# Puerto Rico update: Some preliminary results and plans for modeling

Jeff Gaffney, N. Marley, P. Doskey, and V. R. Kotamarthi

Argonne National Laboratory

PUERTO RICO
United States
0
25 mi
0
25 km
Atlantic Ocean
Bay of San Juan
San Juan
Punta Borinquen
Aguadilla Bay
Isabela
Aguadilla
Arecibo
Manatí
Vega Baja
Cataño
Bayamón
Carolina
Rincón
San Sebastián
Lares
Ciales
Guaynabo
Trujillo Alto
El Yunque
3,524 ft
(1,074 m)
Fajardo
Culebra
Vieques S
Utuado
Orocovis
Caguas
Ceiba
Mayagüez
Adjuntas
San Lorenzo
Isabel Segunda
Humacao
Cordillera Central
Cabo Rojo
San Germán
Cayey
Cerro
Yauco
Ponce
Patillas
Maunabo
Guánica
Guayama
Vieques
Cabo Rojo
Santa Isabel
Rincón Bay
I. Caja de Muertos
Caribbean Sea

# Why Puerto Rico?

1. Trade Winds – Easterly – North Easterly at Coast
2. 100x35 mile geometry – G-1 Friendly
3. Tropical – lots of photons
4. Terrain – 4,390 ft max. elevation – PBL work
5. San Juan – 3.5 million – Urban Plume
6. Other Collaborators – NSF, USPS, NAVY, EPA, ???
7. U.S. Commonwealth – Rain Forests
8. Interested Universities – Students, Faculty, Collaborators

Scientists Who Have Expressed An Interest in Puerto Rico Field Studies

Jeff Gaffney, Argonne National Lab
Nancy Marley, Argonne National Lab
Paul Doskey, Argonne National Lab
Rao Kotamarthi, Argonne National Lab
Marv Wesely, Argonne National Lab
Rich Coulter, Argonne National Lab
Chris Doran, Pacific Northwest National Lab
Jerome Fast, Pacific Northwest National Lab
Carl Berkowitz, Pacific Northwest National Lab

Tica Novakov, Lawrence Berkeley National Laboratory
Barbara Finlayson-Pitts, University of California, Irvine
Chester Spicer, Battelle, Columbus
John Frederick, The University of Chicago
Peter McMurray, The University of Minnesota
Oswaldo Rosario, The University of Puerto Rico, Rio Piedras
Brad Weiner, University of Puerto Rico, Rio Piedras
Sasha Madronich, NCAR
Darrel Baumgardner, UNAM
Graciela Raga, UNAM
Nelson Seaman, Penn State (seaman@ems.psu.edu)
John McHenry, North Carolina Supercomputing Center
Christine Wiedinmyer and Chuck Wilson, University of Denver
Martina Schmeling, Loyola University (Chicago)
Patricia Quinn, NOAA PMEL

SURE Students!
Monica Martinez, UPR, Rio Piedras
Neiza Hernandez, UPR, Mayaguez
Javier Ramirez, UPR, Mayaguez

Other Key Contacts:
LCDR Daniel Eleuterio
Officer in Charge
NAVLANTMETOCDET Roosevelt Roads, PR
(787) 865-4580

PRIDE Project Coordinator:
Dr. Jeffrey S. Reid
Atmospheric Propagation Branch-D858
SPAWAR Systems Center-San Diego
49170 Propagation Path
San Diego, CA, 92152-7385
Tel: 619-553-1419
Email: jreid@spawar.navy.mil

Meteorology Team Leader
Douglas L. Westphal
Naval Research Laboratory
7 Grace Hopper Street, Stop 2
Monterey, CA 93943-5502
Tel: 831-656-4743
E-mail: westphal@nrlmry.navy.mil

NASA Team Leader
Dr. Lorraine A. Remer
Code 913, NASA/Goddard Space Flight Center
Greenbelt MD 20771
Tel: 301-614-6194
E-mail: remer@climate.gsfc.nasa.gov

University of Miami Team Leader
Dr. Hal Maring
Rosenstiel School of Marine and Atmospheric Science
University of Miami
4600 Rickenbacker Causeway
Miami FL, 33149
Tel: 305-361-4679
E-mail: hmaring@rsmas.miami.edu

## Some Field Study Possibilities include:

Urban Plume Impacts –Winds well defined

Urban/Regional Scale Model Testbed

Sea Salt Aerosol Chemistries – Cl ?

Nighttime Chemistry – $NO_3$, etc.

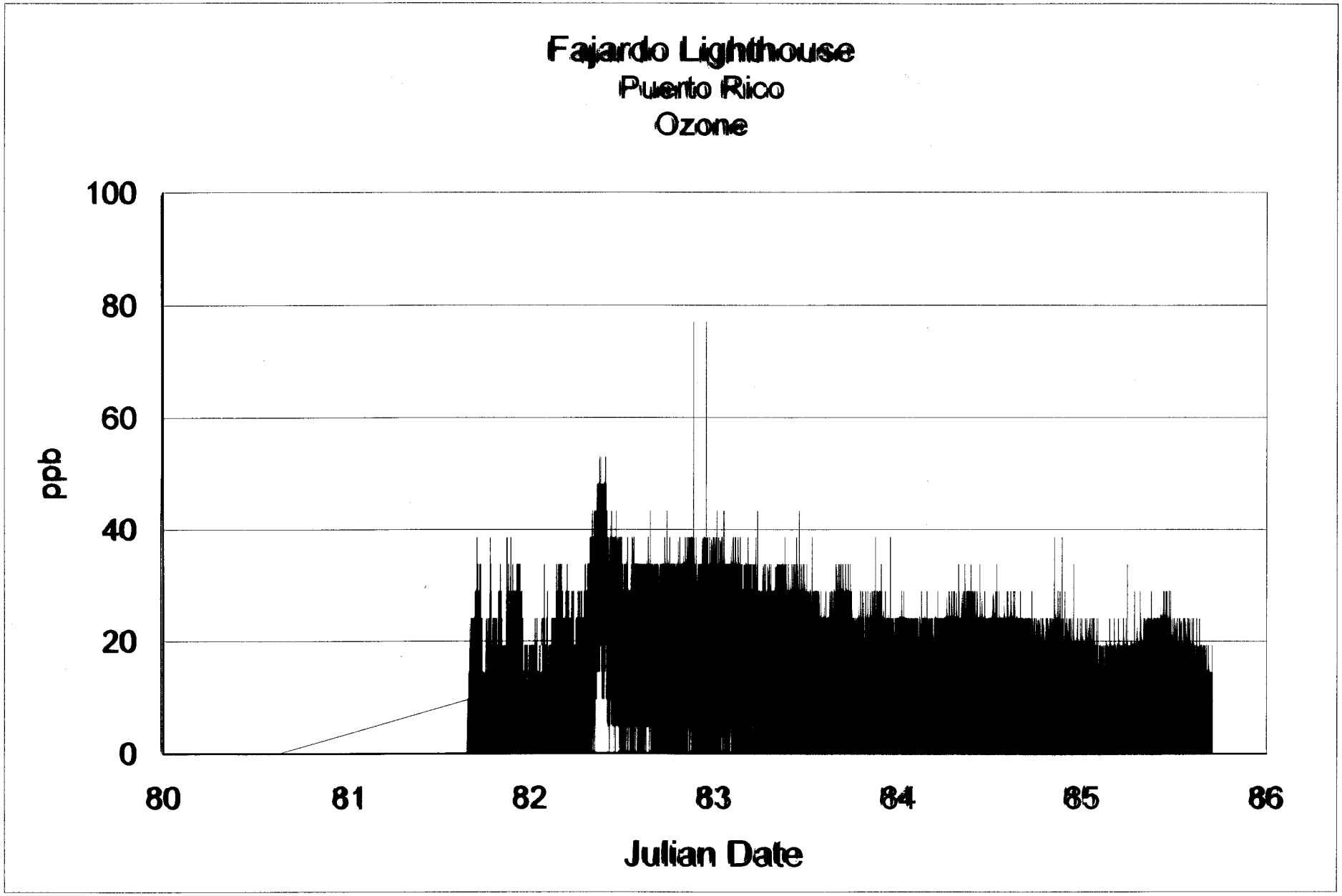
Natural Hydrocarbons – Organic Aerosols, $NO_3$, Cl, –TAP

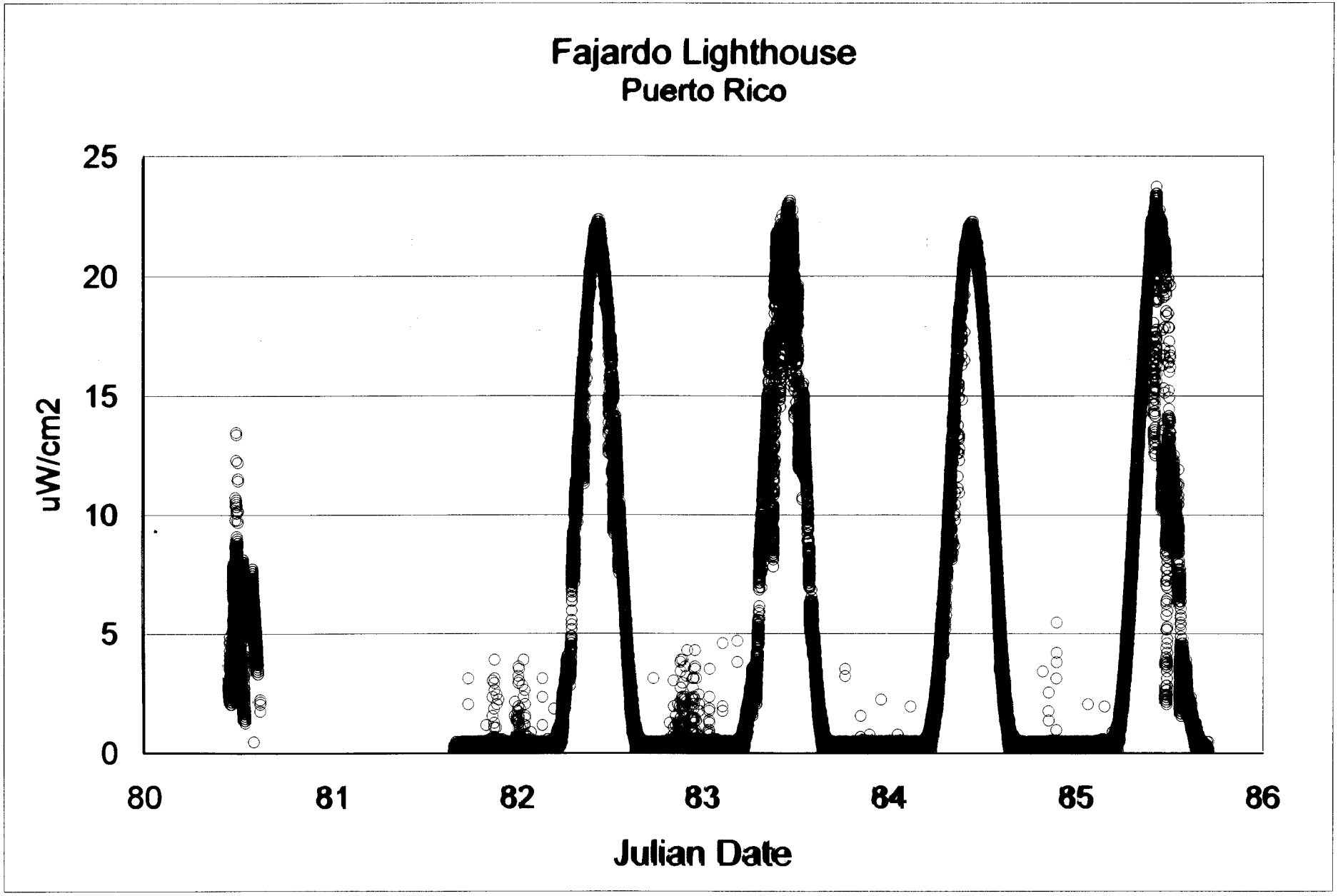
Combined EMP/ACP study of Boundary Layer

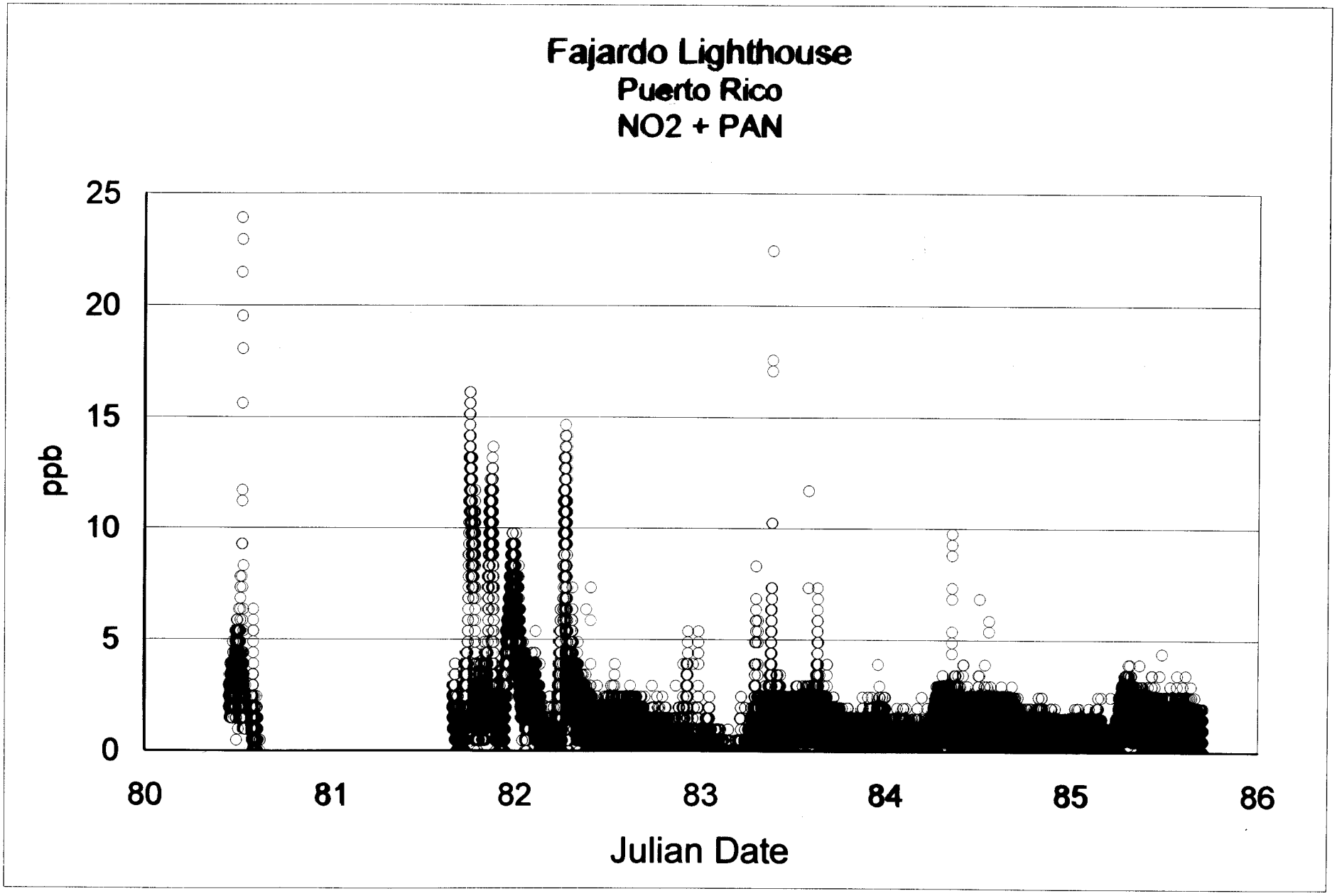
Cloud effects – Heterogeneous Chemistry

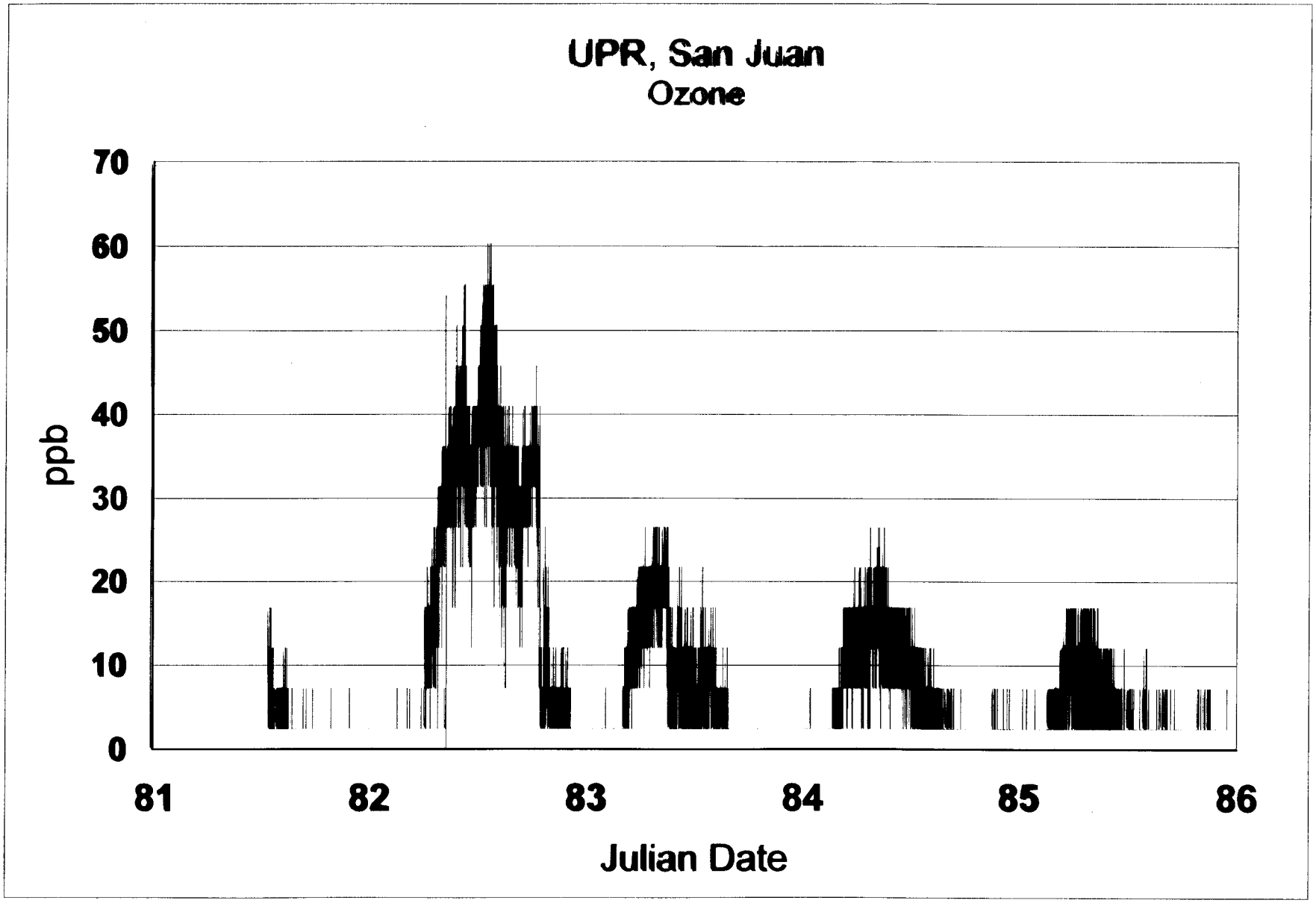
Radiative effects of aerosols and clouds on air chemistry

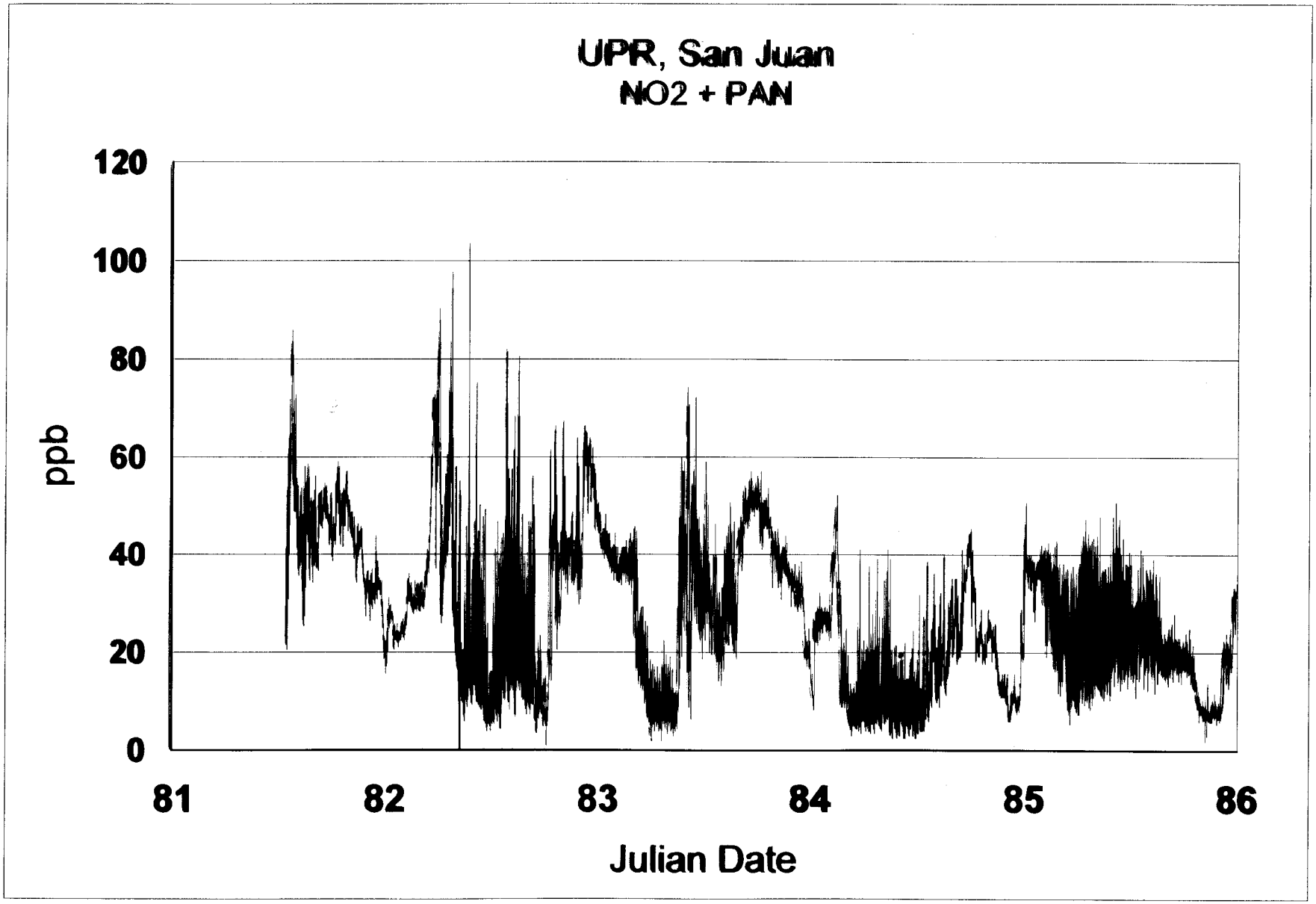
NORTH AMER. INCOMING BACKGROUND


Fajardo Lighthouse
Puerto Rico
Ozone
100
80
60
40
20
0
ppb
80
81
82
83
84
85
86
Julian Date


Fajardo Lighthouse
Puerto Rico
25
20
15
10
5
0
uW/cm2
80
81
82
83
84
85
86
Julian Date


Fajardo Lighthouse
Puerto Rico
NO2 + PAN
ppb
25
20
15
10
5
0
80
81
82
83
84
85
86
Julian Date


UPR, San Juan
Ozone
70
60
50
40
30
20
10
0
ppb
81
82
83
84
85
86
Julian Date


UPR, San Juan
NO2 + PAN
120
100
80
60
40
20
0
ppb
81
82
83
84
85
86
Julian Date

Puerto Rico is fairly polluted! – Lot of traffic.

Fajardo – Impacted by Two Cycle Engines and Diesels – Jet Skis and Speed boats!

Will be looking at Culebra as possible site for Clean Input Characterization – 2003

Modeling to be done with preliminary data on VOC's

VERY HIGH LEVELS OF ISOPRENE IN SAN JUAN

High Nitrogen Dioxide

Want to model ozone plume downwind to determine best sites for characterization.

Also Good site for examining secondary aerosol formation and possibly homogeneous nucleation at El Junque.

Will be looking toward Winter of 2005 for Field Study examining natural hydrocarbon interactions and also aerosol impacts (TAP?)

Thanks to Univ. of Puerto Rico, Rio Piedras
O. Rosario, B. Weiner (UPR)
Tica Novakov (LBNL – Trailer)
Laura Alvarez (SURE)
Monica Aviles (SURE)
Peter Lunn