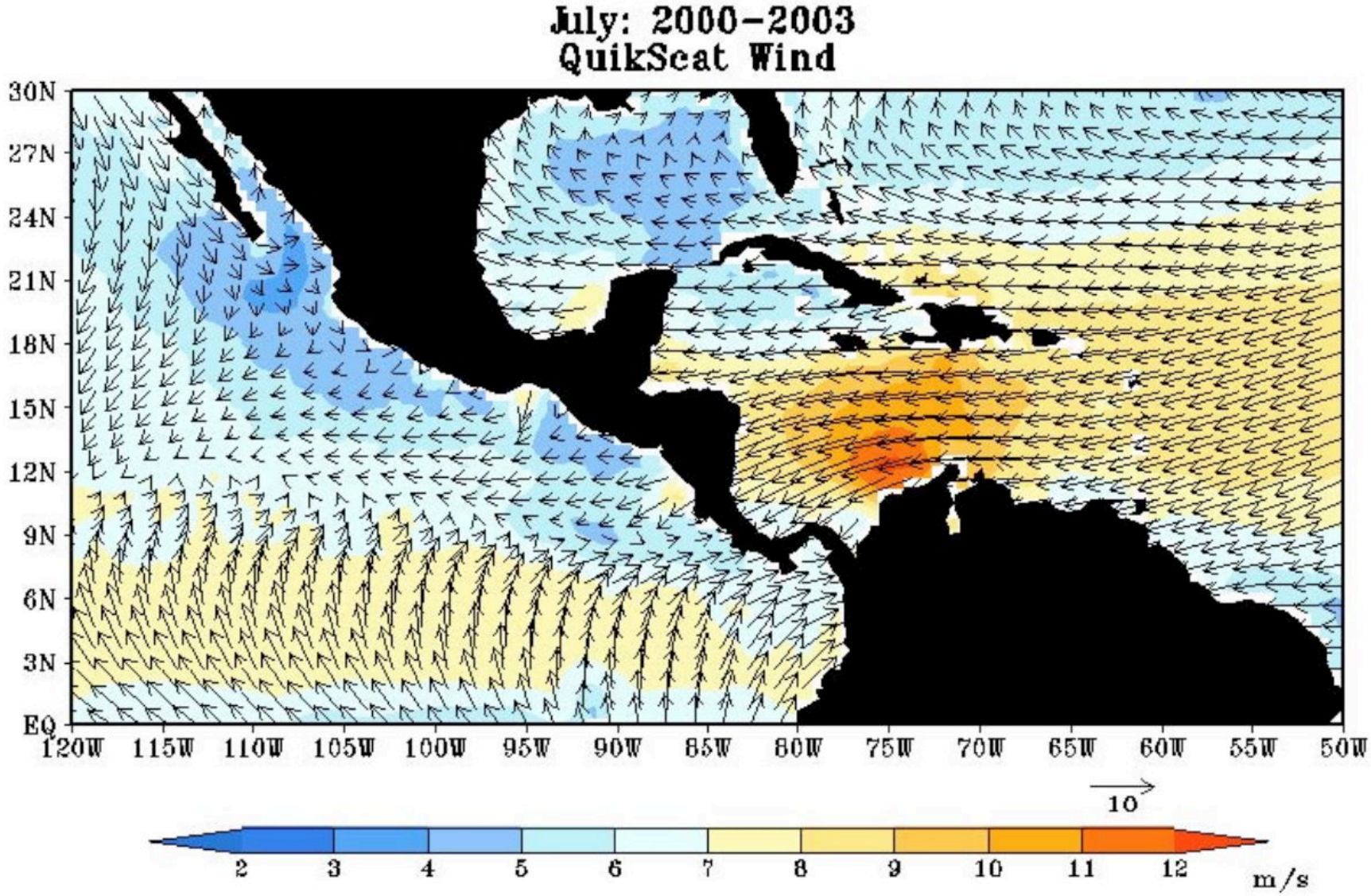
1/2 x 2/3 deg analysis is regridded to ~1deg

wind speed contour interval 2 m/s



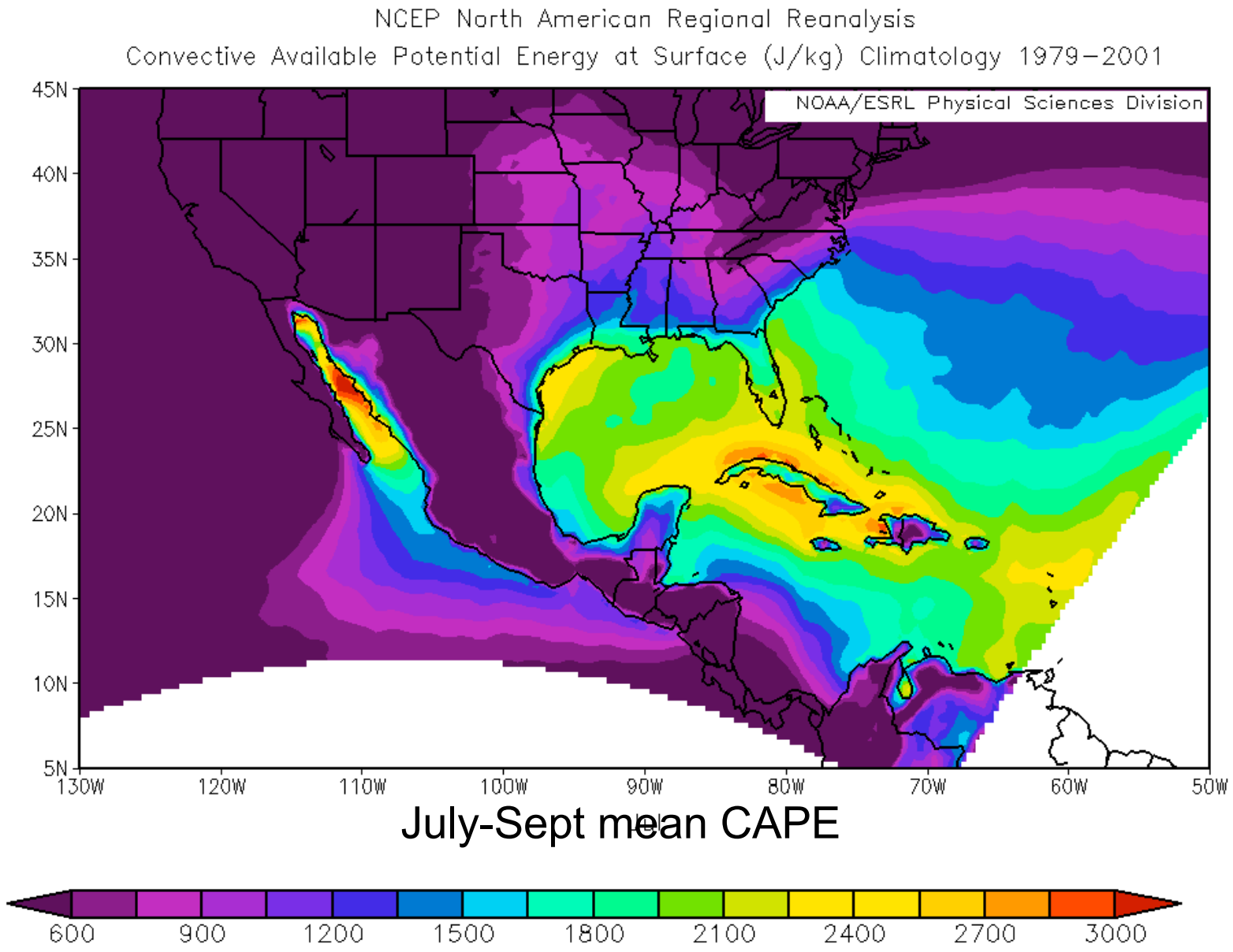


Scatterometer “good” for surface winds...



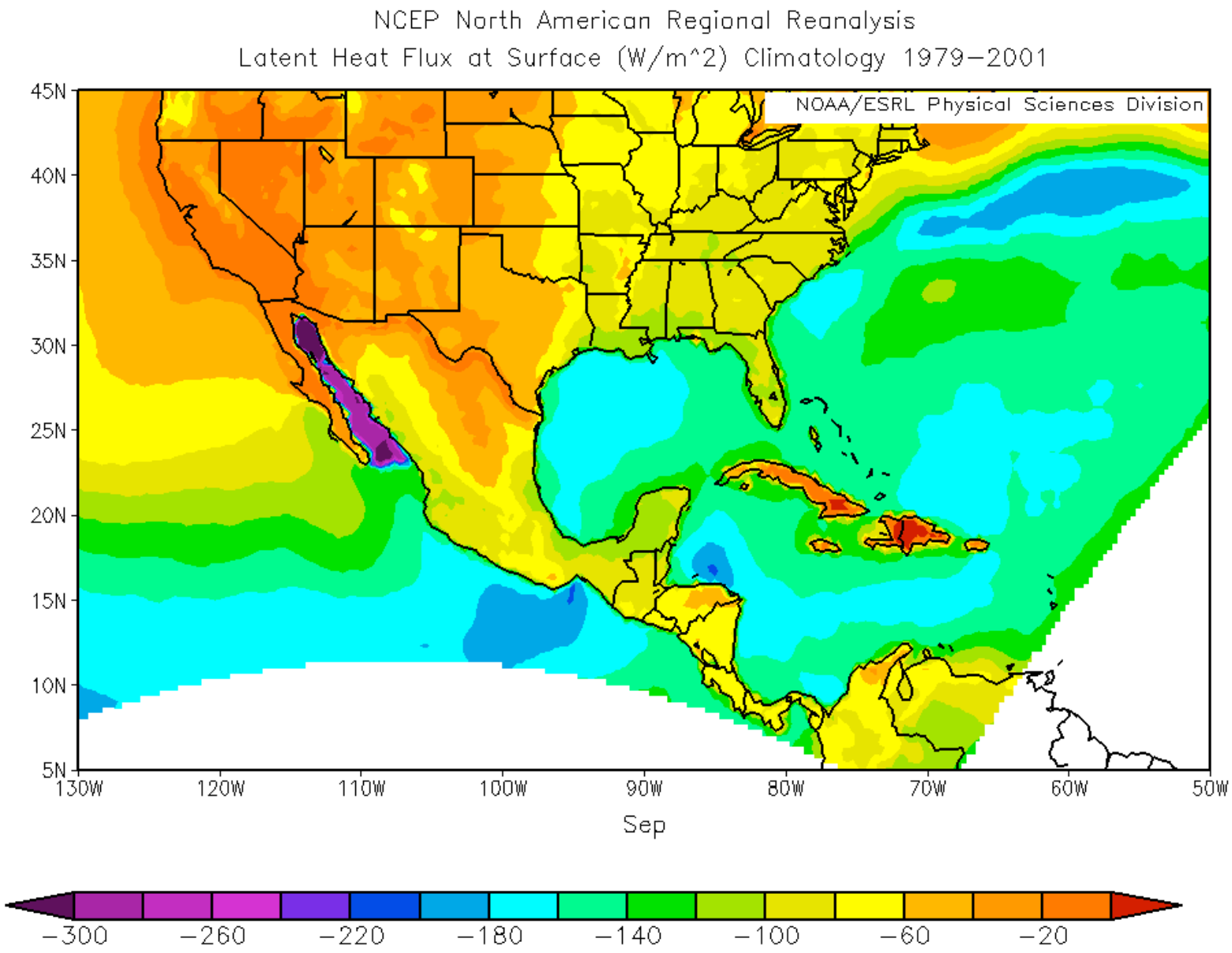
"motivational material"

large CAPE areas are low rainfall regions...and max rain area east of Costa Rica is a CAPE min.

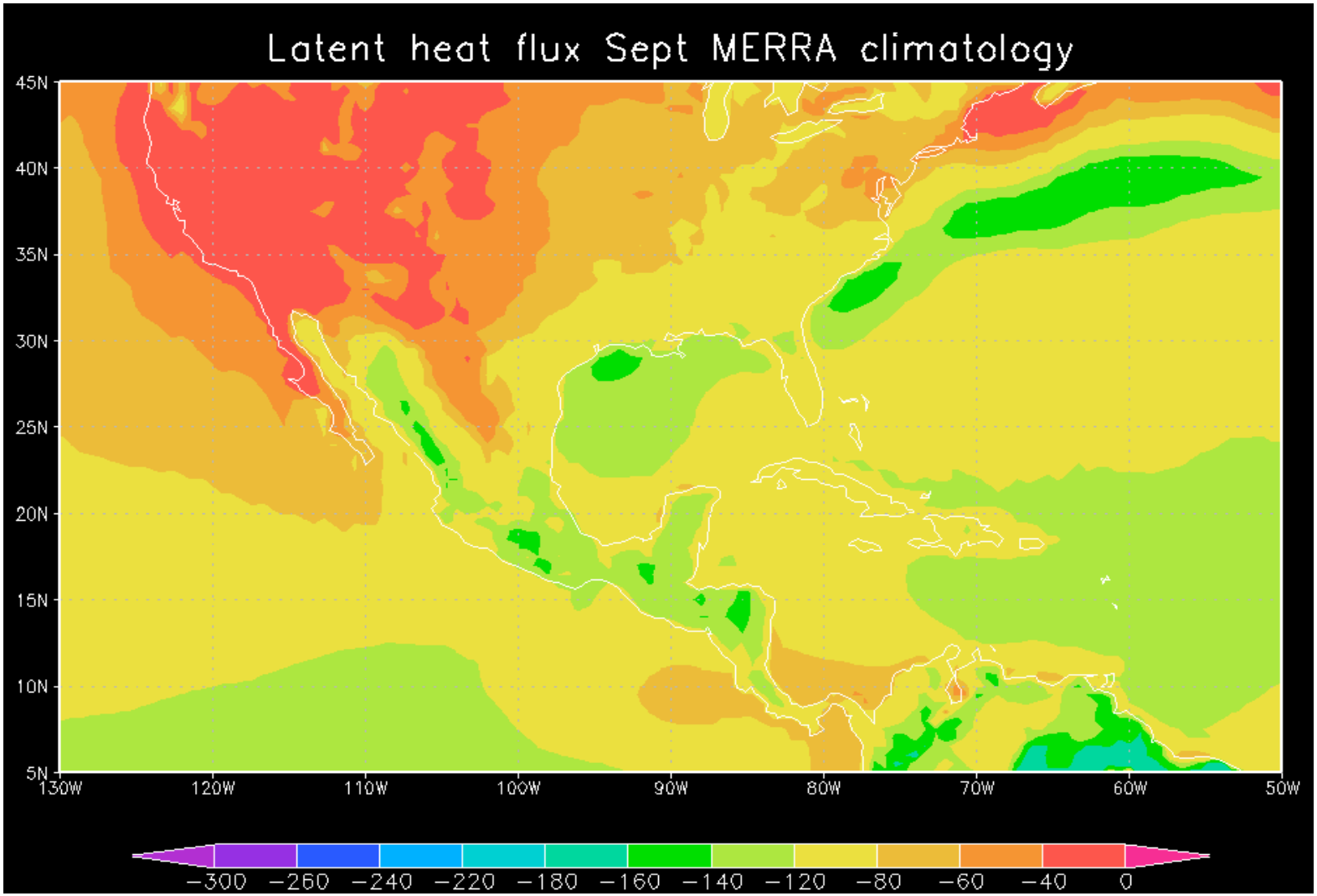


July-Sept mean CAPE

latent heat flux September



latent heat flux September



1. What is current status of routine atmospheric and oceanic monitoring activities in the IAS region? (survey of potential institutions/individuals)

2. What are the critical scientific questions that depend on additional observations beyond those routinely available? What observations are needed for:

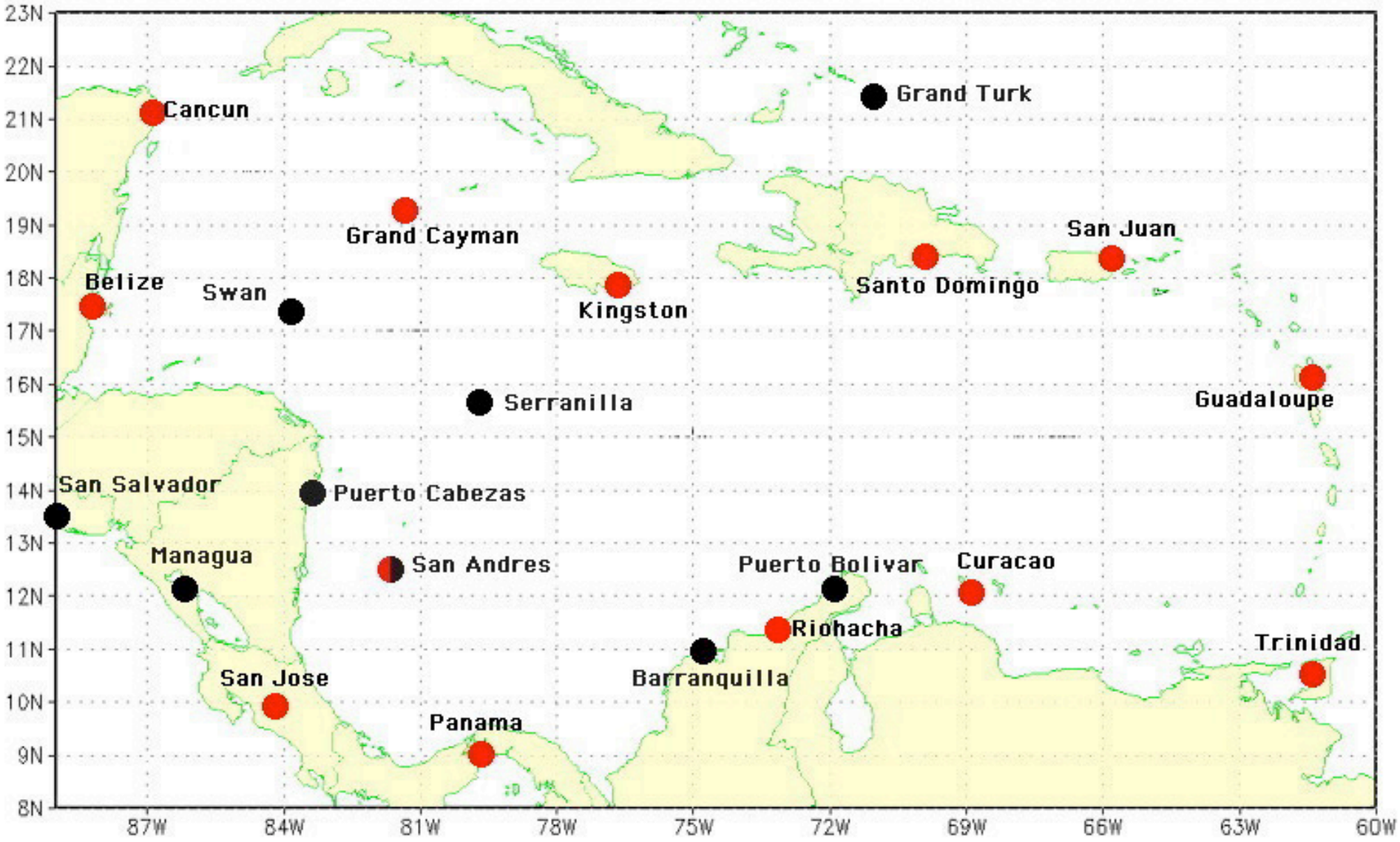
a) detecting biases in numerical simulations and reanalysis products?

b) detecting short-period climate variations (weeks to a few years)?

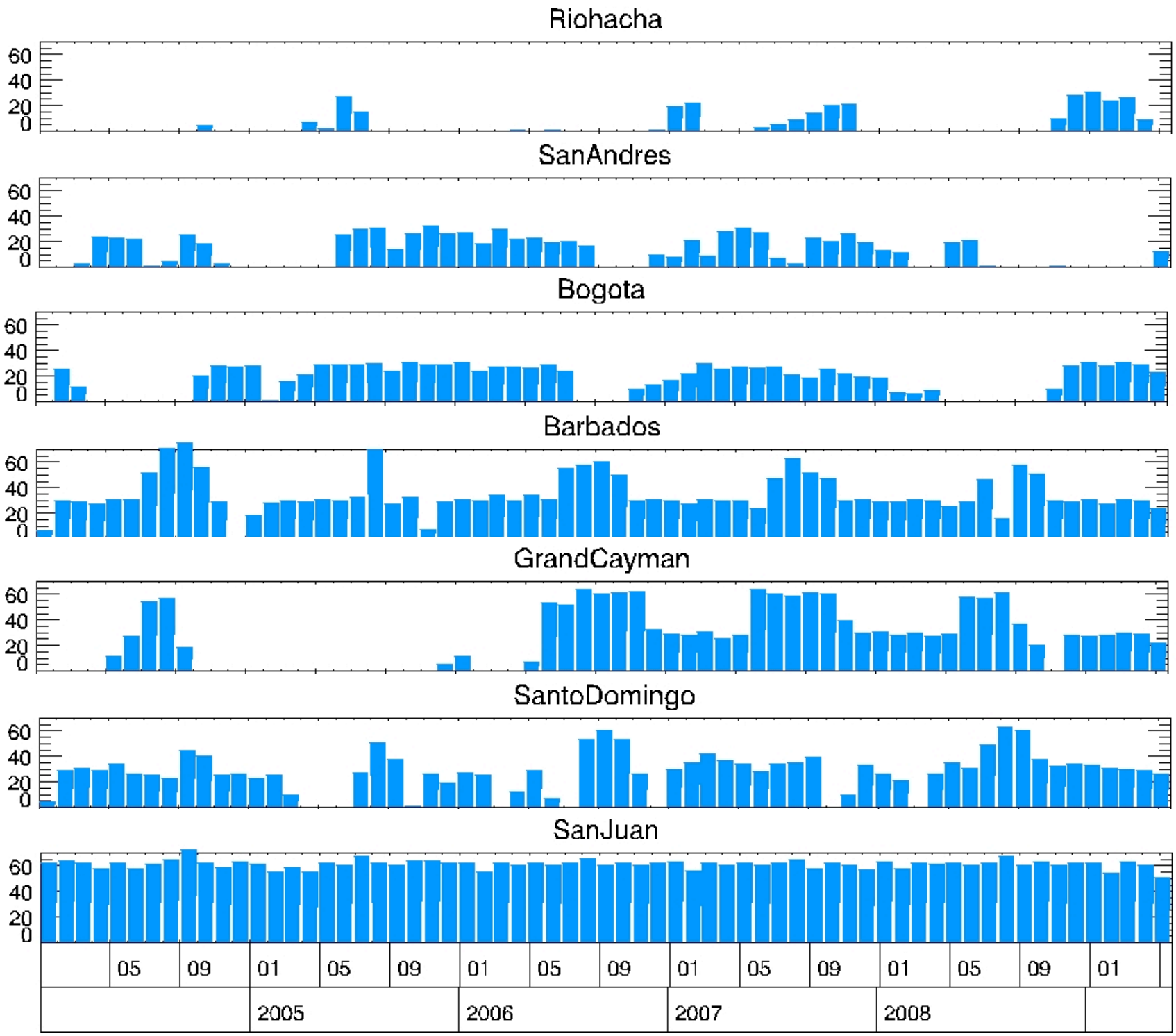
c) answering questions related to physical processes that are specific to the IAS domain?

d) providing acceptable routine monitoring of the state of the climate over the IAS domain?

radiosonde sites (red) plus other plausible (?) sounding sites

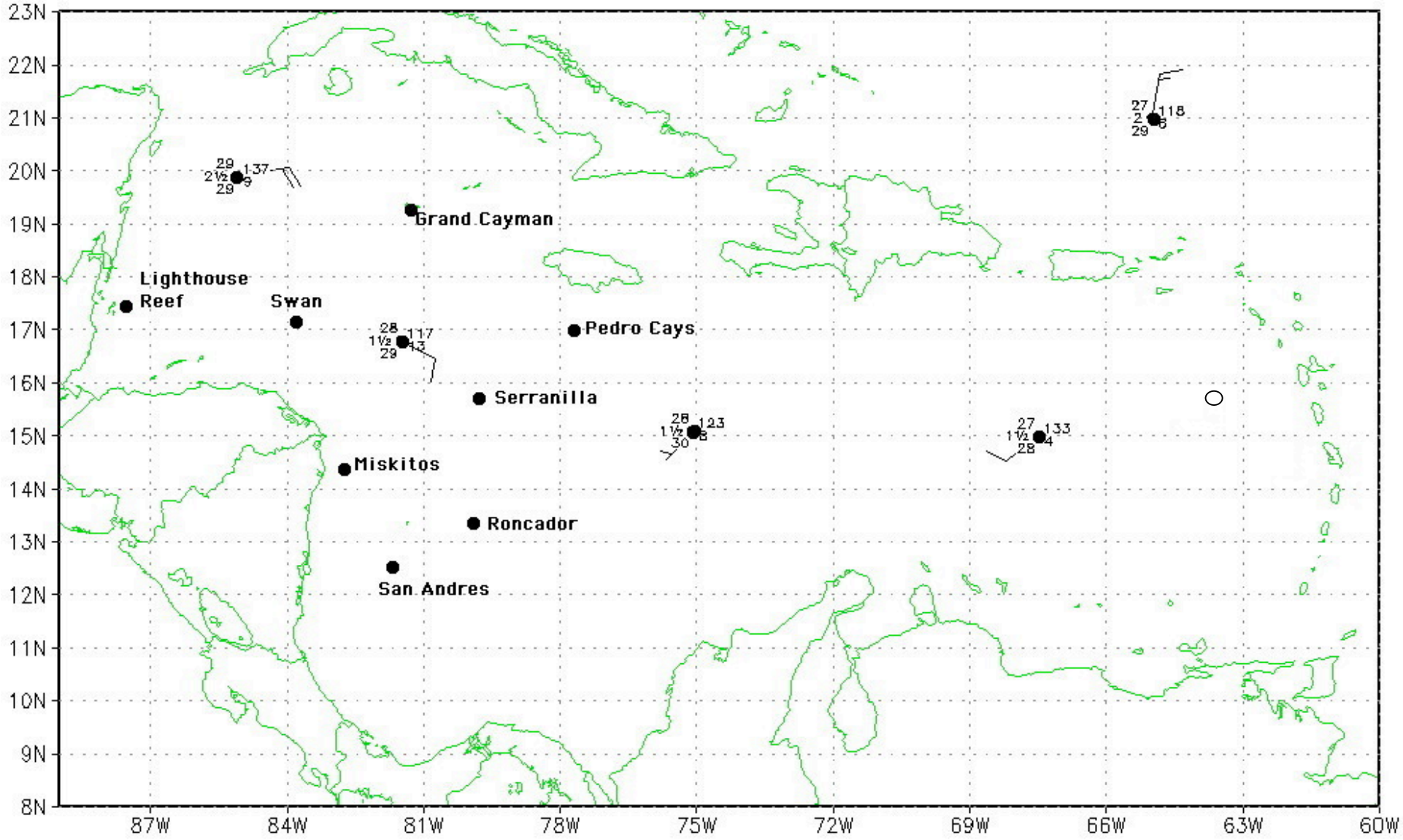


some additional sites in Colombia and Venezuela

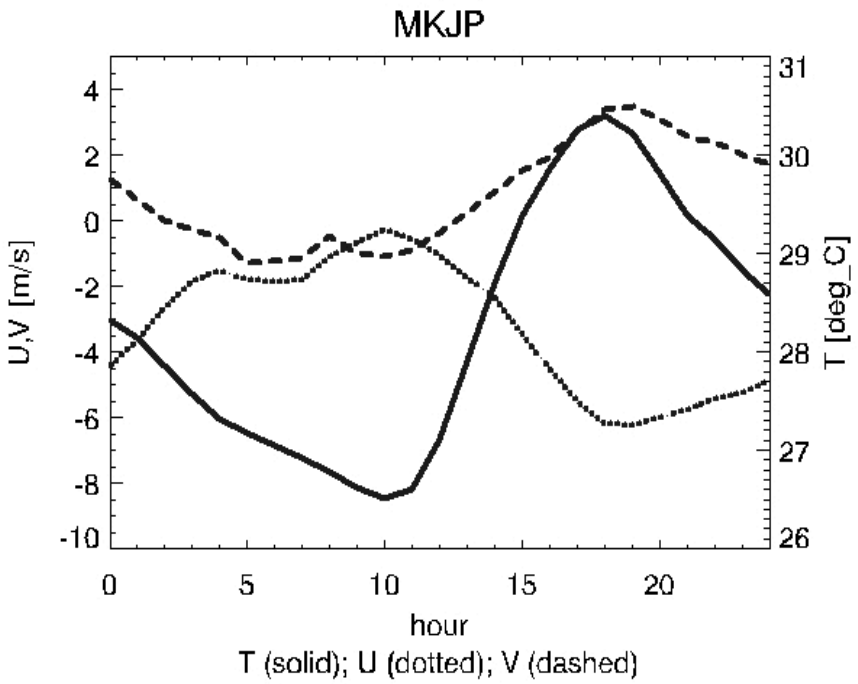


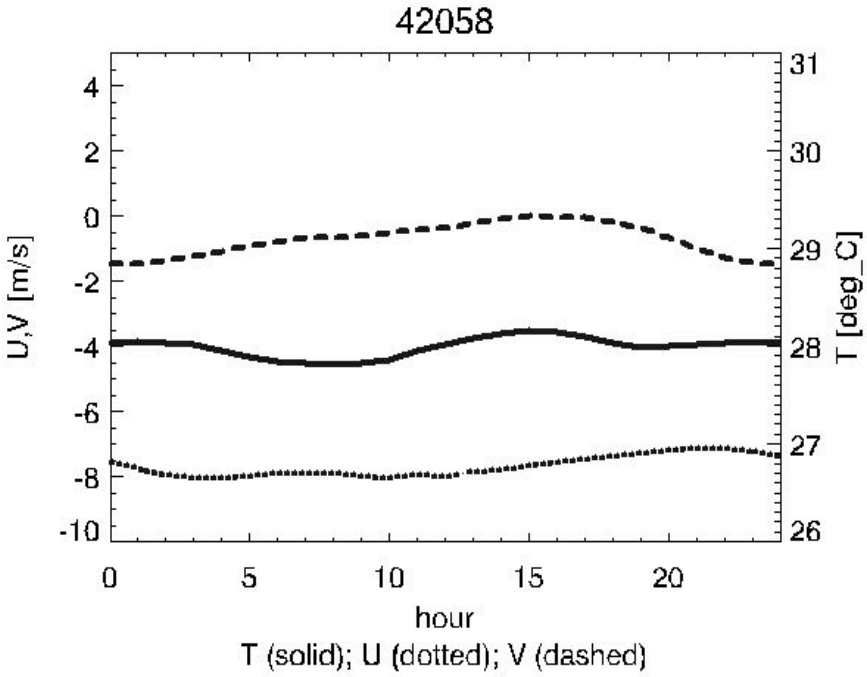
Radiosonde reception is "non-uniform"

Buoys and small islands in Caribbean Sea (not complete)

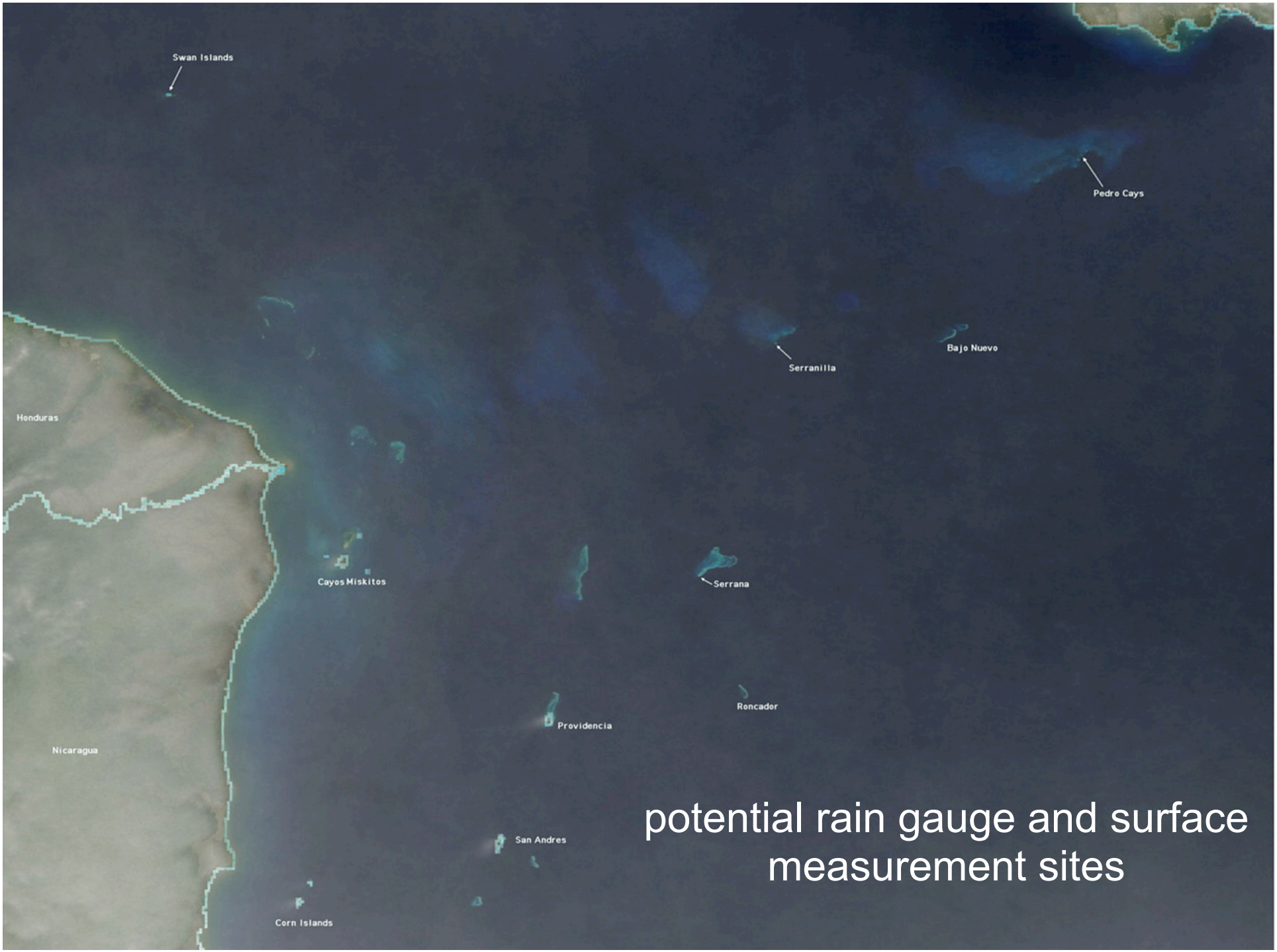


Why small islands or buoys are important: example of large diurnal changes at Kingston, and small changes at Caribbean buoy...

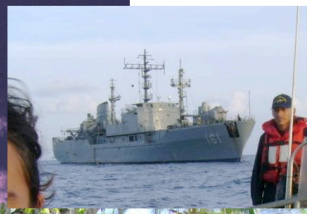


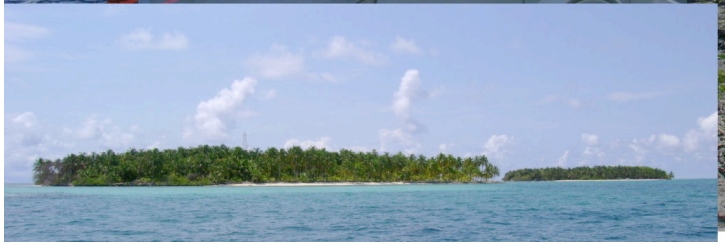



Cayman Brac
Grand Cayman
Jamaica
Swan Islands
Pedro Cays
Roatan
Serranilla
Bajo Nuevo
Honduras
Cayos Miskitos
Serrana
Roncador
Providencia
Nicaragua
San Andres
Corn Islands

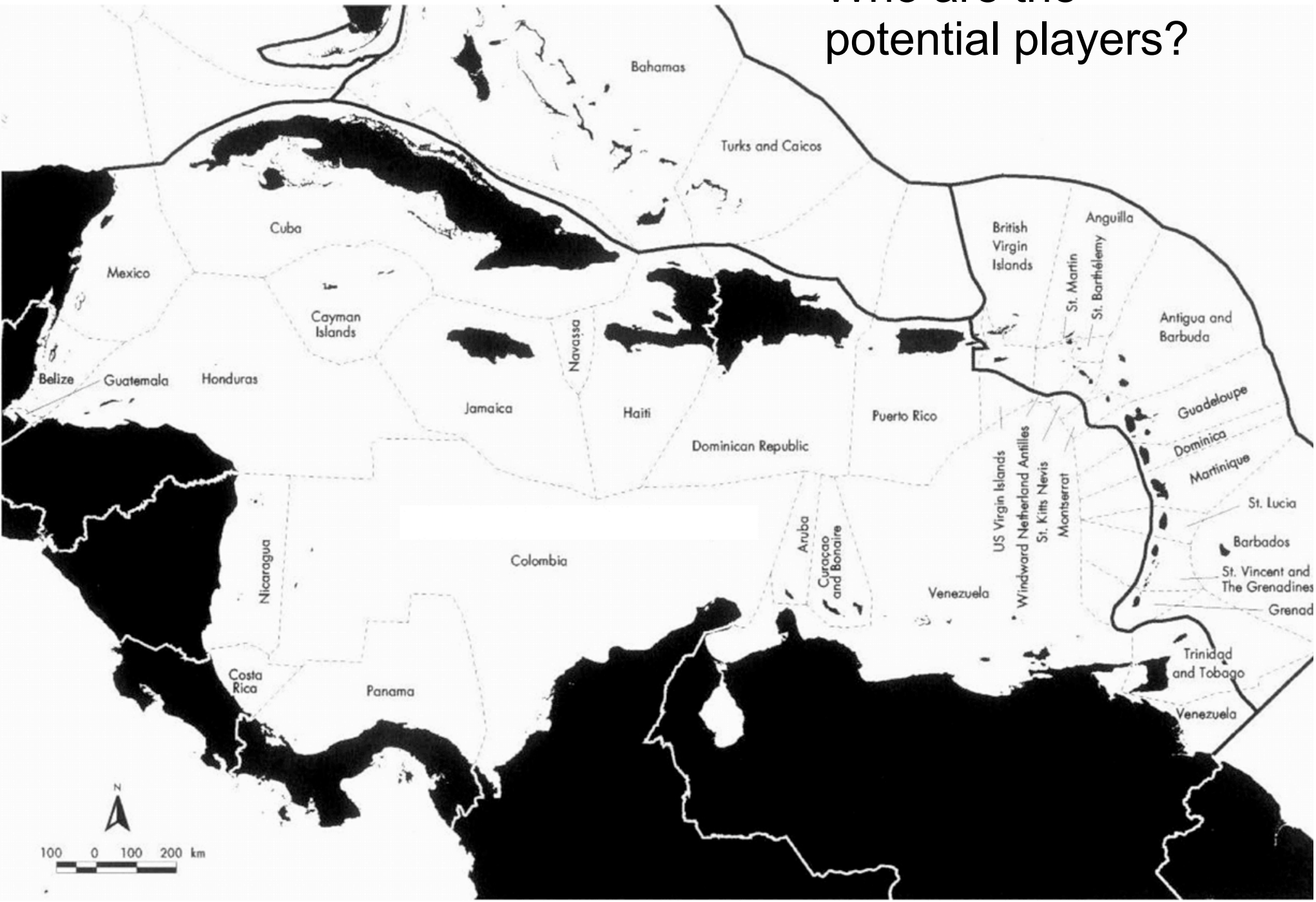

Swan Islands
Pedro Cays
Serranilla
Bajo Nuevo
Honduras
Cayos Miskitos
Serrana
Roncador
Providencia
Nicaragua
San Andres
Corn Islands
potential rain gauge and surface measurement sites

Colombian cayos...note facilities and logistical arrangements

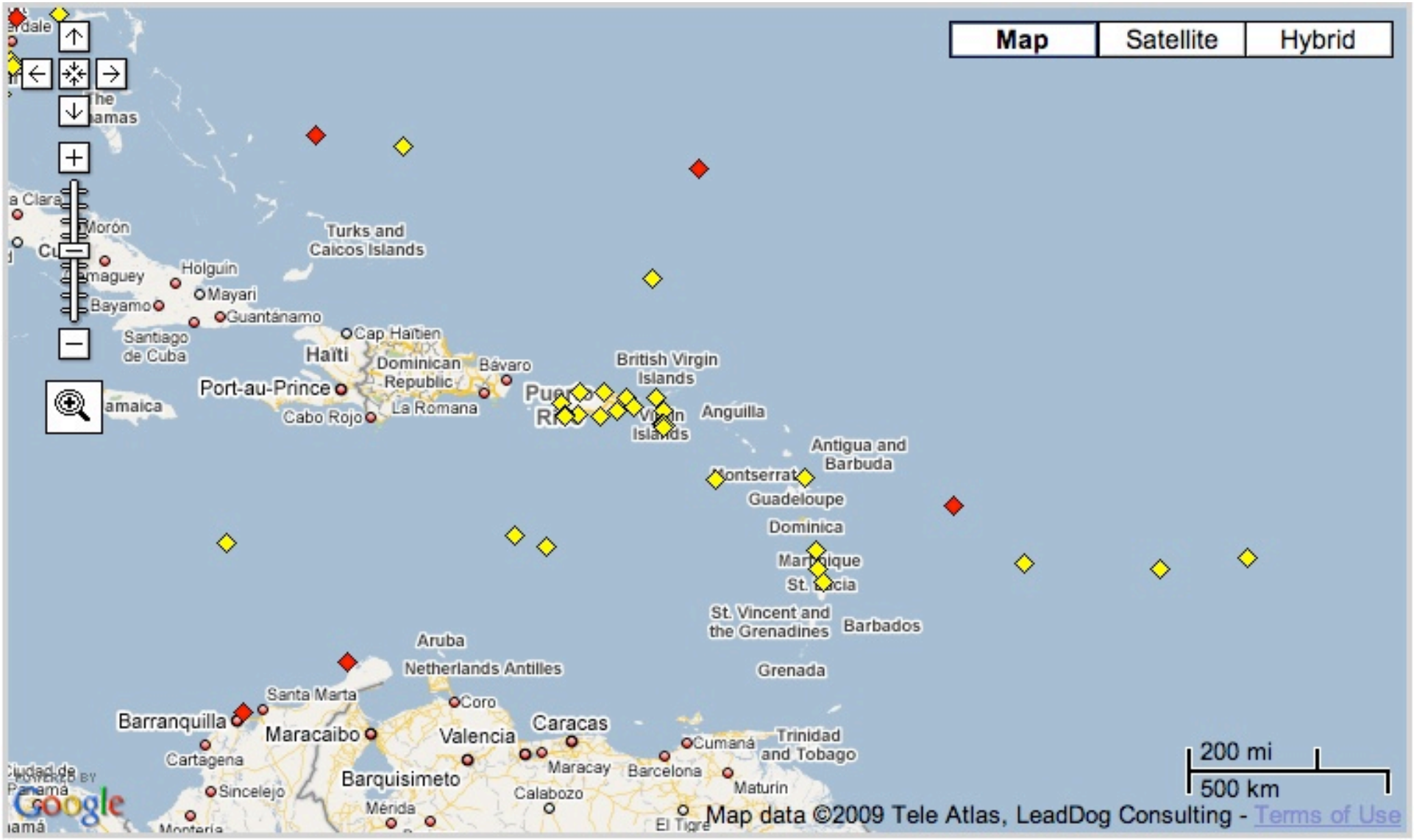


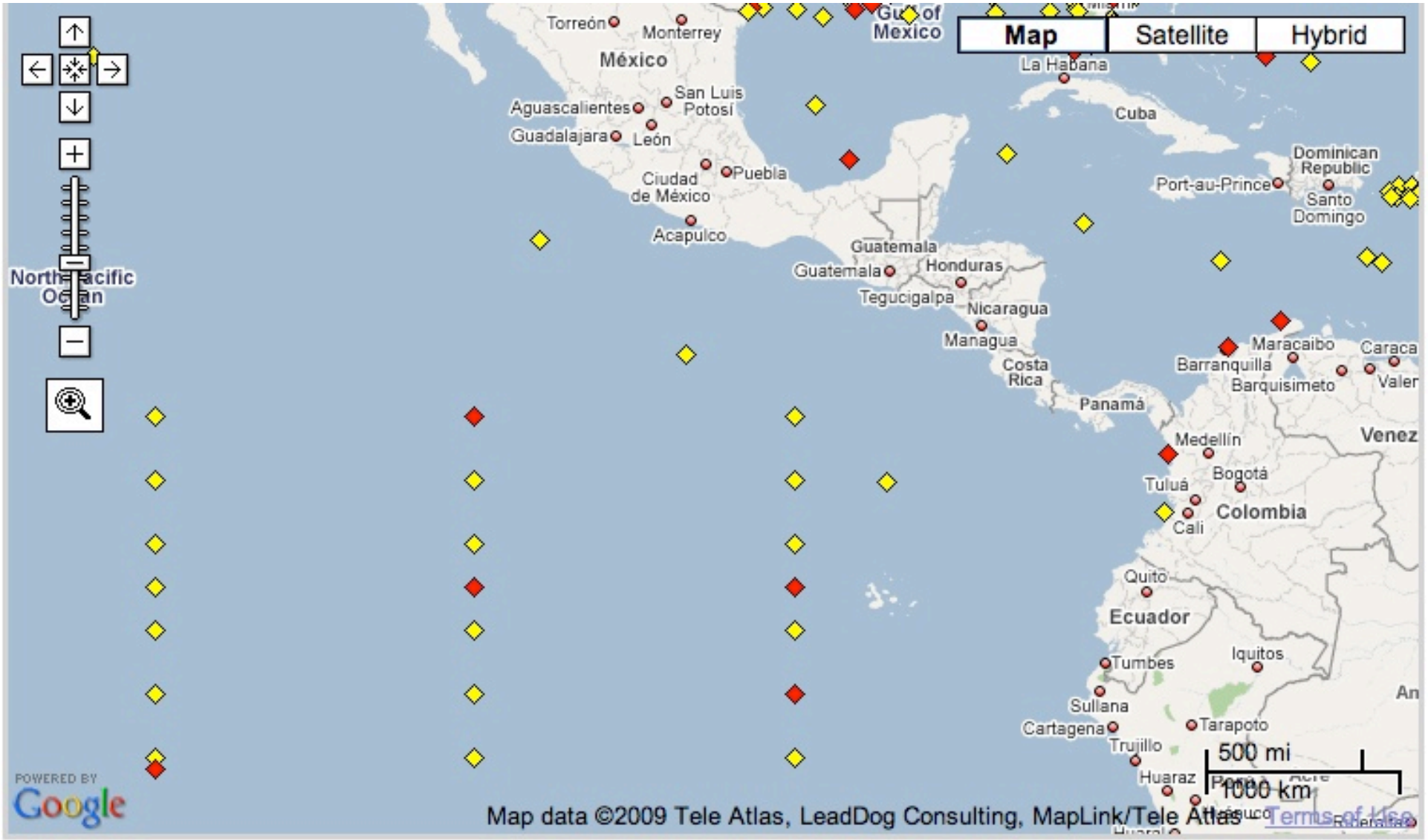


Who are the potential players?



Current buoy array




Map
Satellite
Hybrid
Torreón
Monterrey
México
Gulf of Mexico
La Habana
Cuba
Aguascalientes
San Luis Potosí
Guadalajara
León
Puebla
Ciudad de México
Acapulco
Dominican Republic
Port-au-Prince
Santo Domingo
Guatemala
Honduras
Tegucigalpa
Nicaragua
Managua
Costa Rica
Panamá
Maracaibo
Barranquilla
Barquisimeto
Caraca
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Medellín
Bogotá
Tuluá
Cali
Colombia
Venez
Quito
Ecuador
Iquitos
Tumbes
Sullana
Cartagena
Tarapoto
Trujillo
Huaraz
500 mi
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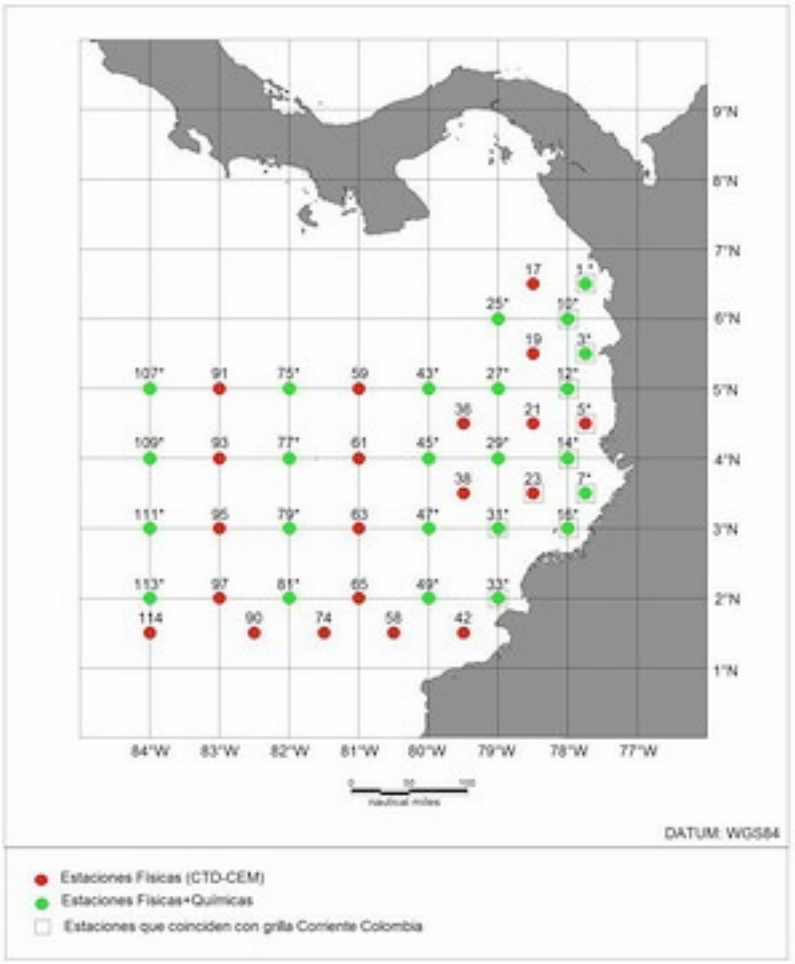
Colombian Navy resources... they have 3 research ships... two like this... #155 and #156



El buque oceanográfico ARC Malpelo será la palataforma que apoyará el crucero que cubrirá estaciones de muestreo a lo largo del Pacífico colombiano.

Some newer options for atmospheric soundings

Low-cost systems now available (~$10K for ground station) may allow for:

1) semi-permanent installation on major research ships in region

2) measurements on smaller islands for extended durations

3) additional density in regions for adaptive observations during events of "high priority" - allowing for "extended duration" process studies

ORDER FOR SUPPLIES OR SERVICES

PAGE 1 OF PAGES 4

IMPORTANT: Mark all packages and papers with contract and/or order numbers.

1. DATE OF ORDER: 25 Mar 2009	2. CONTRACT NO. *(if any)*
3. ORDER NO.: **WB133R-09-SU-0582**	4. REQUISITION/REFERENCE NO.: NRMAG000-9-08989

5. ISSUING OFFICE *Address correspondence to:*
NATIONAL SEVERE STORMS LABORATORY/R/NSSL
120 DAVID L. BOREN BLVD

NORMAN, OK 73072-7318
DENA GROSE 405-325-6507

6. SHIP TO:
a. NAME OF CONSIGNEE: NATIONAL SEVERE STORMS LABORATORY/R/NSSL
b. STREET ADDRESS: 120 DAVID L. BOREN BLVD
c. CITY: NORMAN | d. STATE: OK | e. ZIP CODE: 73072-7318
f. SHIP VIA

7. TO: 00000782 TIN: 383372127
a. NAME OF CONTRACTOR: INTERNATIONAL MET SYSTEMS INC. DUNS: 179332341
b. COMPANY NAME: Attn: Frederick Clowney FAX: 616 957-1280
c. STREET ADDRESS: 4460 40TH ST. SE
d.CITY GRAND RAPIDS | e. STATE MI | f. ZIP 495124035

8. TYPE OF ORDER
X a. PURCHASE — REFERENCE: Quote 41362 Rev B. Please furnish the following on the terms and conditions specified on this order and on the attached sheet, if any, including delivery as indicated.
b. DELIVERY — Except for billing instructions on the reverse, this delivery order is subject to instructions contained on this side only of this form and is issued subject to the terms and conditions of the above-numbered contract.

9. ACCOUNTING AND APPROPRIATION: See Attached Schedule BOC: OBLIGATED AMT: $18,350.00

10. REQUISITIONING OFFICE: NOAA - OAR
Linda McGuckin 405 325-6167

11. BUSINESS CLASSIFICATION *(Check appropriate box (es))*
[X] a. Small [ ] b. Other than small [ ] c. Disadvantaged [ ] d. Women-owned [ ] e. HUBZone [ ] f. Emerging small business [ ] g. Service-disabled veteran-owned

12. F.O.B. POINT	14. GOVERNMENT B/L NO.	15. DELIVER TO F.O.B. POINT ON OR BEFORE	16. DISCOUNT TERMS
DESTINATION		25 Apr 2009	00.00% 0 Days Net 30

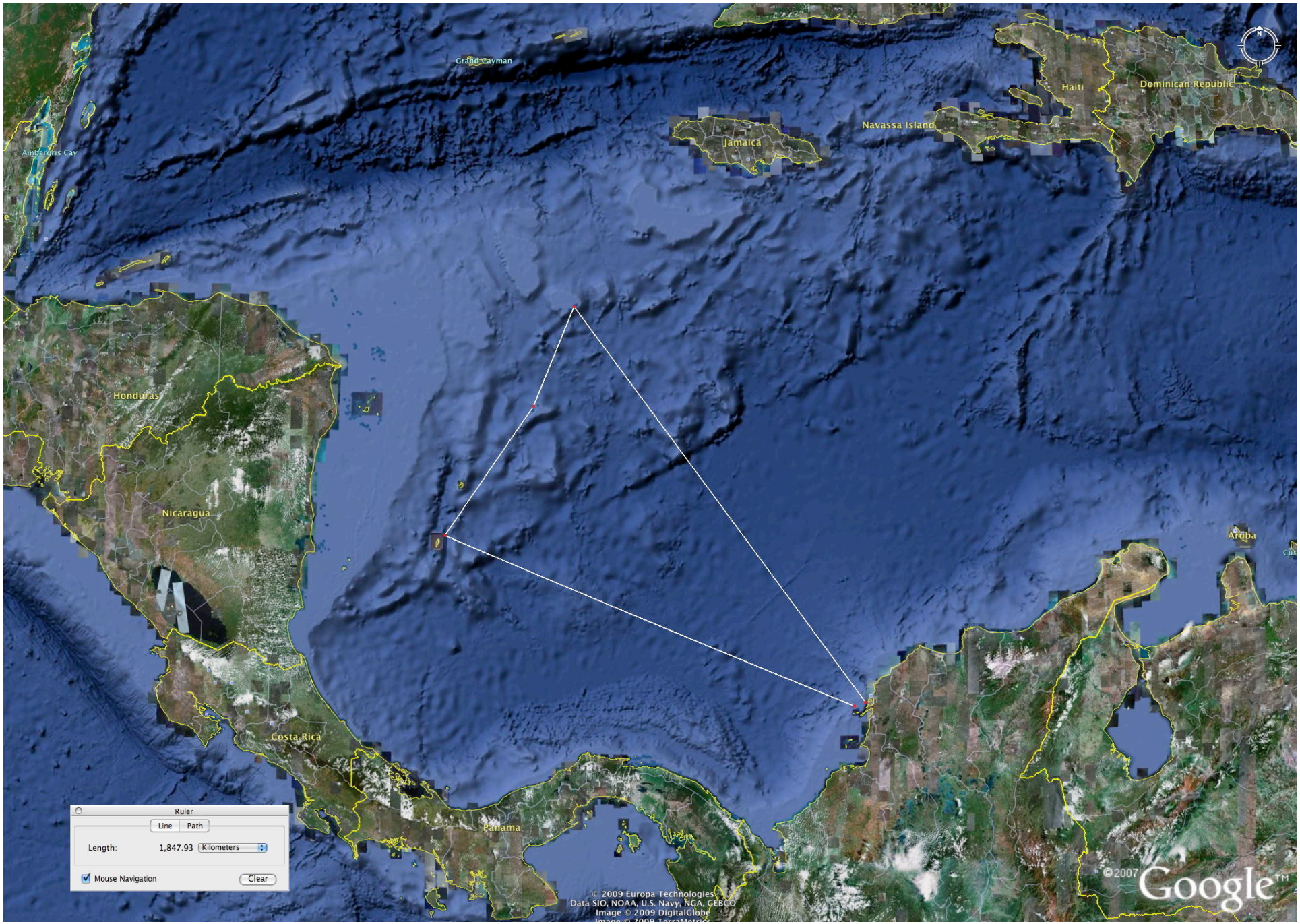
13. PLACE OF: a. INSPECTION | b. ACCEPTANCE

17. SCHEDULE *(See reverse for Rejections)*

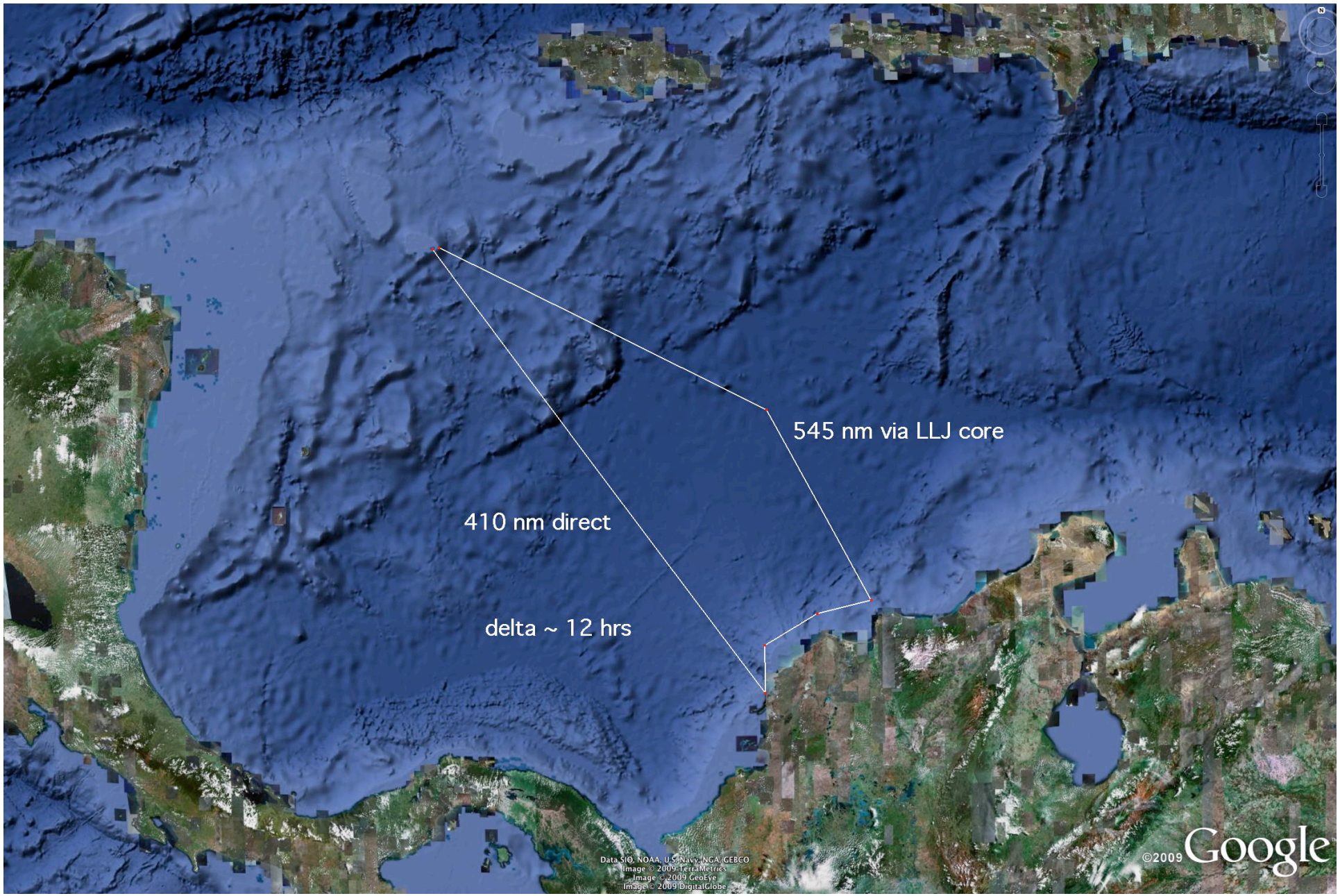
ITEM NO. (a)	SUPPLIES OR SERVICES (b)	QUANTITY ORDERED (c)	UNIT (d)	UNIT PRICE (e)	AMOUNT (f)	QTY ACCEPT. (g)
	COMMERCIAL ITEM. NAICS 423490; STANDARD SIZE 100 EMPLOYEES.					
0001	iMet-3050 403 MHz Upper-Air Sounding System. Base system including UHF Antenna / Receiver, Met Processor, iMetOS Software, Field Cases and System Manuals. Customer will provide System Computer	1	EA	9,850.00	9,850.00	

18. SHIPPING POINT	19. GROSS SHIPPING WEIGHT	20. INVOICE NO.	17(h) TOTAL (Cont.
21. MAIL INVOICE TO:			

possible resupply ship track to Colombian islands



possible modification to ship track to cross LLJ core... adds 12 hr each way



Pedro Brava, Venezuelan Navy
Oceanographic ship

AMDAR Data Display from ESRL/GSD

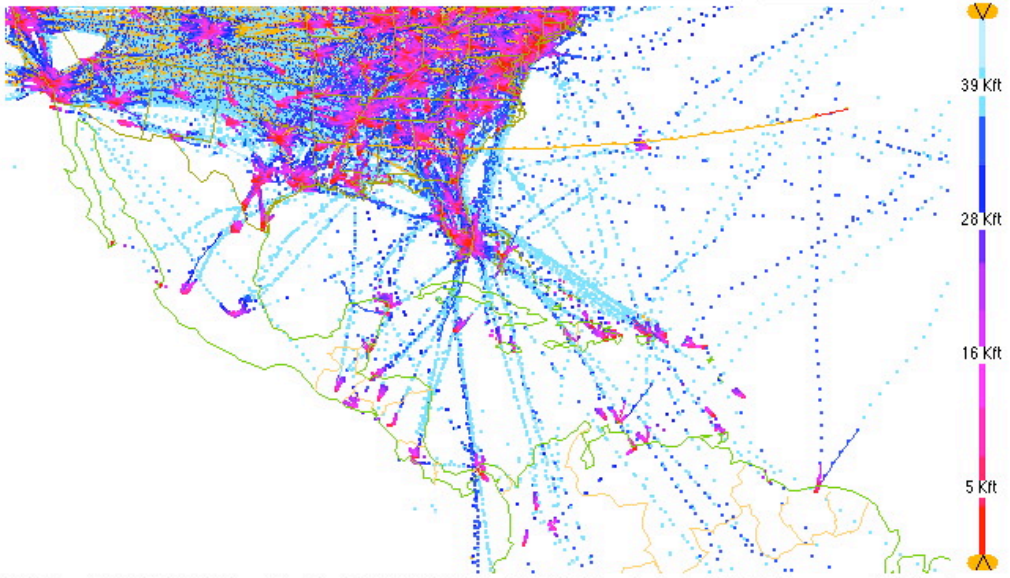
5-May-2008 new Several additional regional airports in the U.S. added. See change details (new window) for more information. Please notify Bill.Moninger@noaa.gov of any problems.

Per our agreements with participating airlines, this data may not be redstributed to third parties. (Use of images in research publications is allowed and encouraged, however.)

ESRL/GSD AMDAR Home | FAQ and General Information | Forecast Discussions
Help | **Forum** | Change Details | Set initial defaults | Privacy Statement

Load | Select | Show: | WindSpd | Barbs | Soundings

Un-zoom | Default | World | Overlays | | Overview



11-Mar-2009 12:00:00 -- 13-Mar-2009 11:59:59 (489347 obs loaded, 247429 in range, 29685 shown)

NOAA / ESRL / GSD Altitude: -1000 ft. to 45000 ft.

All data

5 15

min spacing 1 pixels

1022 airports loaded in 0.1 seconds
1141 VORs loaded in 0.1 seconds
Aircraft loaded: 1218 regular, 0 g, 55 edr, 10 rh, 36 vG, 0 ice, 0 TAMDAR
Aircraft loaded: 1914 regular, 0 g, 100 edr, 27 rh, 123 vG, 0 ice, 106 TAMDAR

National Oceanic and Atmospheric Administration (NOAA)
Earth System Research Laboratory (ESRL)
Global Systems Division (GSD)
Prepared by Bill Moninger, 303-497-6435
Last modified: Sun Sep 7 16:44:48 DST 2008

AIRCRAFT OBSERVATIONS

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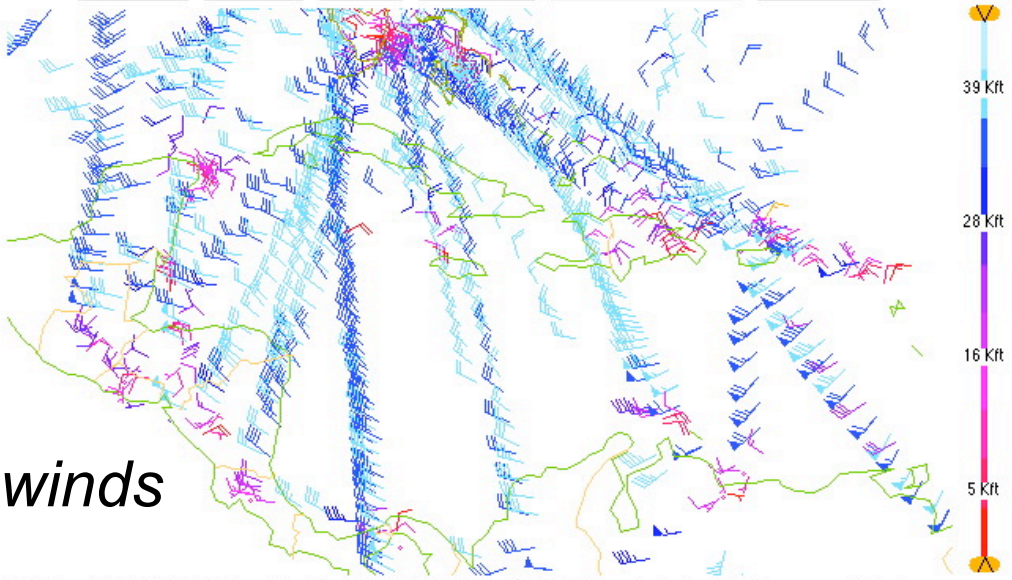

11-Mar-2009 12:00:00 -- 11-Mar-2009 23:59:59 (152686 obs loaded, 9180 in range, 978 shown)

NOAA / ESRL / GSD Altitude: -1000 ft. to 45000 ft.

1141 VORs loaded in 0.1 seconds
Aircraft loaded: 1218 regular, 0 g, 55 edr, 10 rh, 36 vG, 0 ice, 0 TAMDAR
Aircraft loaded: 1914 regular, 0 g, 100 edr, 27 rh, 123 vG, 0 ice, 106 TAMDAR
Aircraft loaded: 1472 regular, 0 g, 96 edr, 10 rh, 97 vG, 0 ice, 106 TAMDAR

All data
5 15
min spacing 5 pixels

Reasonable quality winds

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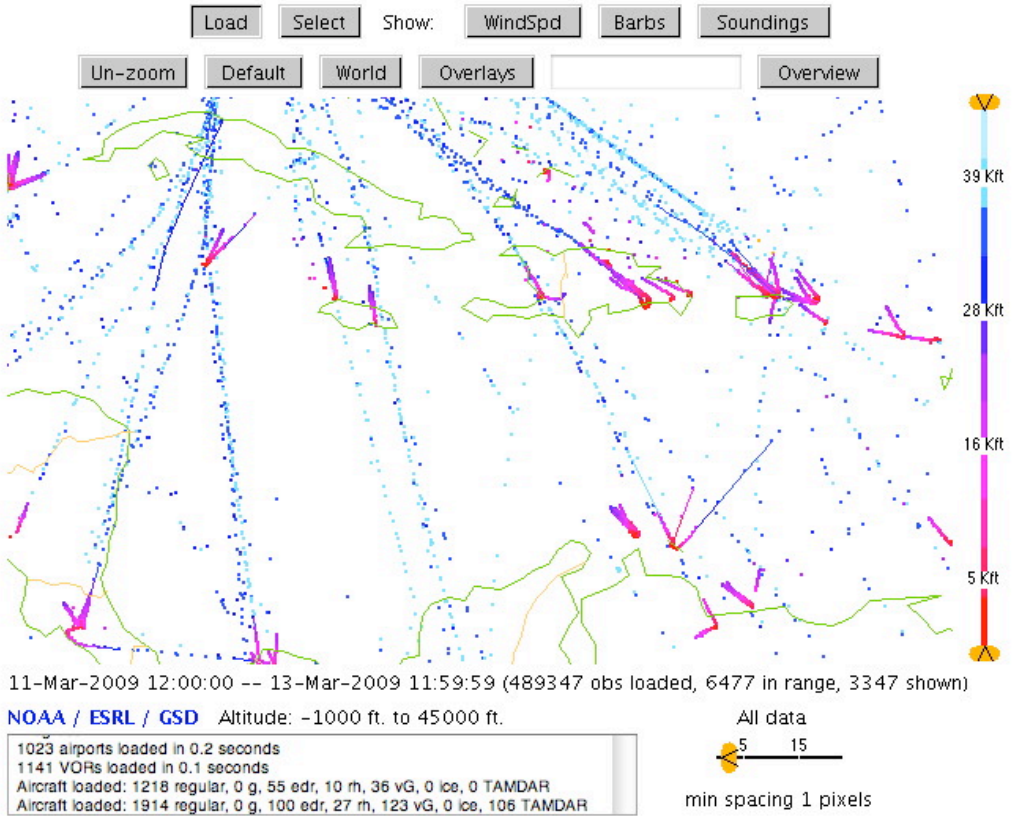

good high-level coverge

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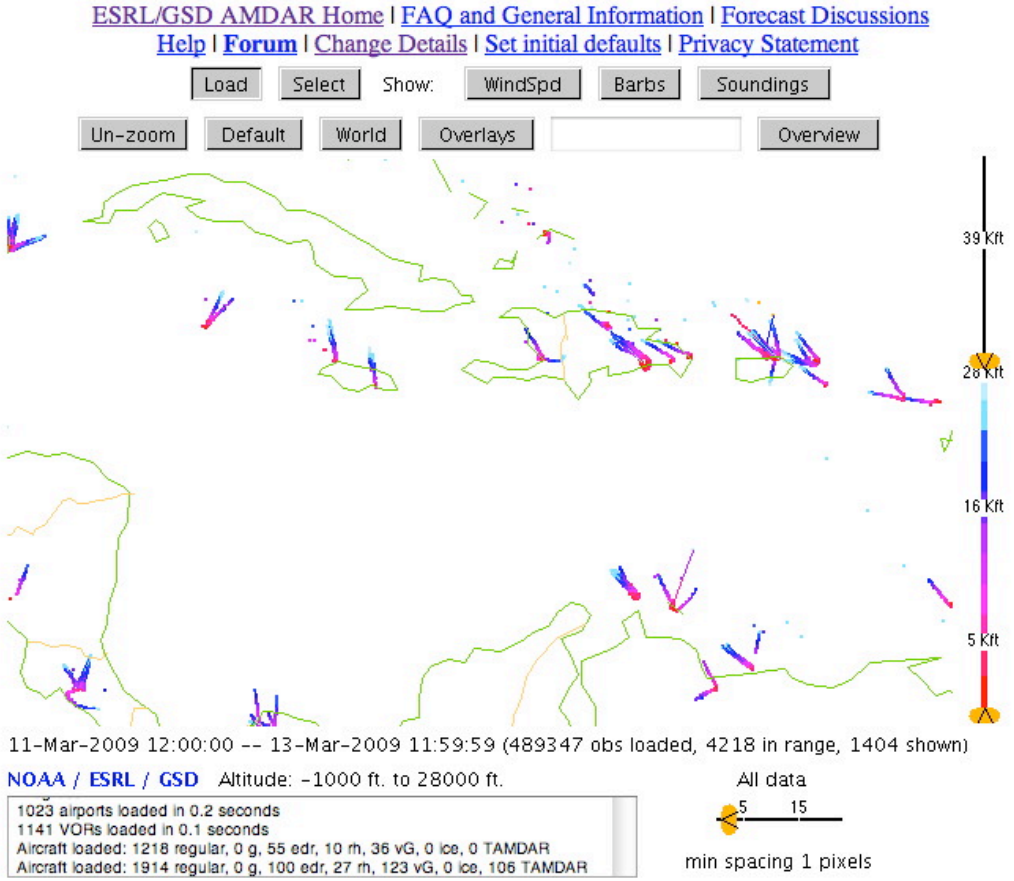

AMDAR soundings don't cover over-ocean regions well enough.

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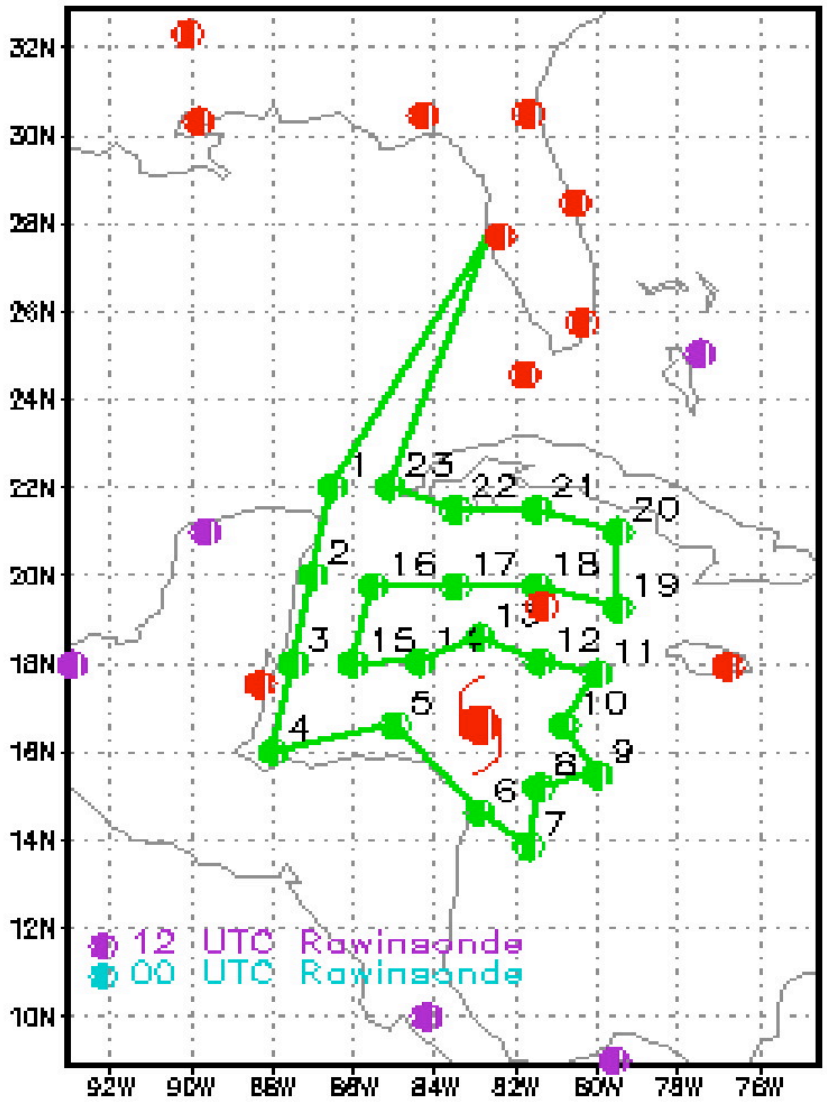
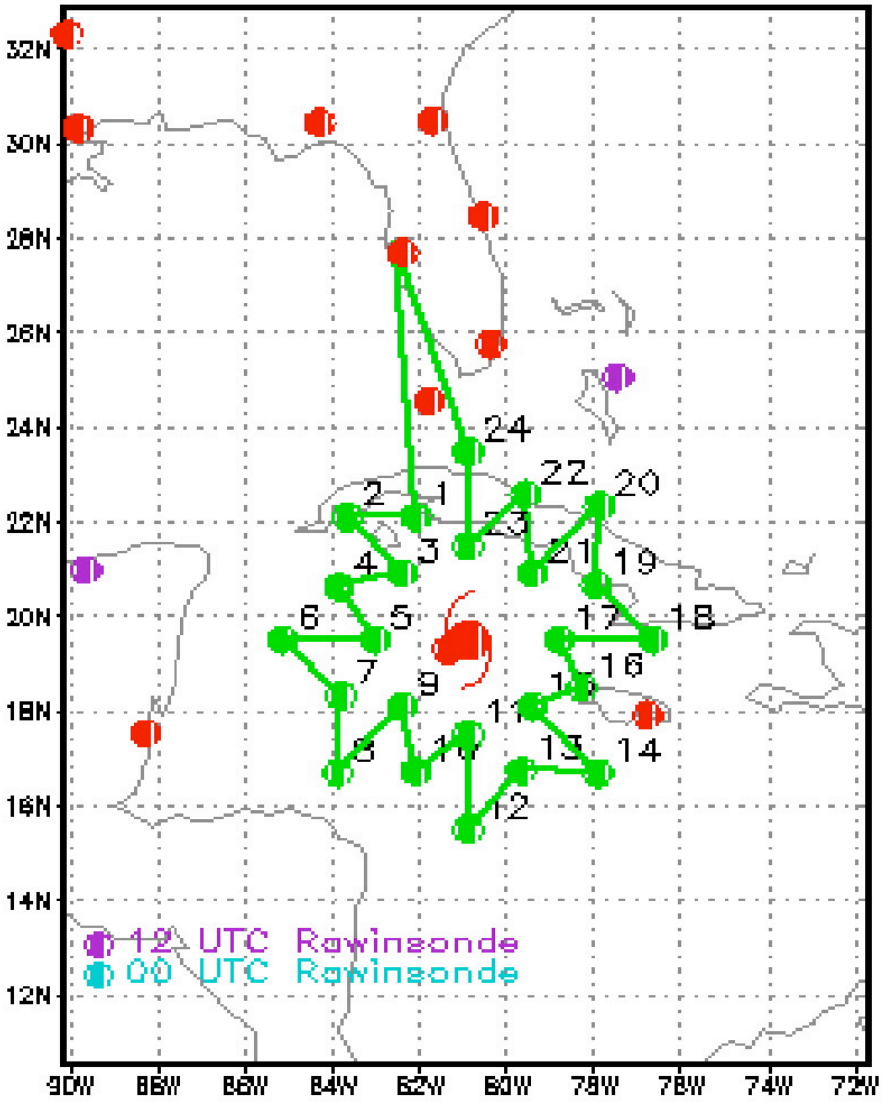
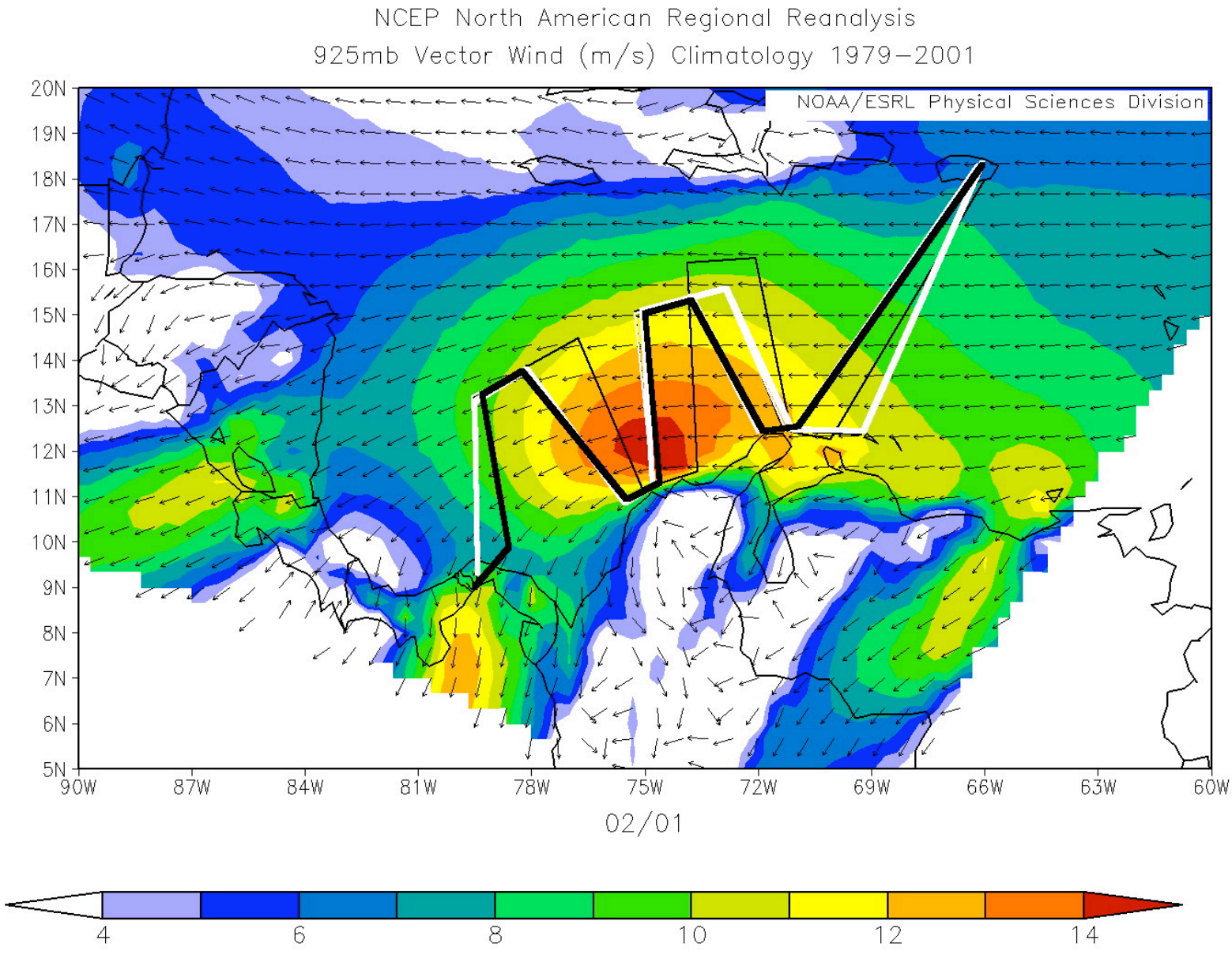
Dropsonde flight possibilities
(from 2008 AOML summary)

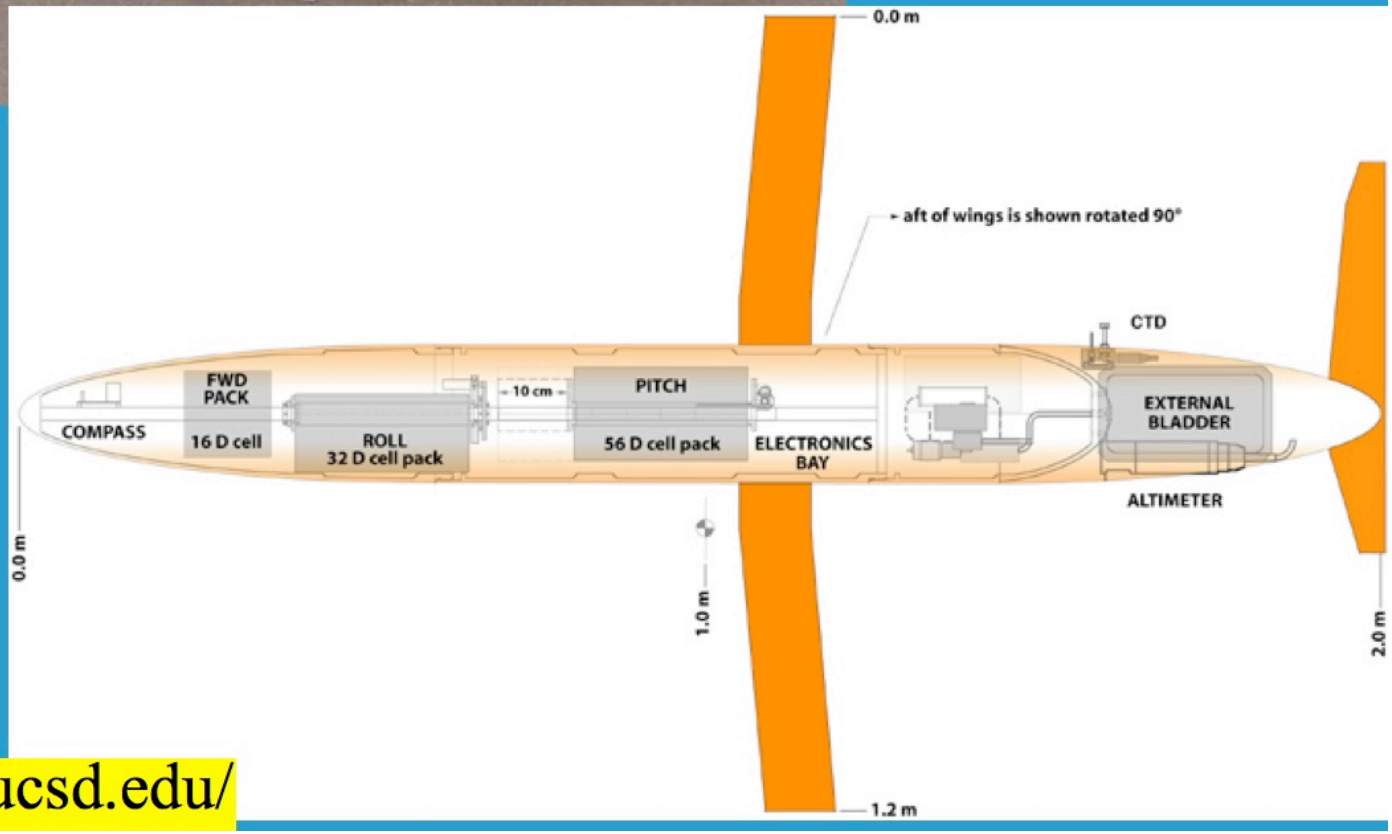




plausible research flight to describe horizontal and vertical structure of LLJ (many options...)



Spray glider

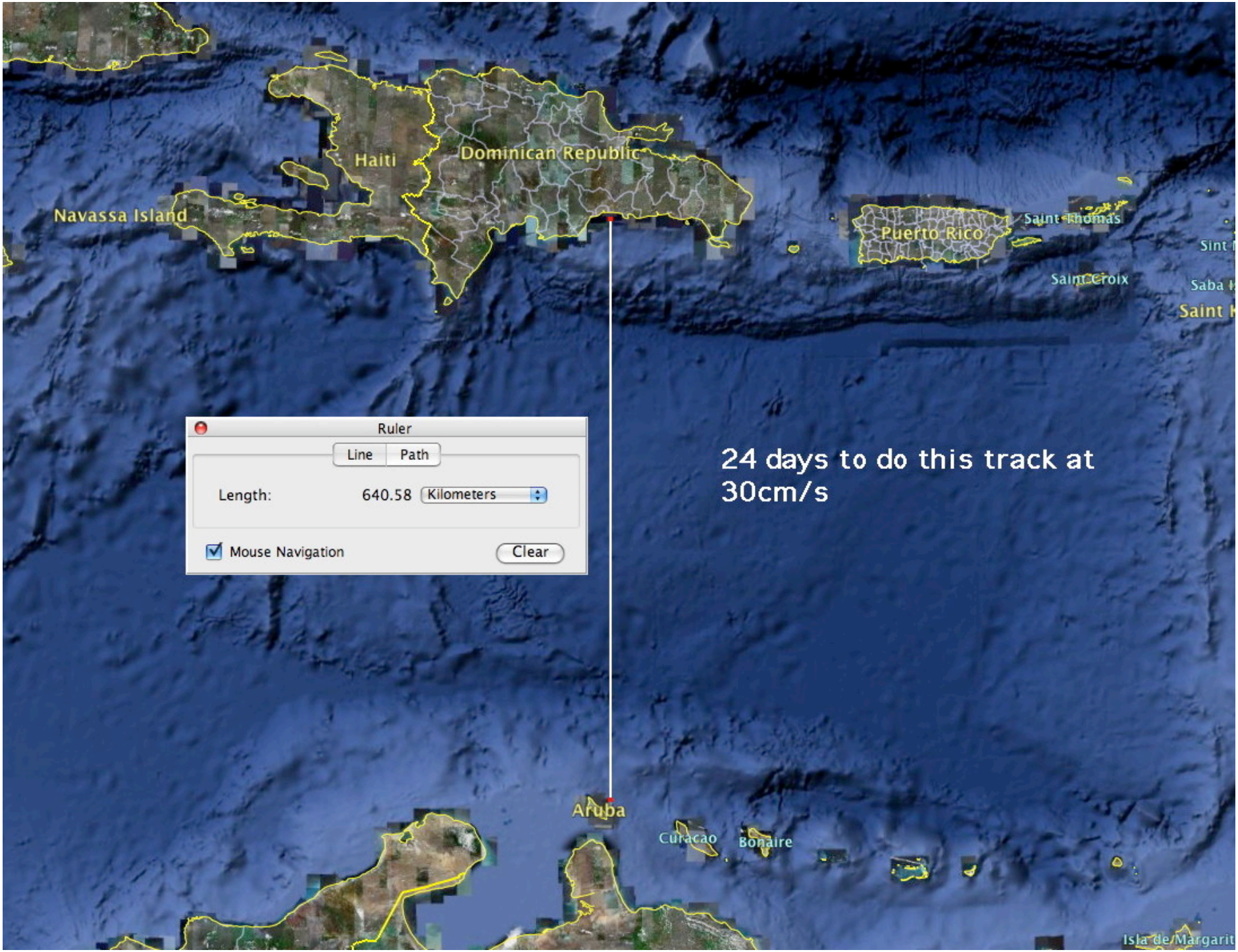


From http://spray.ucsd.edu/

Spray glider

Price	~ $90,000	
Volume Change	250 cc	
Life	815 Cycles	
Glide Angle (deg)	19	25
Horizontal Velocity (cm/s)	25	30
Horizontal Range (km)	4700	3500
Length, Diameter	200cm, 20cm	
Wingspan, Chord	110cm, 10cm	
Mass, Payload	51.8kg, 3.5kg	
Energy	13 MJ, 52 DD Li CSC	
Refuelling cost	~ $3000	
Maximum Depth	1500m	
GPS Navigation	+/- 100m	
Iridium Comm.	2-way, ~ 100 bytes/sec	

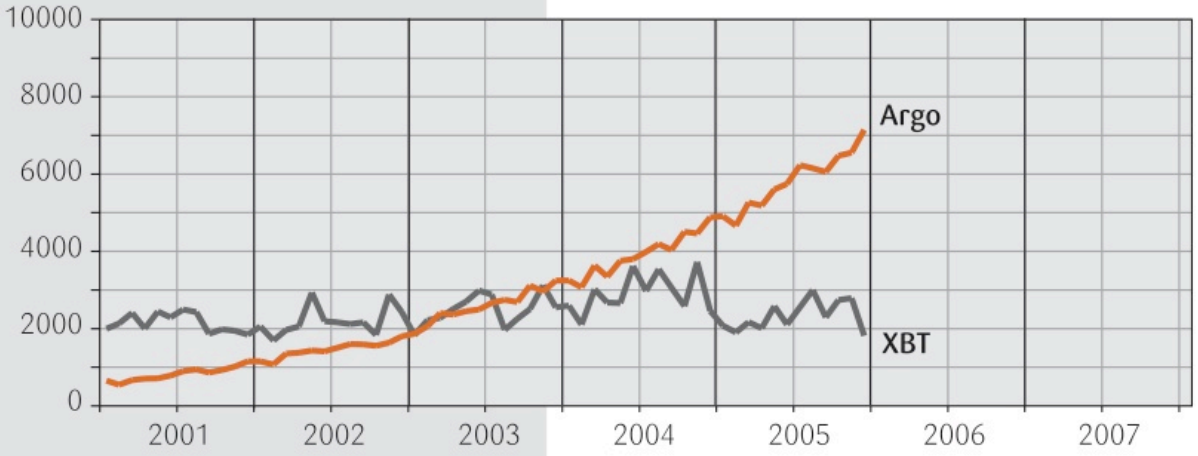
From http://spray.ucsd.edu/


Haiti
Dominican Republic
Navassa Island
Puerto Rico
Saint Thomas
Saint Croix
Ruler
Line
Path
Length:
640.58
Kilometers
Mouse Navigation
Clear
24 days to do this track at
30cm/s
Aruba
Curacao
Bonaire
Isla de Margarit

operating and how much data do they produce?

In mid-February 2006 Argo had a global array of 2355 floats in the ice-free areas deeper than 2000 m. This represents almost 80% of the target array.

The number of profiles has risen steadily and since mid-2002 Argo has been the largest single source of ocean profile data. As well as being more numerous, the Argo data go deeper than the 750 m XBTs, measure temperature much more accurately, and also collect salinity and ocean current data. In the Southern Ocean Argo now collects temperature/salinity profiles at 50x the pre-Argo rate.



Monthly real time profile counts

How accurate are the data?

Temperatures are accurate to ±0.005 °C and depths to ±5 m. For salinity there are two answers. The data delivered in real time are sometimes affected by sensor drift. For many floats this drift is small, and the uncorrected salinities are accurate to ± 0.01 p.s.u. At a later stage salinities are corrected by expert examination, comparing older floats with newly deployed instruments and with ship-based data. Following this delayed-mode correction, salinity errors are reduced further and in most cases the data become good enough to detect subtle ocean changes.

When will the array be completed?

The Argo array should approach 3000 floats by the end of 2006, and can be maintained at that level as long as national commitments provide about 800 floats per year. The need for global Argo observations will continue indefinitely, though the technologies and design of the array will evolve as better instruments are built, models are improved and more is learned about ocean variability.

How is Argo managed?

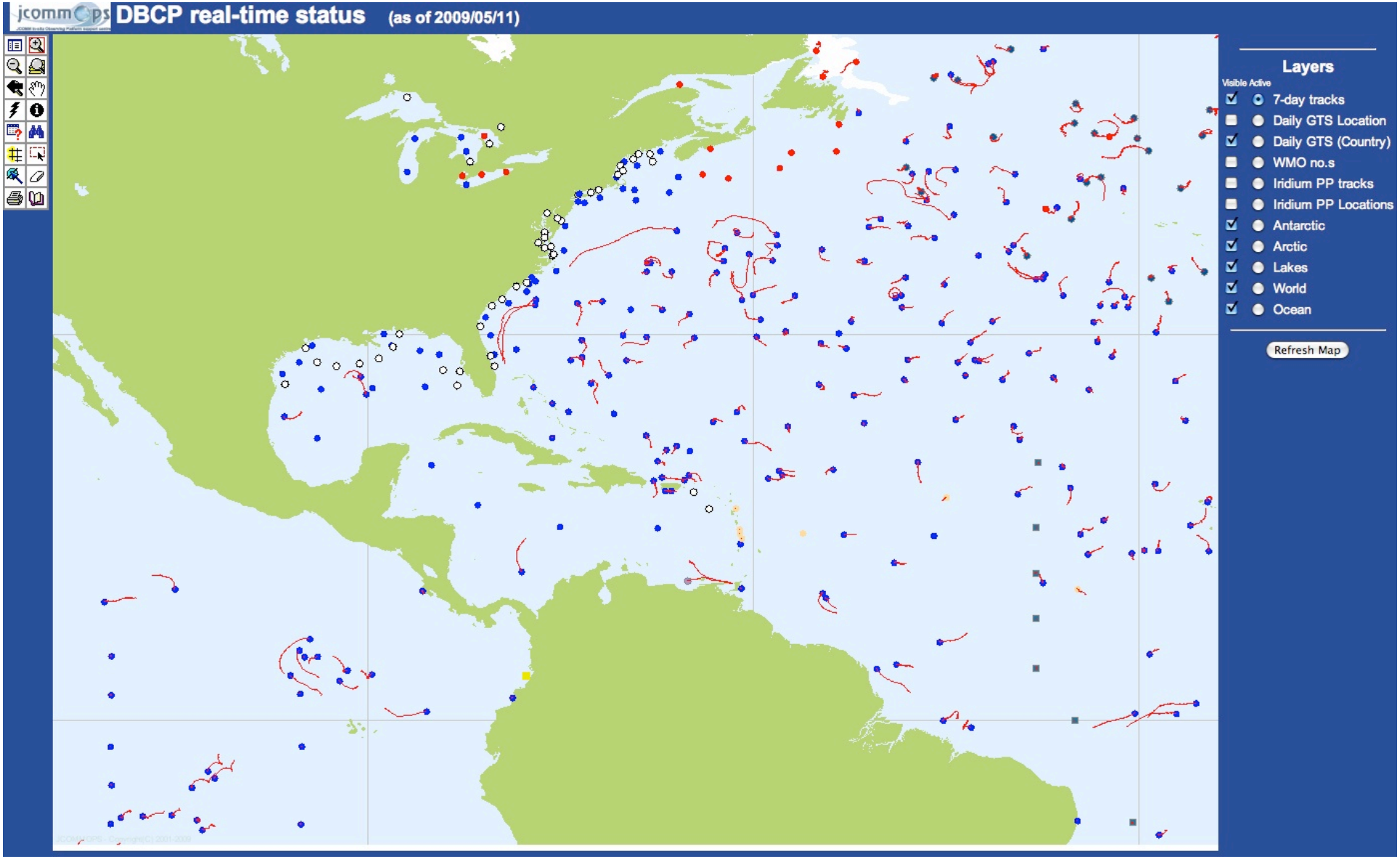
Argo has an international Steering Team and a Data Management Team made up of scientists from countries involved in Argo. An Argo Technical Co-ordinator monitors the array and registers each float deployment in accordance with international agreements. Argo also has an international Director. Each country finds its own funding and sets its own priorities for where floats are deployed in consultation with other countries.

How much does Argo cost?

The total annual cost of Argo is about $20 million, or roughly $25 thousand per float-lifetime, which means that each profile costs around $200.

Some costs (rough)

Iridium drifters $18K
XBT's.... $40 in large quantities


jcommOps
DBCP real-time status
(as of 2009/05/11)
Layers
Visible Active
7-day tracks
Daily GTS Location
Daily GTS (Country)
WMO no.s
Iridium PP tracks
Iridium PP Locations
Antarctic
Arctic
Lakes
World
Ocean
Refresh Map

Probable countries and institutions that may be contacted for IASCLIP collaboration

Country/likely participation	Institution	Expected IASCLIP contribution/activity
Very likely		
Colombia	CIOH	Research personnel, research ship resources
Colombia	IDEAM	Sounding sites, research collaboration
Colombia	Navy	Island sites, personnel, island logistics
Colombia	Universities (2+)	Joint research activities
Colombia	Air Force	Personnel for observations
Venezuela	Met Service	Personnel, education, sounding network
Venezuela	Navy	Possible research vessels, logistics to Aves island
Venezuela	Disaster prevention	Climate and weather monitoring
Venezuela	Universities (2-3)	Joint research, student participants
Barbados	Caribbean Met Institute	Educational activities, dissemination.
Dominican Republic	Met Service	
Netherland Antilles	Met Service	Observations, joint research
Jamaica	Met Service +	Observations, logistics to Cays, joint research
Jamaica	universities	
Nicaragua	Met Service +	Observations, logistics to islands
	universities	
Honduras	Met Service +	Logistics to Swan Islands and other Cays
	universities	
El Salvador	Met Service	Observations, joint research
Costa Rica	Met Service+	Observations, joint research
Costa Rica	Univ. Costa Rica	Joint research, logistics
Panama		Observations, joint research
Mexico		Observations, joint research, ship resources
possible		
Belize		Observations, joint research
Cuba		Observations, joint research

Many sites not working well...

Options for IASCLIP beginning activities

usual procedure:

1) what are research needs...fund basic research to determine key uncertainties

2) with key uncertainties known design measurement campaign

3) contact potential international collaborators, make observations

4) analyze observations – compare with hypotheses

5) generate new hypotheses and look for validating observations... cycle starts over.

This procedure is justified when 1) observational costs are high relative to basic research costs and 2) *where results are not urgently needed*. **If value of improved forecasts is high compared with research costs then this procedure may not be economically justified**. Rather, simultaneous activities on multiple fronts is needed to obtain most rapid progress, *even if it is less efficient.*

To speed up the development of the IASCLIP activity the following activities are suggested:

1) Evaluate the condition of current observation network – are they reliable?

2) Begin to ramp-up a sustainable monitoring activity that will develop useful data sets for anticipated research activities and provide real-time diagnostics that may have predictive value. Seek overlapping interests.

3) Immediately entrain major potential institutional players in the overall effort, do not focus strictly on the research component alone.

4) Expand the scope of the research problems to overlap interests of collaborating institutions. The possible loss “of focus” may likely be more than made up with support from these otherwise “non-participants”.

Some possibilities for quick action in ascending cost:

Atmospheric:

Rain gauges at island sites and other priority locations. Calibration of satellite-based procedures over "oceanic" regions and over special networks where gauge data currently limited.

Digitization of historical rainfall data in paper form. Improve historical database for local-area studies, satellite calibration and downscaling.

Automatic weather stations at selected small island sites. Develop surface time series at sites mostly unaffected by the islands themselves.

Pilot balloon observations at selected sites. Wind profiles for development of time series and mean profiles of lower-troposphere windfield.

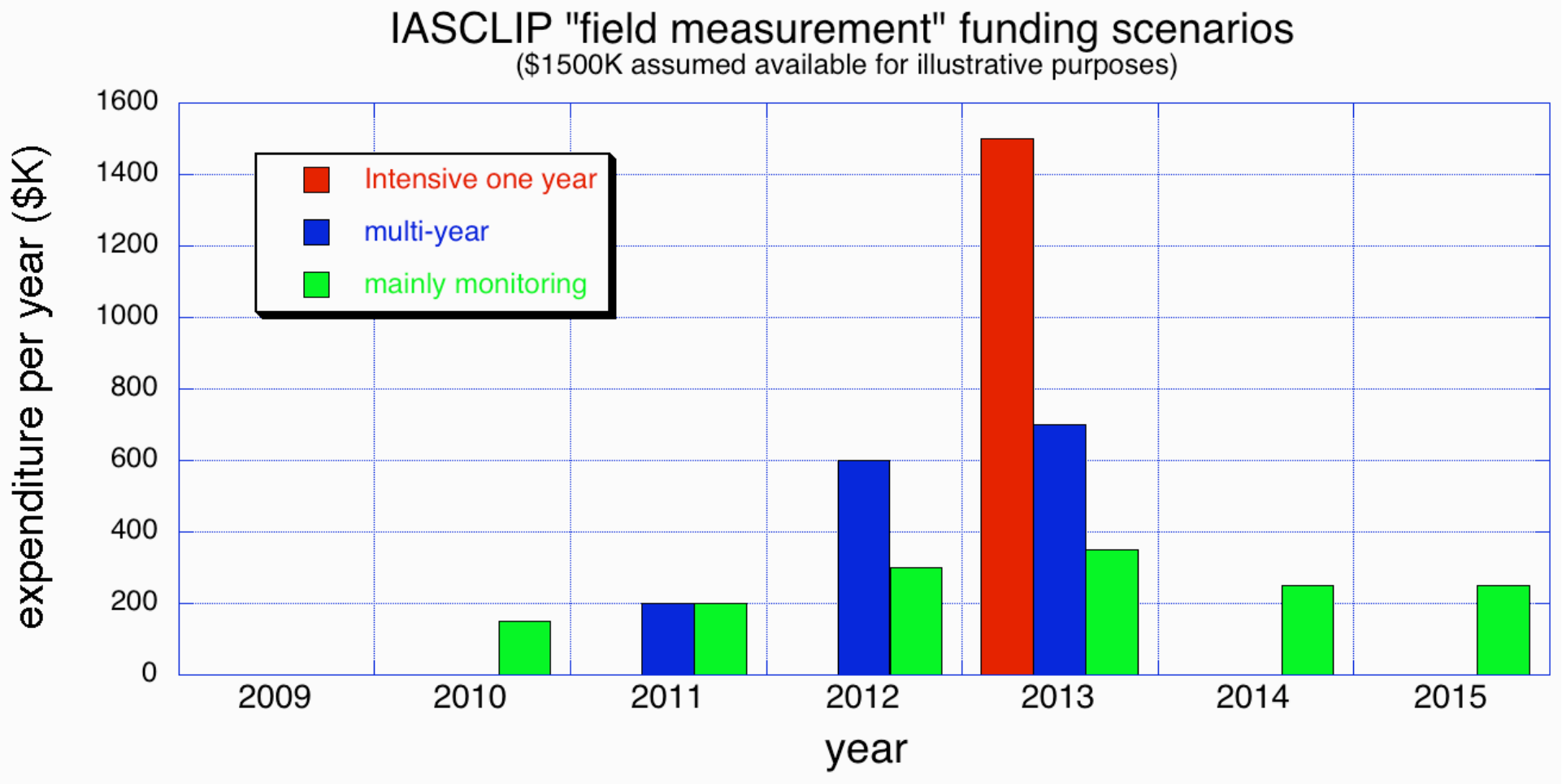
Radiosonde observations at selected sites (adaptively). Thermodynamic and wind profiles for developing mean profiles and for monitoring evolution of anomalies on seasonal to interannual time scales.

cont'd

Oceanic:

XBT's for transects using Colombian and Venezuelan Navy vessels traveling to their island sites. Consider funding modifications to their routine tracks to optimize data collection where it is needed.

Colombian and Venezuelan ships to deploy drifting buoys for routine current sampling of currents.



Which option do we want?

Advantages of monitoring efforts

1) can be real-time for help in climate monitoring and hurricane forecasting.

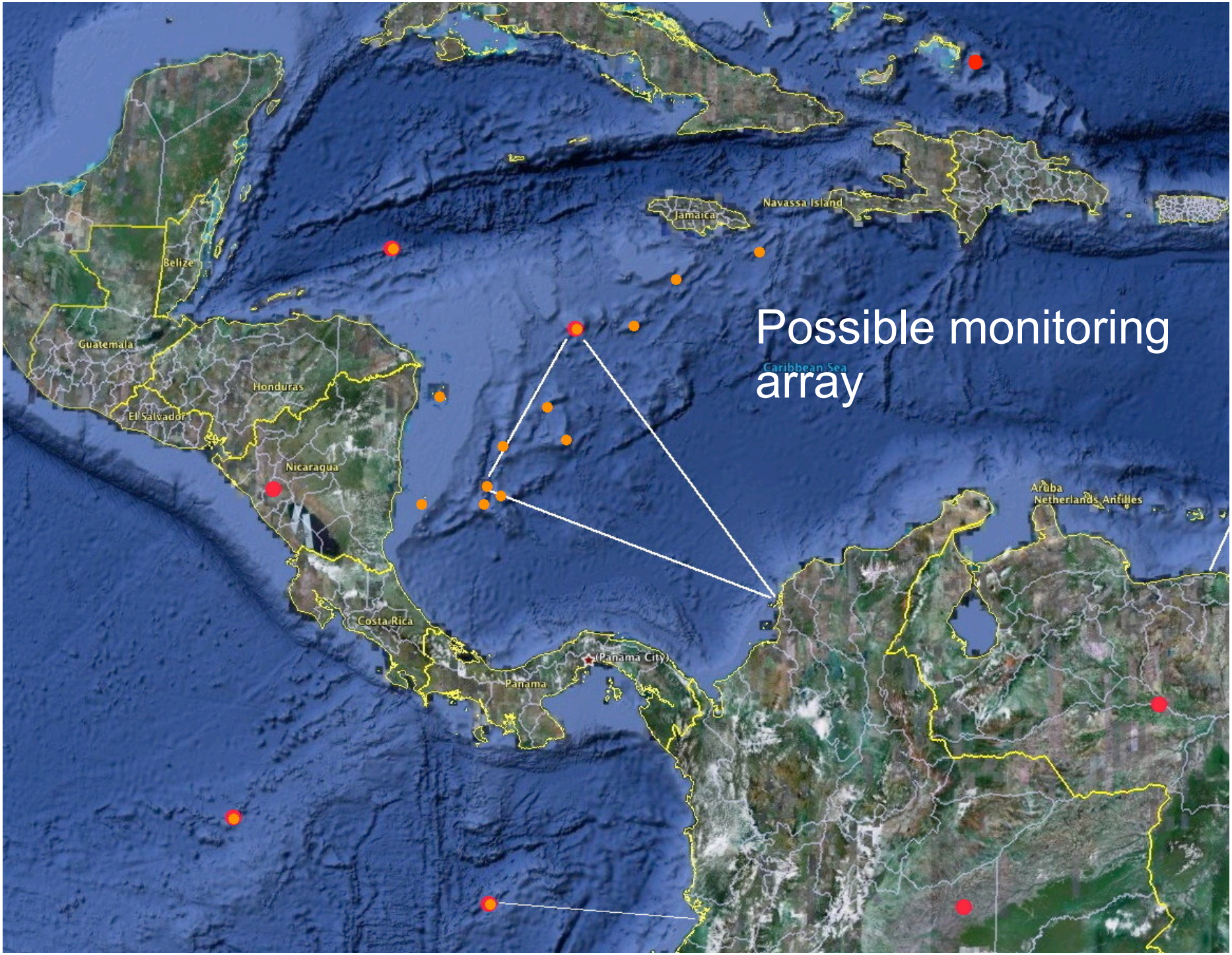
2) would strengthen ties to operational services in region that will be required for special field programs.

3) motivate regional institutions to exploit new data sources and become active participants in IASCLIP research.

4) could be fine-tuned as needed to satisfy changing needs of research community.

5) a monitoring effort should *evolve* into a sustainable climate observing system for the region.


priority "new" sounding sites


Possible monitoring array
Navassa Island
Jamaica
Belize
Guatemala
Honduras
El Salvador
Nicaragua
Caribbean Sea
Aruba
Netherlands Antilles
Costa Rica
Panama City
Panama

Note that precip anomalies over western Caribbean are undocumented by raingauge observations

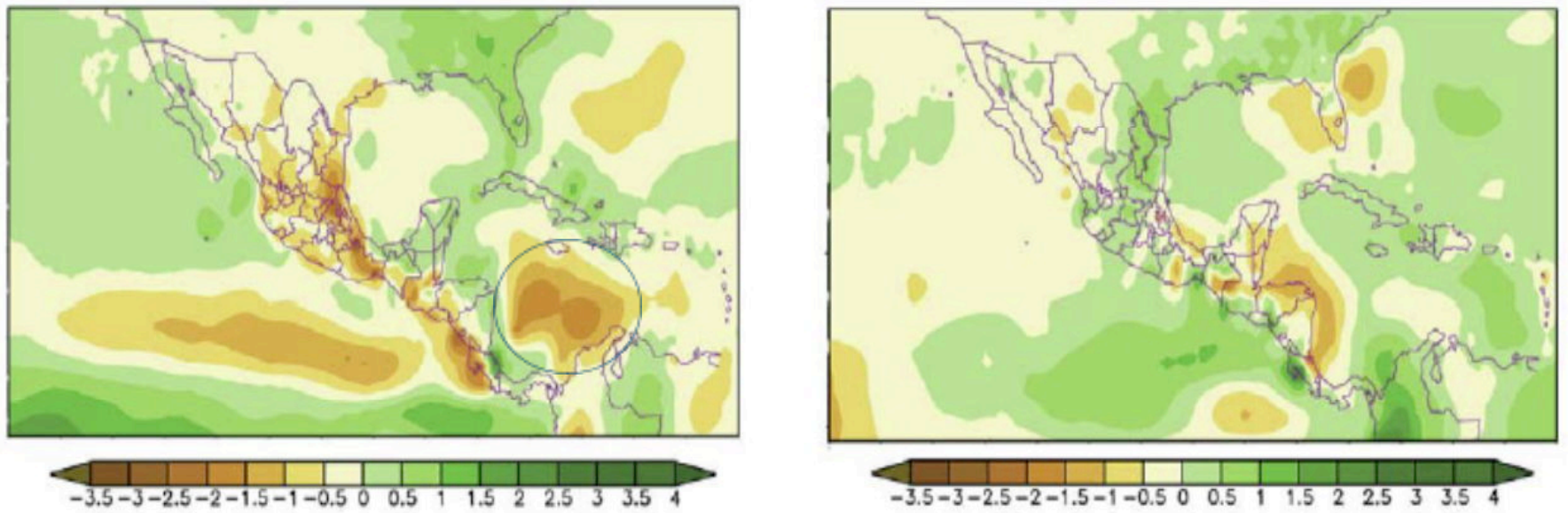
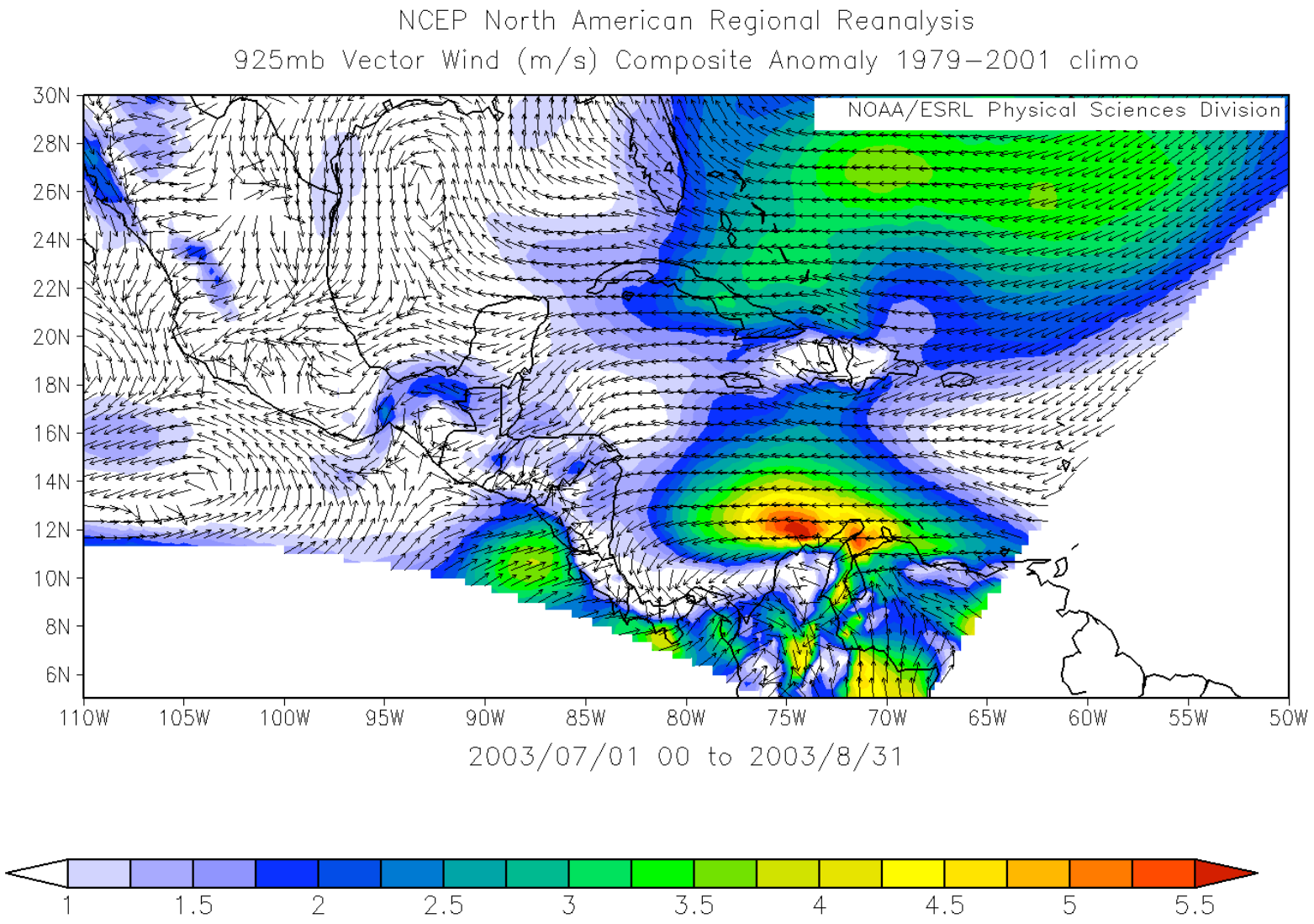
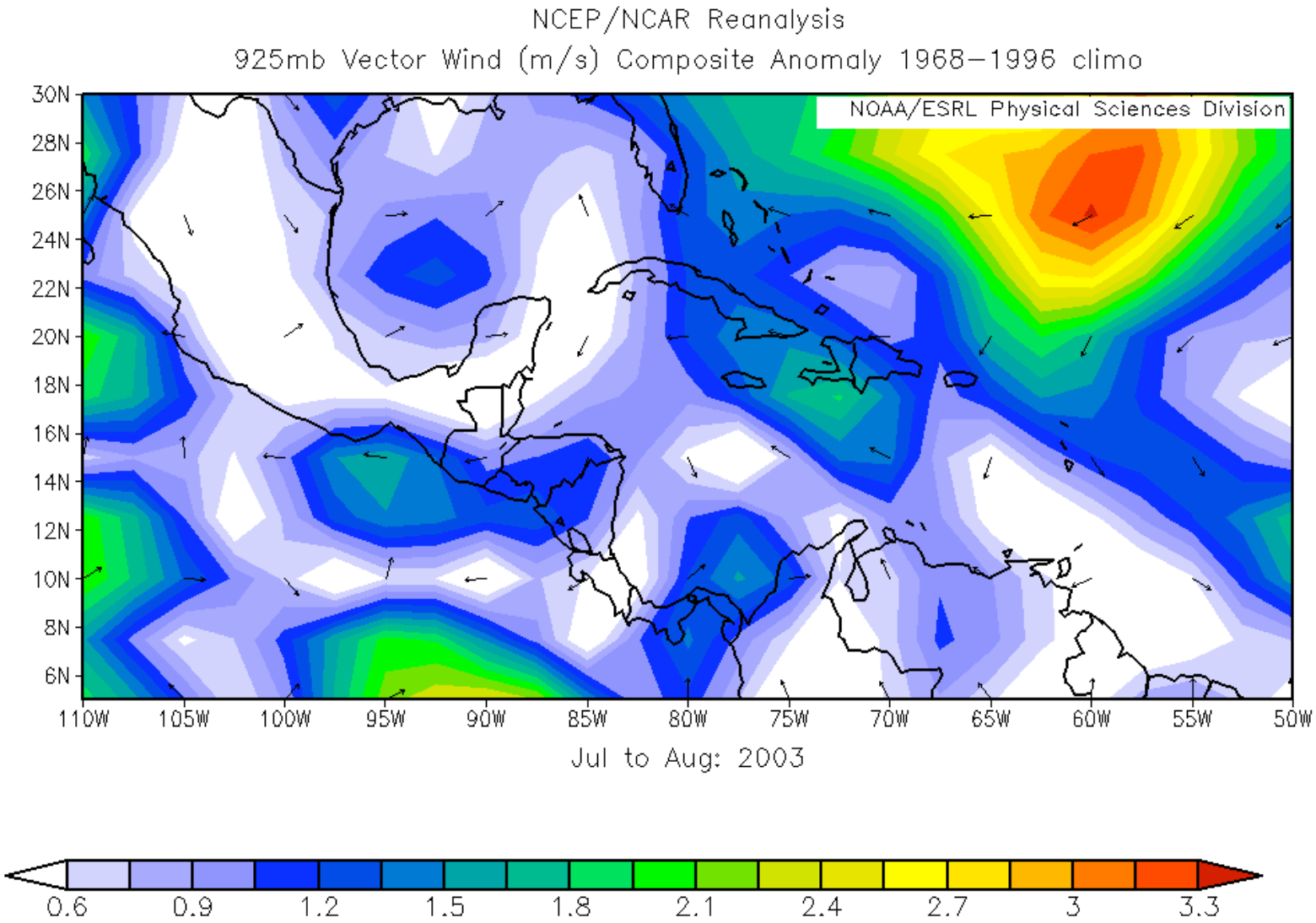


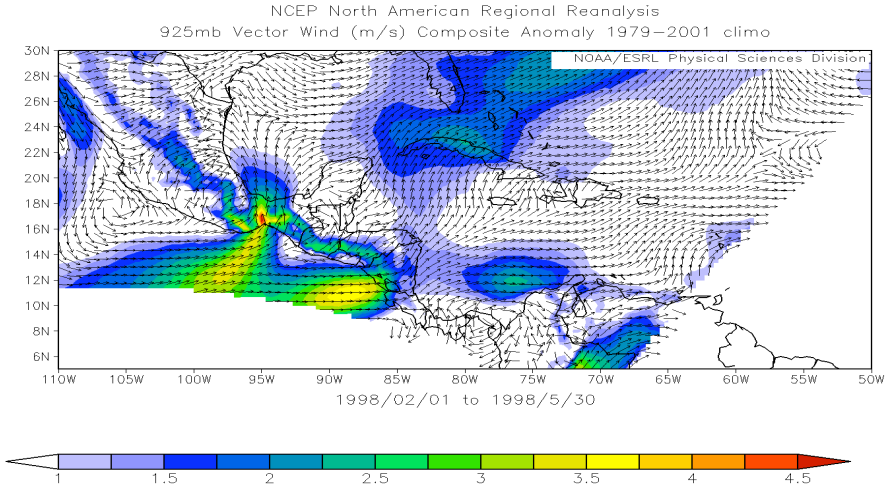
Fig. 5: Composite of precipitation anomalies (mm/day) during the summers (Jun-Jul-Aug-Sep) of (left panel) six El N onset years (1965,1972, 1982, 1986, 1991, 1997), and (right panel) La Niña years (1964, 1970, 1973, 1975, 1988, 19 (From Magana 2000)

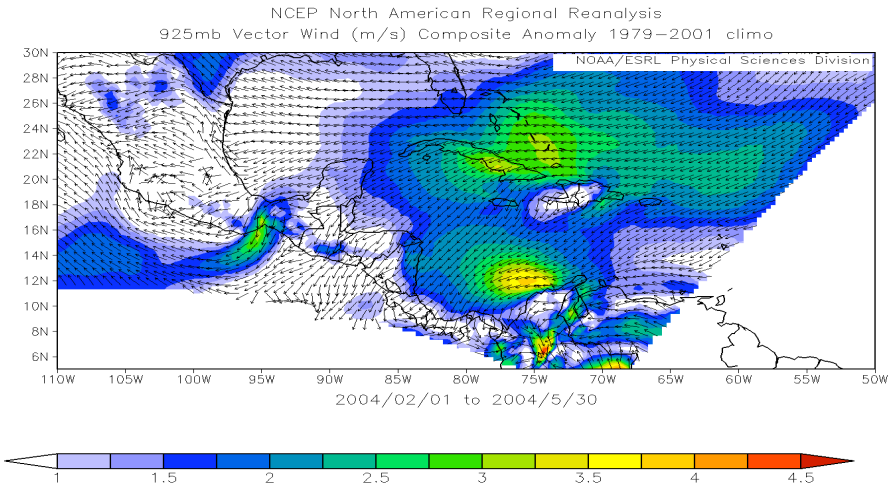
NARR anomaly winds July-Aug 2003



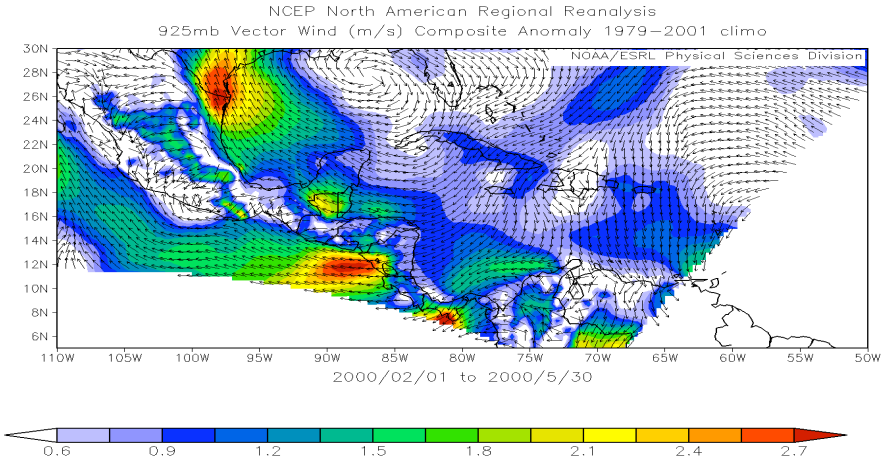
NCEP anomaly winds July-Aug 2003

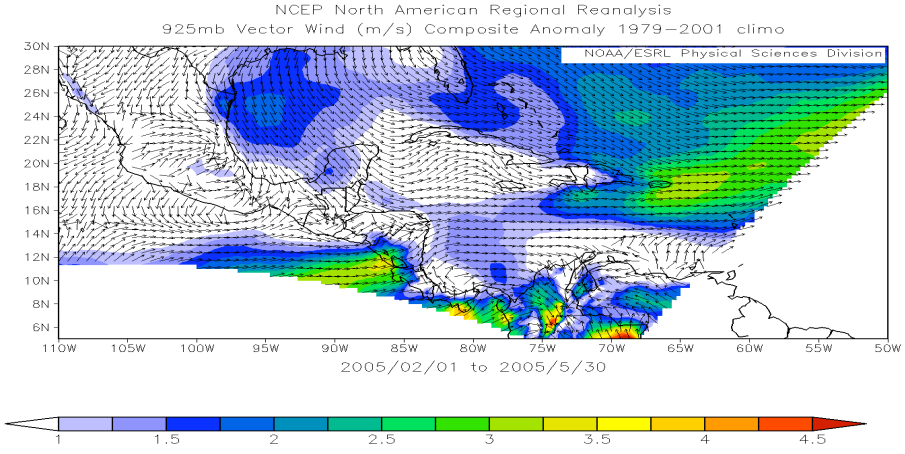


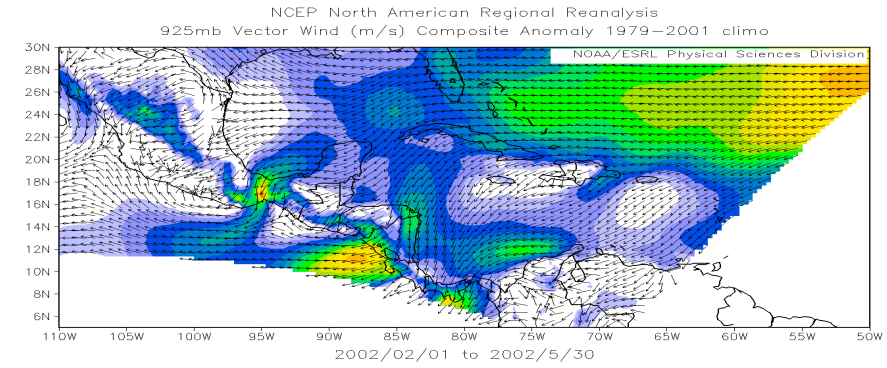


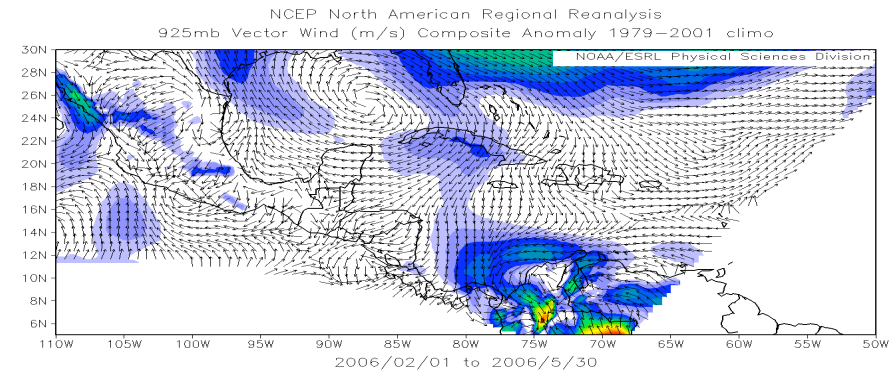


NARR 925 wind anomalies for Feb-May for various years - note regions of higher variability climate monitoring sites?









Summary

Observations in IASCLIP domain better than many tropical regions but...

many key climate features not sampled by sounding network

topography and land-sea contrasts are strong local controls

The need for process studies is not yet clear

The value of enhanced monitoring is clearer

NARR-validation studies are straightforward but potentially costly and for what?

User community not currently involved or consulted - do they care?

Need more effort to entrain international partners, especially operational sectors (since they have needs and capacity)

My opinion

A research program that depends only on US research funding will have limited lasting impact.

A program that has a goal of establishing a long-term climate monitoring network will have a lasting impact. SALLJEX, NAME and VOCALS haven't done this...

IASCLIP must not just make recommendations for climate monitoring - it must initiate them and seek to sustain them. *(Implementation must be fast compared with technology changes)*

If an IASCLIP climate monitoring effort on order of $1M/year cannot be sustained by NOAA what does this say about the importance of IASCLIP region/processes? Why waste our time?

Reality check - ARGO costs $20M a year...

Questions

- Why most CPO funds go into ocean monitoring - little atmospheric component?
- Does National Climate Service have an international component?
- If not, who is taking care of international atmospheric monitoring ?