Climate Change Monitoring in Sonoma County: What's a Manager to Do?

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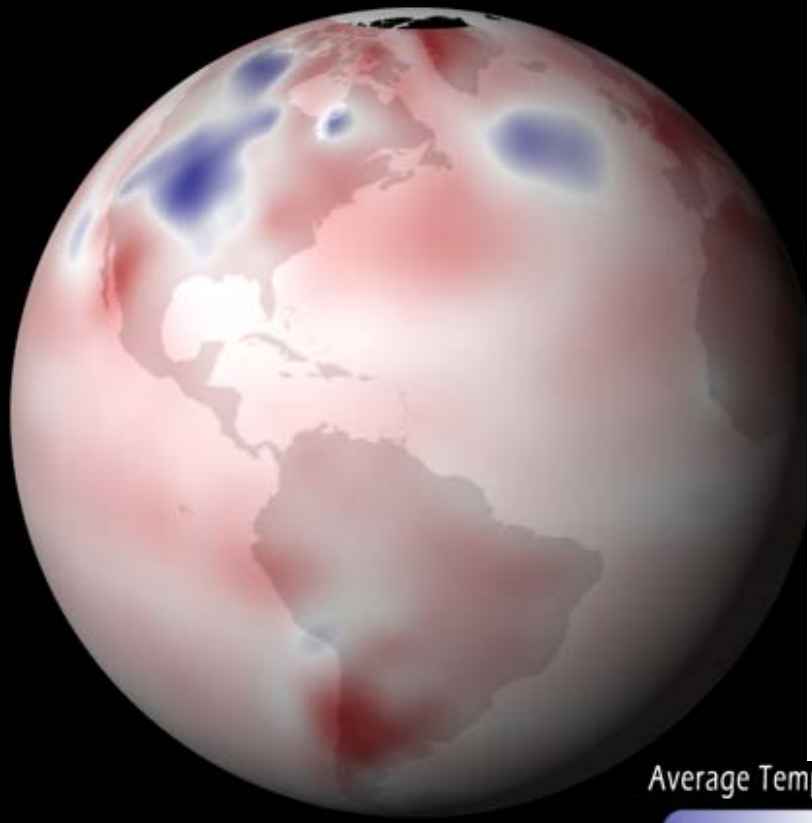
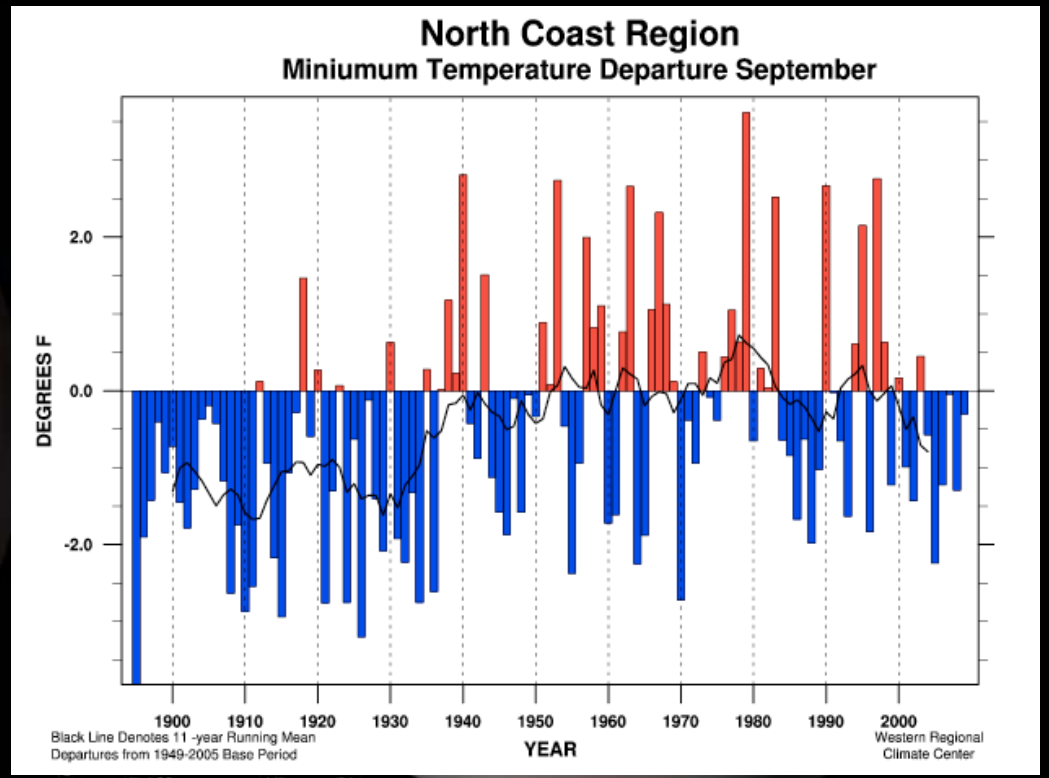
Project Scientist, Oceanography
Bodega Marine Laboratory
UC Davis

?

Global Climate Models are Useful But Limited

- Scale: local changes will be different than global changes





DRI Climate Tracker

Global Climate Models are Useful But Limited

- Scale: local changes will be different than global changes
- Stationarity

GEOPHYSICAL RESEARCH LETTERS, VOL. 36, L13704, doi:10.1029/2009GL038082, 2009

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Climate projections: Past performance no guarantee of future skill?

C. Reifen[1] and R. Toumi[1]

Received 16 April 2009; revised 28 May 2009; accepted 8 June 2009; published 7 July 2009.

Global Climate Models are Useful But Limited

- Scale: local changes will be different than global changes
- Stationarity
- Complexity

Top-Down + Bottom Up

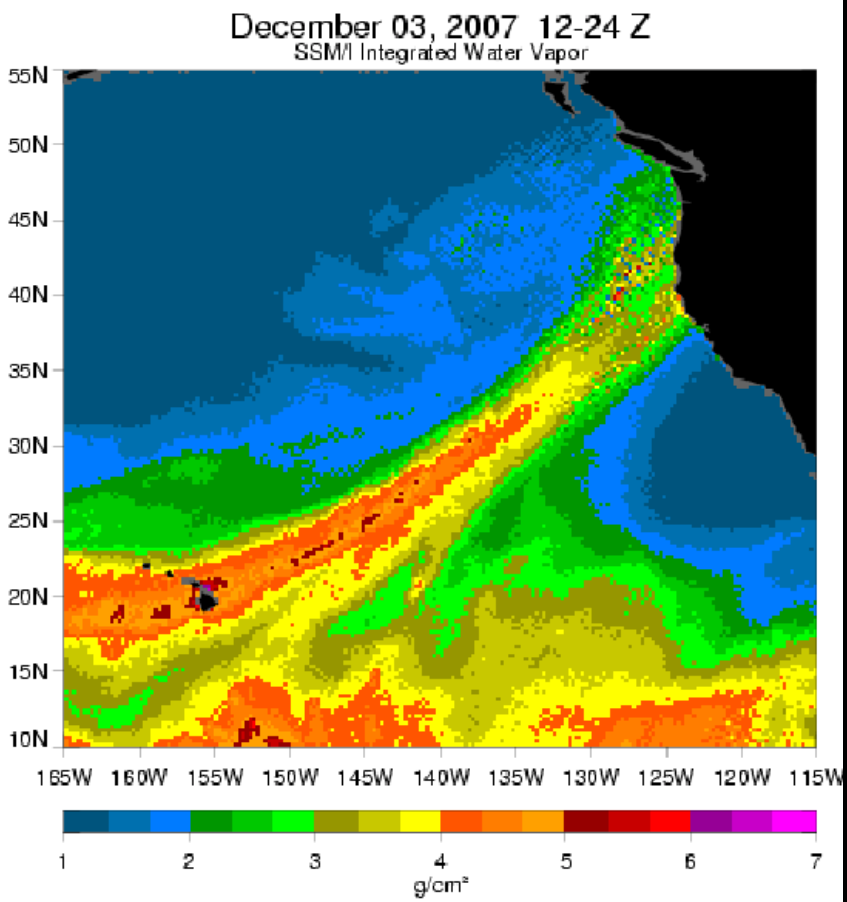
Models + Observations

Bottom-Up …..

- Climatic Identity
- Existing Resources
- Collaborations: Interdisciplinary Divides and Opportunities

CLIMATIC IDENTITY – Six factors that shape our local climate(s)

1. Pineapple connection (event driven)
2. Upwelling (one of four most persistent areas in the world)
3. Narrow boundary layer
4. Fog (“fog fence”)
5. Topography (microclimates)
6. Coast-Interior gradient

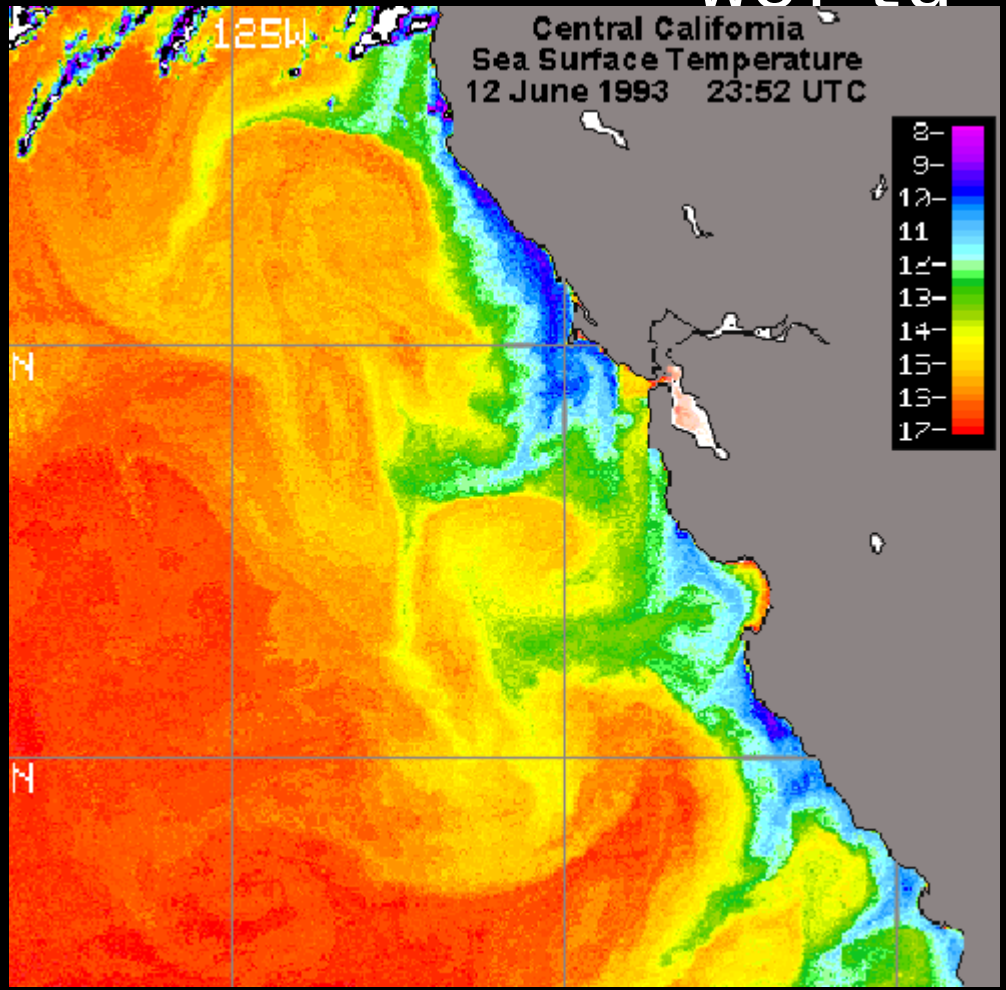


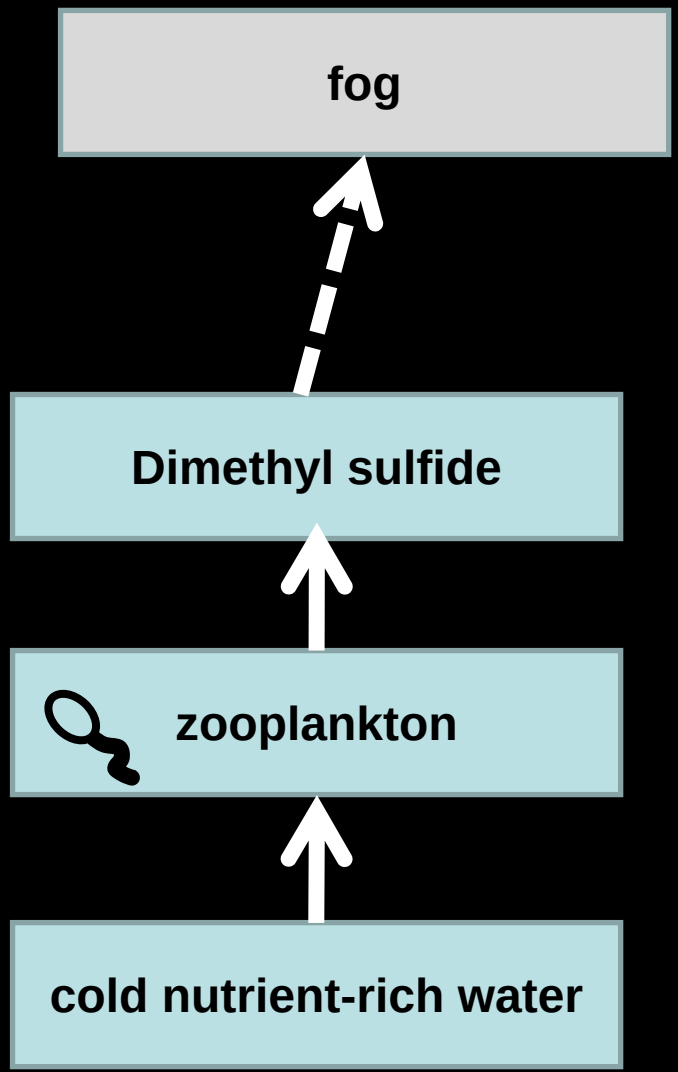
"Rivers in the Sky Are Flooding The World With Tropical Waters"

atmospheric rivers caused all seven floods on the Russian River since October 1997.

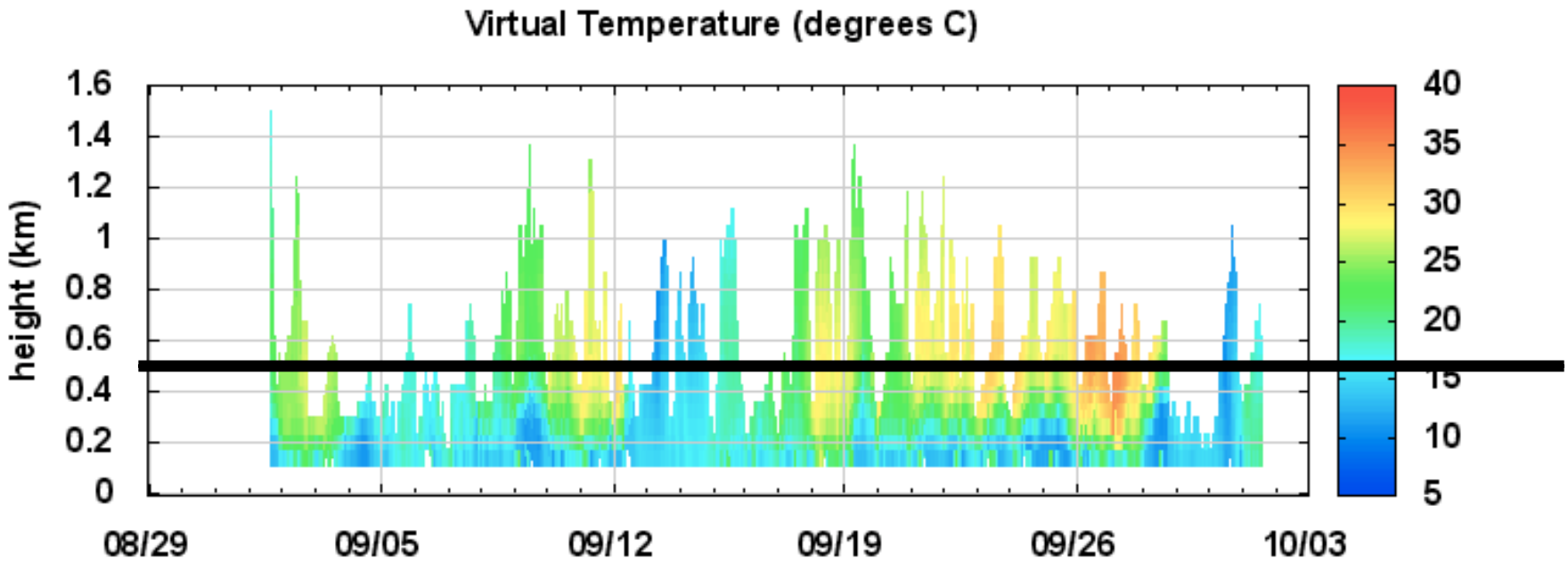
www.sciencemag.org SCIENCE VOL 313
28 JULY 2006

One of four most persistent areas of upwelling in the world





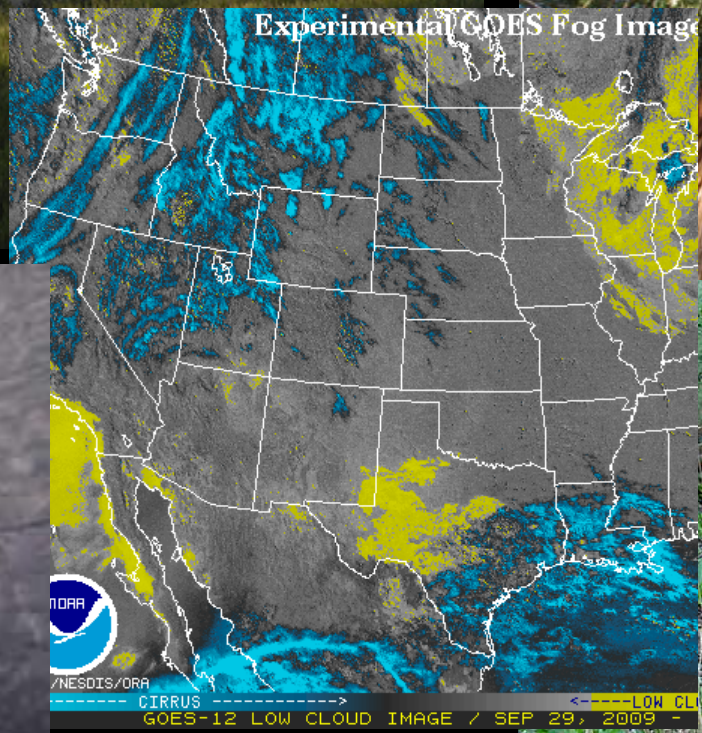
Narrow boundary layer



NOAA Dopplar Wind Profiler

“Fog Fence”

30
MONGOLIA


Experimental GOES Fog Image
NESDIS/ORA
CIRRUS
GOES-12 LOW CLOUD IMAGE / SEP 29, 2009


Clear Lake
Russian River
WATERSHED
WHAT IS A WATERSHED?
A WATERSHED IS ALL THE LAND AREA THAT DELIVERS RUNOFF TO A SPECIAL BODY OF WATER, FROM ITS HIGH RIDGES TO ITS LOW VALLEYS. IT IS A CATCH BASIN. A WATERSHED IS A LIVING SYSTEM, WHICH INCLUDES ALL THE BIOLOGICAL AND PHYSICAL FACTORS CONTAINED WITHIN ITS BOUNDARIES. THERE ARE WATERSHEDS WITHIN WATERSHEDS, CREATING SMALLER SUB-WATERSHEDS.
WHY LEARN ABOUT WATERSHEDS?
YOUR WATERSHED IS A COMMUNITY, AN INTERCONNECTED WEB OF LIFE THAT SHARES WATER. THE PEOPLE IN YOUR WATERSHED MAKE IMPORTANT DECISIONS ABOUT THE HEALTH OF YOUR COMMUNITY.
THE BOUNDARIES OF YOUR WATERSHED FROM RIDGE TO RIDGE, AND THE LAND WITHIN THEM FROM THE UPLANDS TO THE MOUTH OF THE WATERWAY CREATE A BASIN OR CONTAINER. IT IS IN THIS BASIN OF RELATIONS THAT WE DECIDE HOW WE CARE FOR THE WATER OF OUR COMMUNITY. EXPLORING AND KNOWING ABOUT OUR WATERSHED HELPS US CARE FOR AND UNDERSTAND OUR HOME AND GIVES US A SENSE OF PLACE.
ALL ORGANISMS NEED WATER TO LIVE. WATER CYCLES FOOD, NUTRIENTS AND ENERGY THROUGH ECOSYSTEMS, THUS LINKING EVERYTHING TO EVERYTHING ELSE. WITH CLEAN WATER, COMMUNITIES THRIVE.
IN EXPLORING AND GETTING TO KNOW YOUR LOCAL PLACE, YOU WILL FIND NEW WAYS OF CREATING A HEALTHIER WATERSHED COMMUNITY. YOU MIGHT ASK YOURSELF SOME QUESTIONS ABOUT YOUR WATERSHED:
1. WHERE DOES MY WATER COME FROM, AND WHERE DOES IT GO?
2. WHERE DO I LIVE IN MY WATERSHED? (CREATE A MAP OF THE WATERSHED.)
3. HOW CLEAN IS MY WATER? HOW IS MY WATER BEING POLLUTED? WHO'S POLLUTING IT?
4. WHO LIVES IN MY WATERSHED? (INCLUDE THE PLANTS AND ANIMALS.)
5. WHAT HELPS MY WATER STAY IN MY WATERSHED? WHAT MAKES WATER LEAVE MY WATERSHED TOO FAST?
6. IS WATER PUMPED OUT OF OR INTO MY WATERSHED? ARE THERE WATER DIVERSIONS IN MY WATERSHED? DO I KNOW MY WATER BUDGET?
AS YOU RE-STORY YOUR WATERSHED:
CREATE POETRY ABOUT YOUR WATERSHED
MAKE A WATERSHED PERSPECTIVE
HAVE WATERSHED MOMENTS
THINK LIKE A WATERSHED
AND REMEMBER,
WE ALL LIVE DOWNSTREAM.
34 North

CLIMATE MONITORING

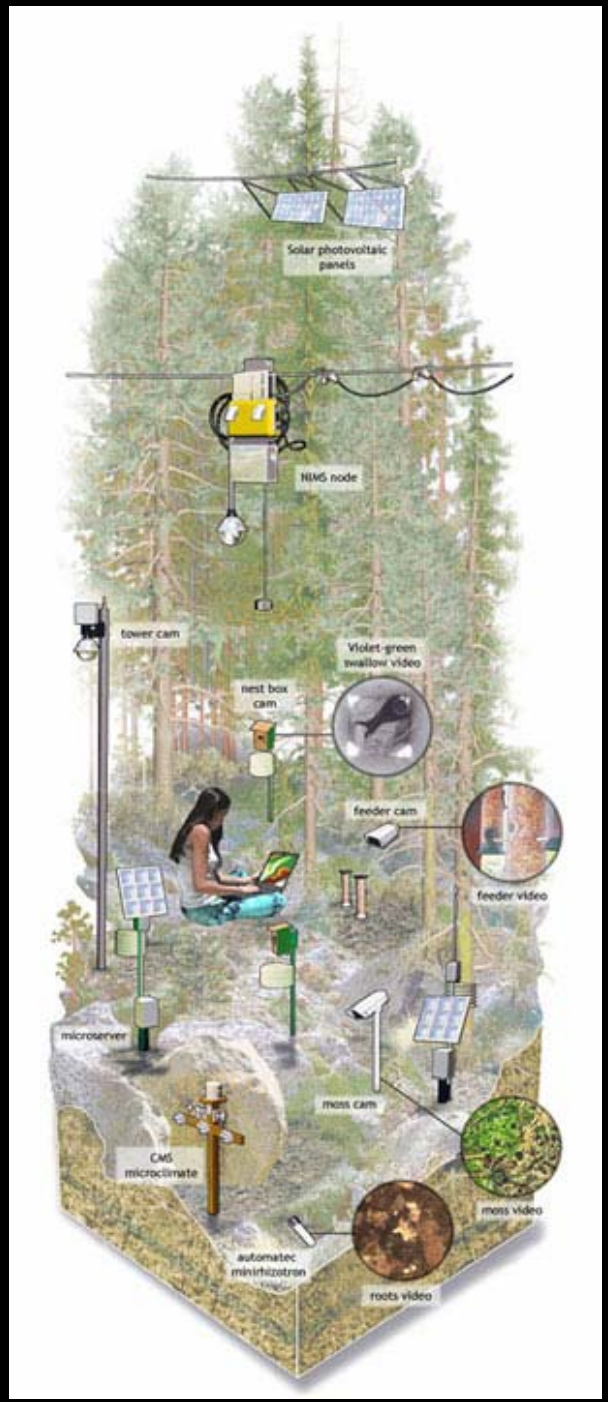
1. Pineapple connection
2. Upwelling
3. Narrow boundary layer
4. Fog (“fog fence”)
5. Topographic variability
6. Coast-Interior gradient

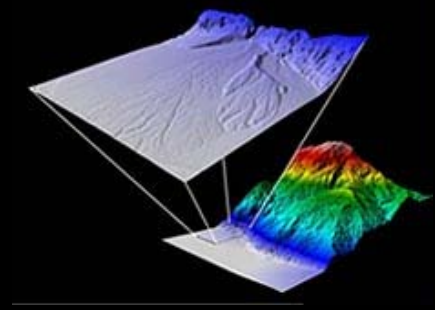
Species Distribution & Abundance ?

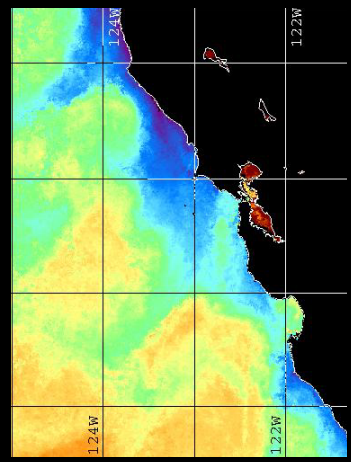
Bottom-Up …..

- Climatic Identity
- Existing Resources
- Collaborations: Interdisciplinary Divides and Opportunities

Environmental Sensor Networks



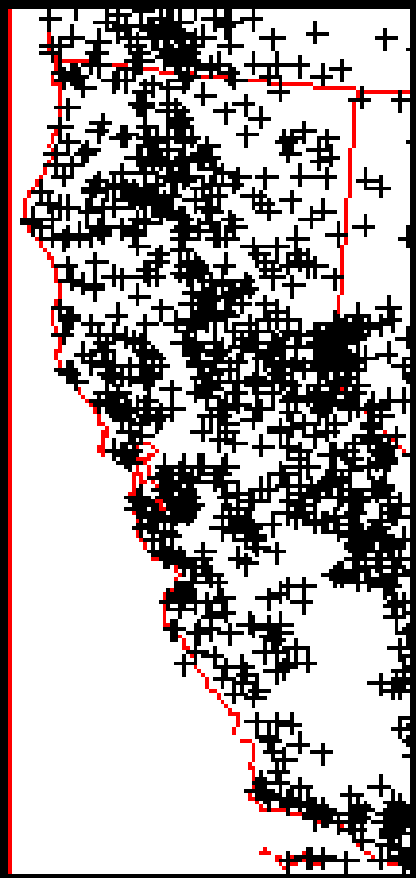




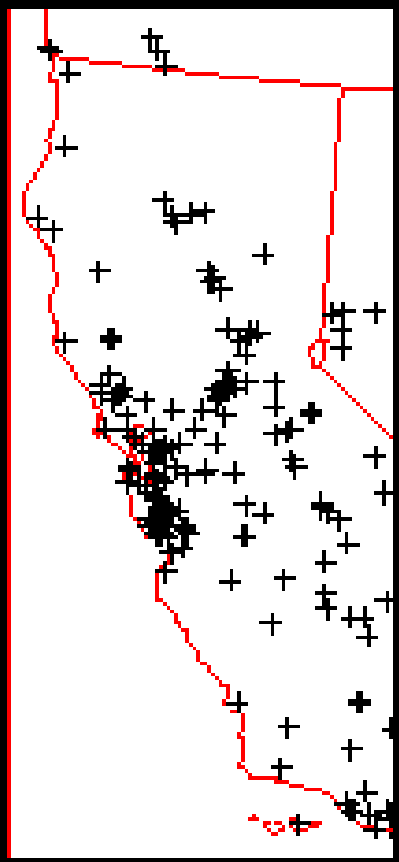
IOOS, CenCOOS, SCOOS, NEON,
and Others

TERRESTRIAL NETWORKS

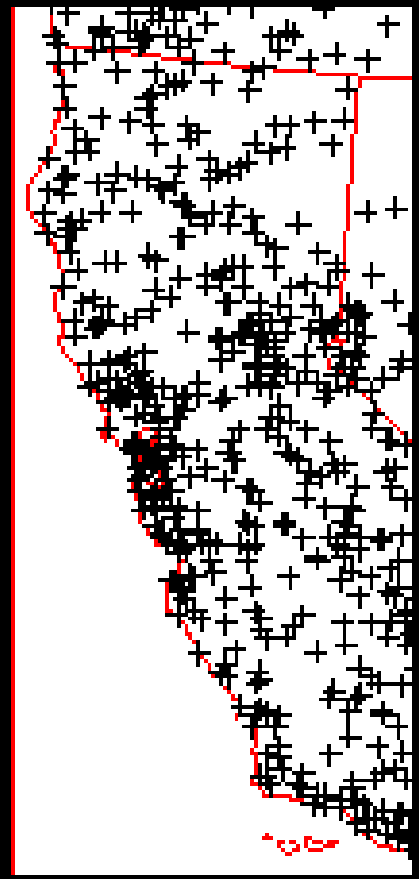
NOAA Hydrometeorological Automated Data System (HADS)



NOAA /FSL Citizen Weather Observer Program (CWOP)



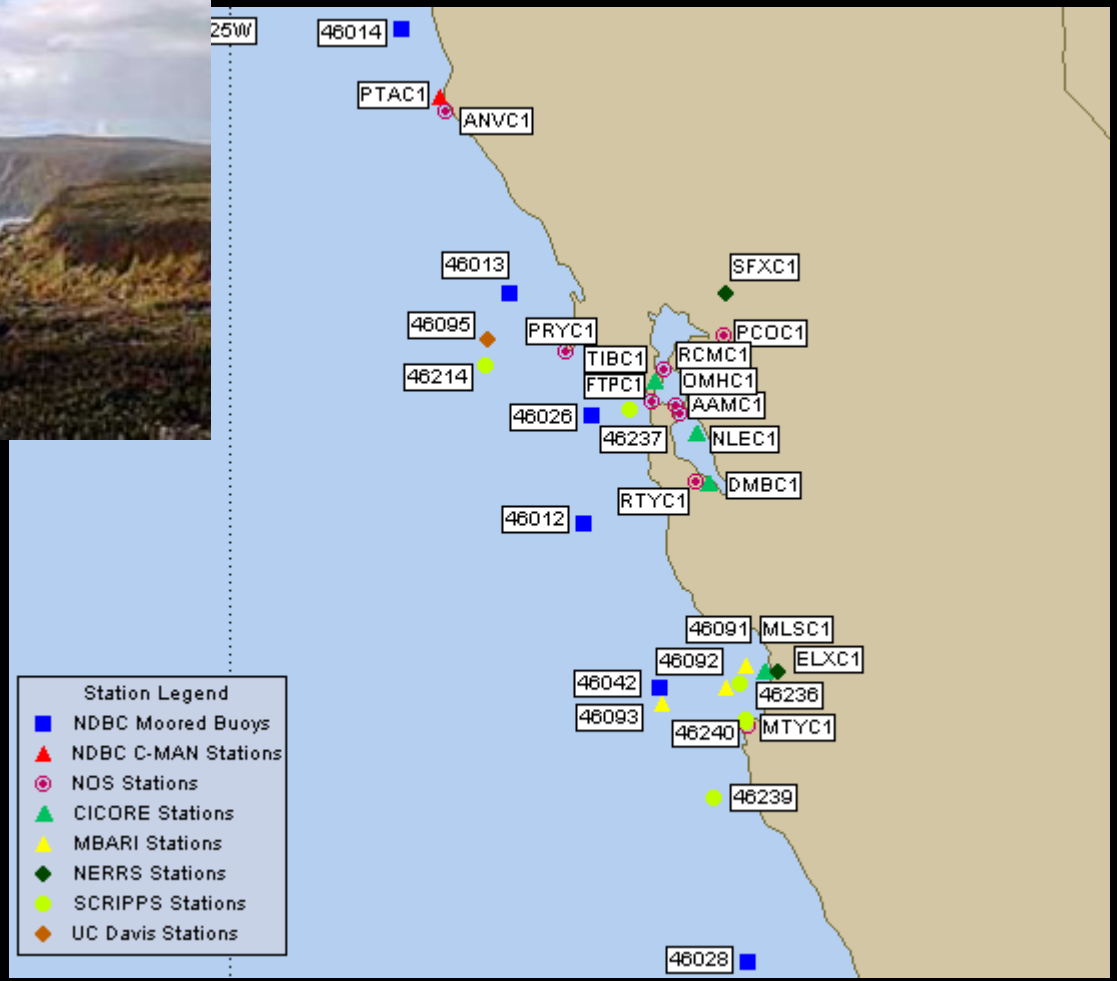
NOAA /NWS Cooperative Observer Program (COP)



MARINE NETWORKS

National Data Buoy Center

CenCOOS – HF Radar



WunderMap Interactive Radar & Weather Stations : Weather Underground

http://www.wunderground.com/wundermap/?lat=38.40185928&lon=-122.85167694&zoom

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WunderMap

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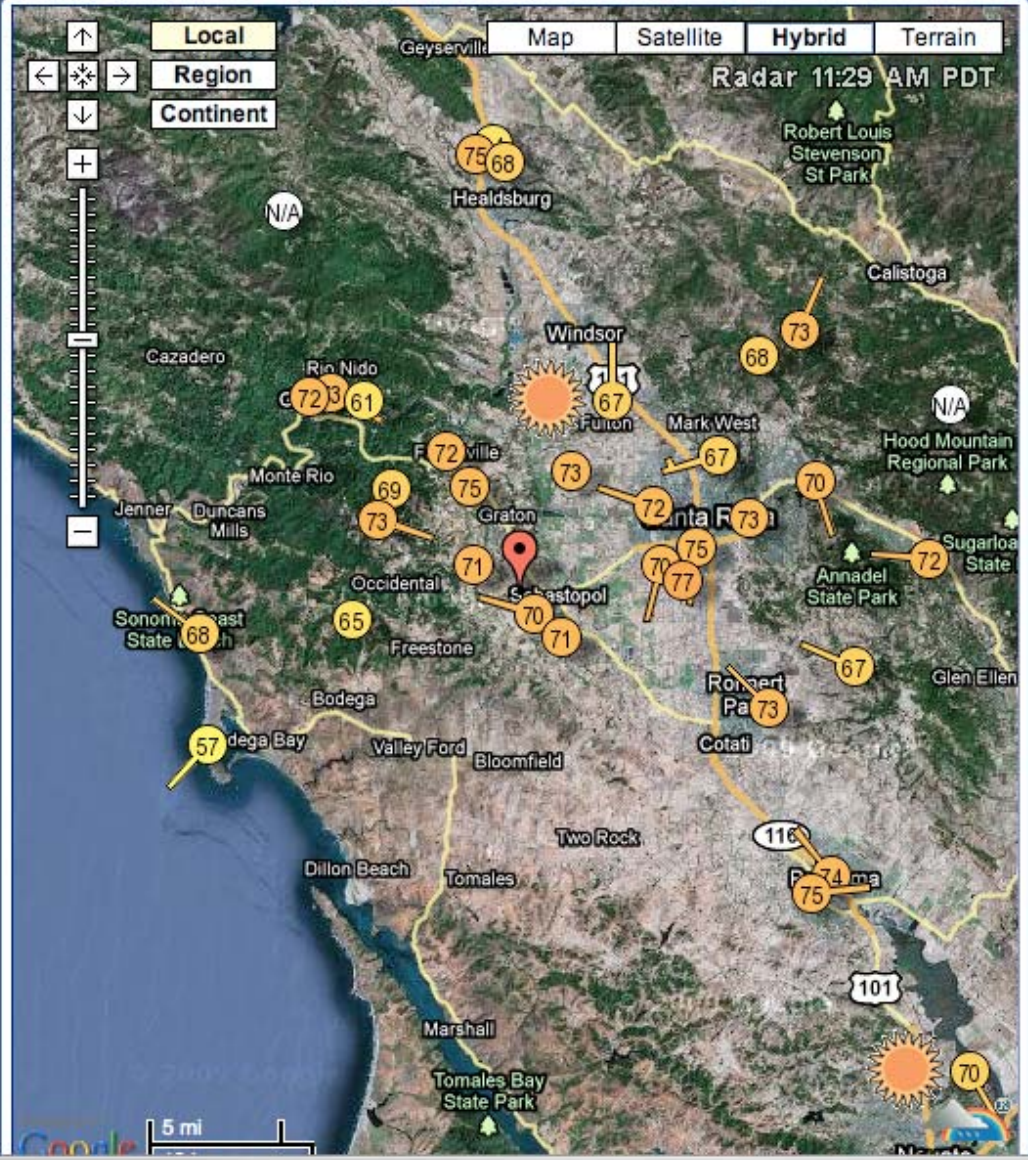
Developer's Blog

Interactive Radar & Weather Stations



Select a Location:

Full Address Search | Go

Stations

Place	Station	Temp.
Armstrong Valley (Fire	KCAGUERN1	72° F
BODEGA BAY CA (MADIS)	MBBYCA	57° F
Bellevue Ranch	KCASANTA135	77° F
Calistoga Rd at Porter	KCASANTA128	73° F
Case Ranch Inn	KCAFORES5	72° F
Green Valley Rd	KCASEBAS17	69° F
HEALDSBURG CA (MADIS)	MHBGCA	64° F
JohnDory Vineyard	KCASEBAS12	75° F
Kenwood	KCASANTA114	72° F
Midtown	KCAPETAL8	74° F
Montgomery Village	KCASANTA25	73° F
N Healdsburg	KCAHEALD6	68° F
NNW Healdsburg	KCAHEALD3	75° F
Novato	KDVO	70° F
Novato (MADIS)	MC3537	66° F
Occidental (MADIS)	MD2849	65° F
Olivet & Piner - Inspi	KCASANTA28	73° F
Petaluma West Side	KCAPETAL6	75° F
RIO NIDO CA (MADIS)	MRODCA	61° F

ImprovingClimateTempMeas.pdf

CITIZEN SCIENCE and reference sites

Automation: A Step toward Improving the Quality of Daily Temperature Data Produced by Climate Observing Networks*

CHRISTOPHER A. FIEBRICH AND KENNETH C. CRAWFORD

Oklahoma Climatological Survey, Norman, Oklahoma

(Manuscript received 6 Octo

The research documented in this manuscrip
values of daily temperature recorded by the N
network and data recorded by the Oklahoma
observations would have the effect of changing
automated observations would produce an *impr*

A sampling of daily data from the two netwo
period 1 January 2003 through 31 December 2
(including transcription errors, incorrectly resett
These errors created large daily differences that
than 55% of the paired observations were found

1. Introduction

For more than 100 yr, the Cooperative Obser

1 of 1

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ImprovingClimateTempMeas.pdf

FIG. 2. Cotton Region Shelter (housing the maximum–minimum liquid-in-glass thermometers) used at a small number of stations in the COOP network.

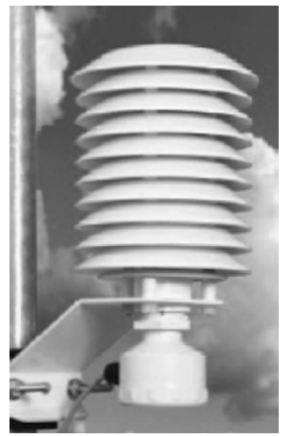


FIG. 3. R.M. Young multiplate radiation shield used by the Oklahoma Mesonet.

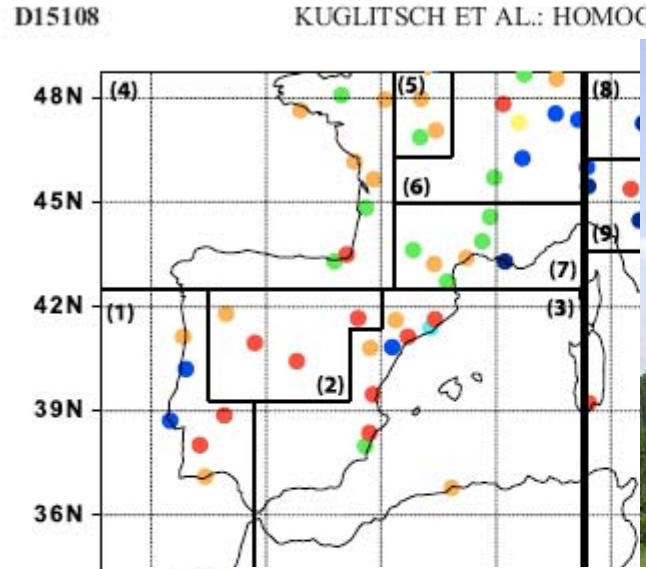
standardization does not exist in the quality checks made by the many federal offices (Guttman 2005; Del Grace et al. 2006)

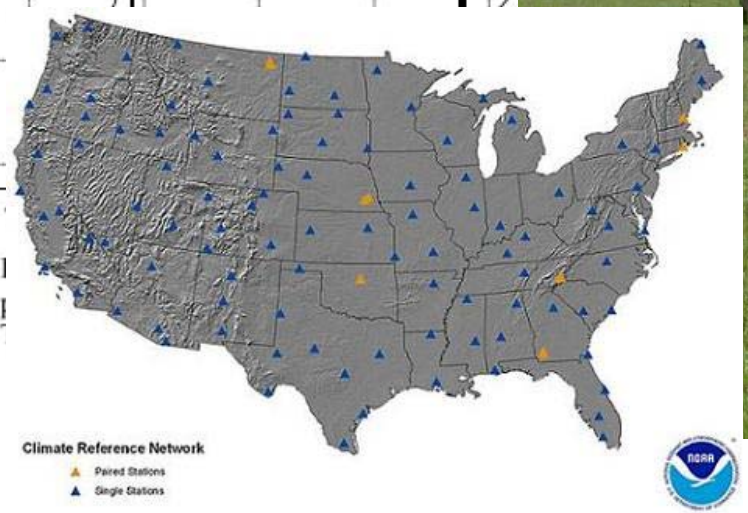
station moves, and an overall contribution to complete spatial coverage across the United States (Karl et al.

3 of 15

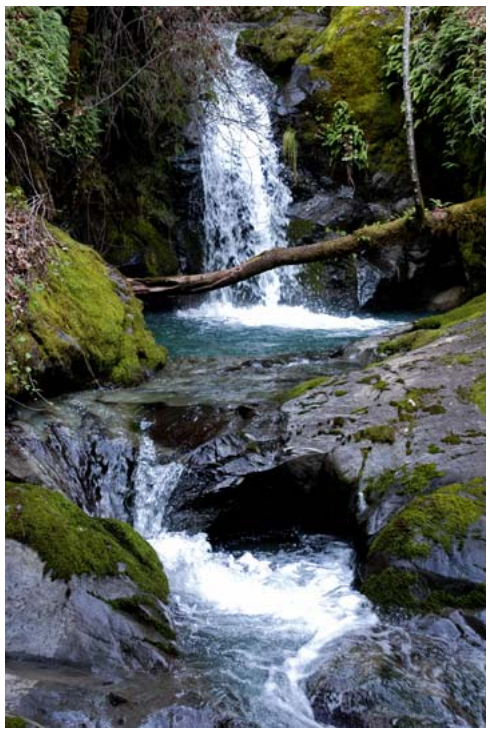
ForSatelliteTalk

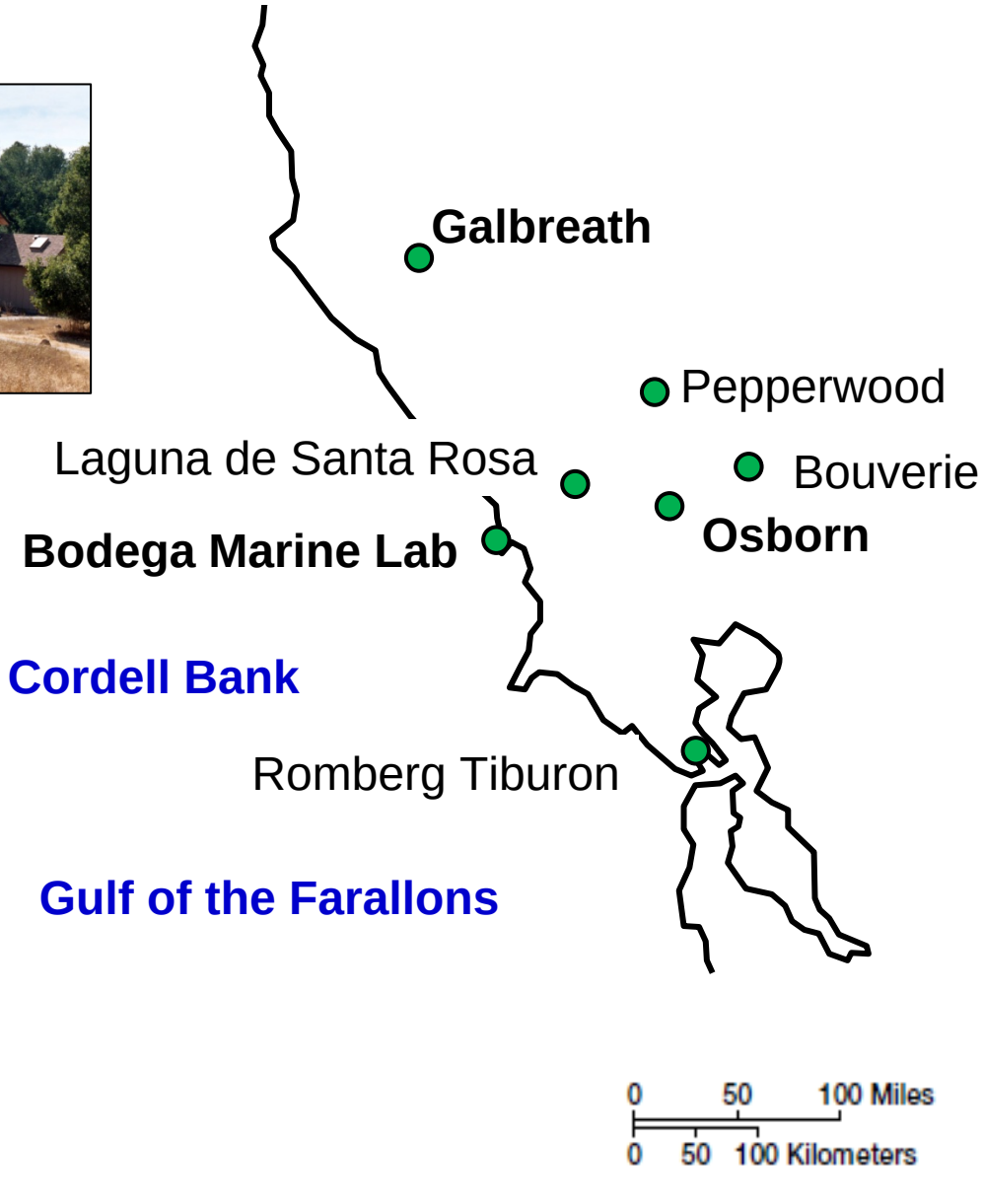
Standardization of Data Using Reference Sites



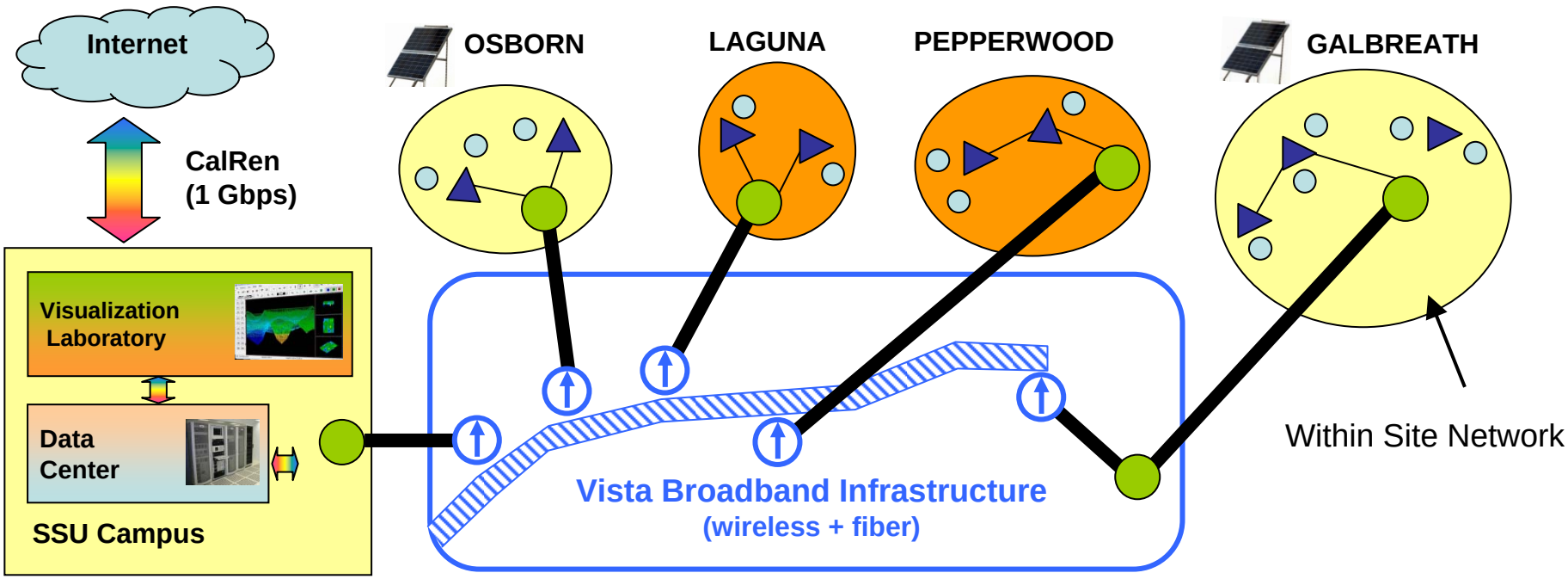


Research Stations: Reference Sites





NSF Proposal: Sonoma Network for Environmental Technology (SonNET)



Bottom-Up …..

- Climatic Identity
- Existing Resources
- Collaborations: Interdisciplinary Divides and Opportunities

INTERDISCIPLINARY DIVIDES AND OPPORTUNITIES

Marine and Terrestrial Sciences

INTERDISCIPLINARY DIVIDES AND OPPORTUNITIES

Agriculture and Ecology

INTERDISCIPLINARY DIVIDES AND OPPORTUNITIES

METEOROLOGY/ OCEANOGRAPHY

Climate is species specific

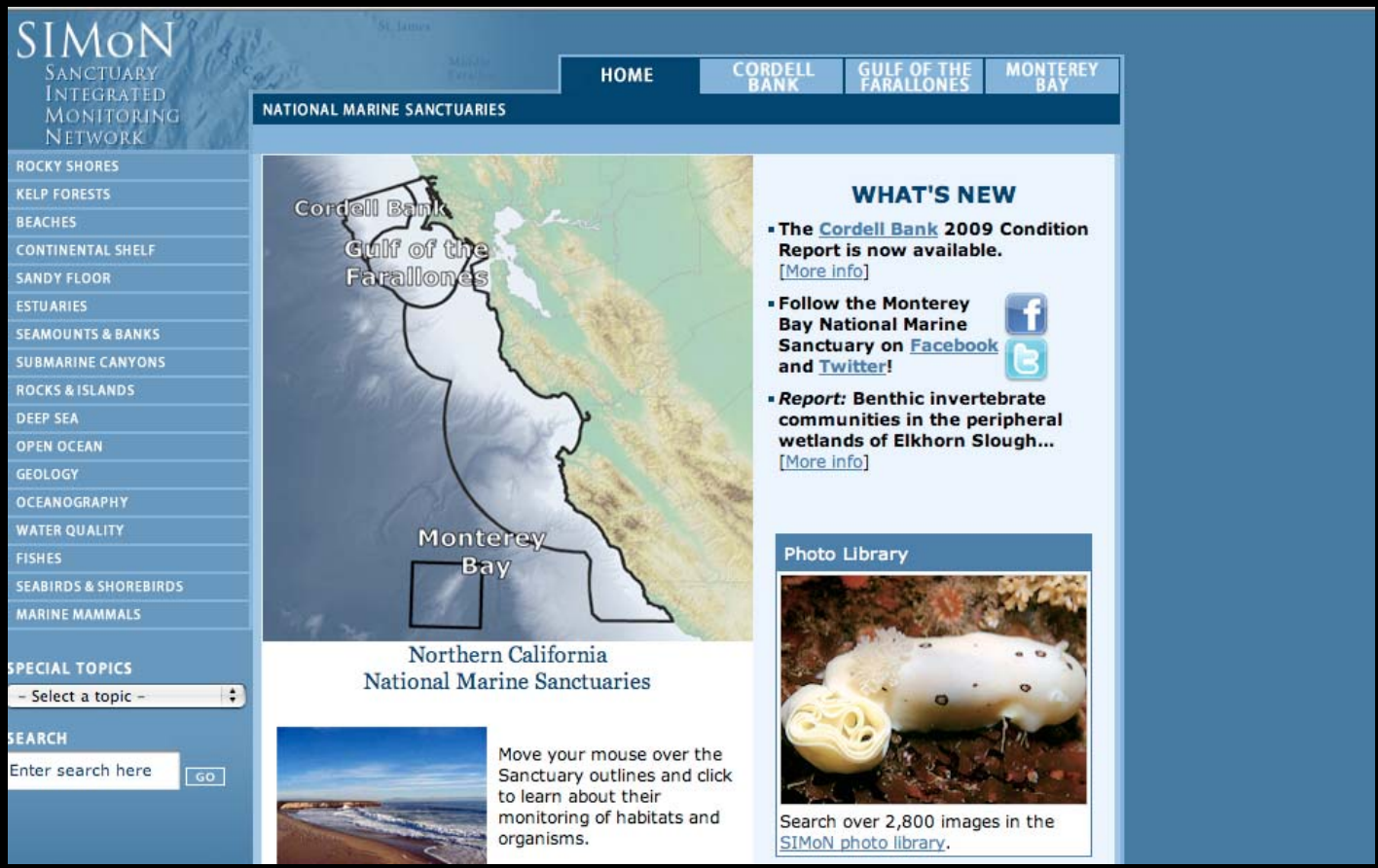
BIOLOGY

- July max
- Jan min
- Mean annual

- Persistence of min
- Diurnal soil temp at 12” depth in April on northfacing slopes

We are not alone…..

- Data Format
- Joint Efforts



Managers & Decision Makers:

- Monitor factors that determine local climate (e.g., fog)
- Monitor and compile data in species-specific manner, including species-interactions
- Collaborate across disciplines and organizations