DR. MELVILLE: I GUESS I NEED TO PRACTICE
MY "ALOHA" IN A SLIGHTLY STRANGE ACCENT.
IT’S MY PLEASURE TO REPRESENT SCRIPPS
INSTITUTION OF OCEANOGRAPHY IN WELCOMING YOU TO THIS
SYMPOSIUM IN CELEBRATION OF THE 50TH ANNIVERSARY OF
THE GLOBAL CO2 RECORD.

THese MEASUREMENTS, BEGUN AND SUSTAINED BY
DAVE KEELING THROUGHOUT HIS CAREER AT SCRIPPS, HAVE
HAD A PROFOUND IMPACT ON CLIMATE SCIENCE AND OUR
ABILITY TO REPRESENT TO THE PUBLIC IN A SINGLE GRAPH
THE INEXORABLE EFFECT OF MAN’S IMPACT ON OUR PLANET.
THE "KEELING CURVE" HAS BECOME AN ICON OF EARTH
SCIENCES AND CLIMATE CHANGE.

IT MAY SEEM CURIOUS THAT THE MOST PROMINENT
SINGLE SCIENTIFIC PROGRAM AT AN OCEANOGRAPHIC
INSTITUTION SHOULD BE THE MEASUREMENT OF CO2 IN THE
ATMOSPHERE, BUT DAVE KEELING FINDING HIS HOME AT
SCRIPPS WAS DUE TO ROGER REVELLE, SCRIPPS DIRECTOR AT
THE TIME, WHO HAD PUBLISHED, WITH HANS SEUSS, ON THE
UPTAKE OF CO2 BY THE OCEAN, AND WAS INTERESTED IN
STARTING ATMOSPHERIC CO2 MEASUREMENTS DURING THE
INTERNATIONAL GEOPHYSICAL YEAR IN '57 AND '58. IT'S
ALSO CONSISTENT WITH REVELLE’S STATEMENT THAT
"OCEANOGRAPHY IS WHATEVER WE DO AT SCRIPPS."

(LAUGHTER)

AS A POST-DOC AT CALTECH, DAVE WAS ALREADY
DEVELOPING THE SCIENTIFIC METHODS OF MEASURING CO2 IN
THE ATMOSPHERE. HE HAD ALREADY RECRUITED A MARINE
CHEMIST AT SCRIPPS, NORRIS RAKESTRAW, TO COLLECT GAS
SAMPLES FROM SHIPS IN THE TROPICAL PACIFIC, REMOTE
FROM ANTHROPOGENIC SOURCES. RAKESTRAW INFORMED
REVELLE OF DAVE’S WORK.

WITH THE APPROACH OF THE INTERNATIONAL
GEOPHYSICAL YEAR, HARRY WEXLER, THE DIRECTOR OF THE
DIVISION OF METEOROLOGICAL RESEARCH AT THE U.S.
WEATHER BUREAU, WANTED TO BEGIN MEASUREMENTS OF CO2 AT
MAUNA LOA. HE TRIED TO RECRUIT DAVE TO LEAD THE
PROGRAM, BUT EVEN THEN LA JOLLA SEEMED A MORE
ATTRACTIVE PLACE TO LIVE THAN WASHINGTON, AND DAVE
CAME TO SCRIPPS.

HOWEVER, IT WAS THE SUPPORT FROM WEXLER AT
THE WEATHER BUREAU THAT WAS CRUCIAL IN GETTING DAVE’S
PROGRAM GOING AND WAS THE BEGINNING OF A LONG
RELATIONSHIP BETWEEN DAVE, SCRIPPS, AND NOAA THAT HAS
OVER TIME EVOLVED INTO THE GLOBAL CO2 PROGRAM.
AS THAT PROGRAM HAS EVOLVED, IT HAS
ENCOMPASSED THE ATMOSPHERIC, OCEANOGRAPHIC,
TERRESTRIAL, AND OTHER APPLIED SCIENCES IN EXPLAINING
THE SEASONAL CYCLES, SPECIFIC EVENTS, AND LONGER TERM
VARIABILITY IN THE CO2 RECORD. WITH ANNUAL BUDGET
CYCLES AND SEMANTIC ARGUMENTS OVER THE DIFFERENCES
BEWEEN "MONITORING" AND "SCIENTIFIC" MEASUREMENTS,
WE STILL HAVE TO ARGUE FOR THE BENEFITS OF LONG-TERM
GLOBAL MEASUREMENTS IN ADDRESSING SCIENTIFIC AND
SOCIETALLY IMPORTANT PROBLEMS THAT STRETCH OVER
DECADAL AND LONGER TIME SCALES. BUT THE CO2 RECORD
SHOULD CLEARLY ESTABLISH THEIR IMPORTANCE.

I DON'T WANT TO DWELL ON THE HISTORY AND
DETAILS OF THE CO2 RECORD. THEY WILL BE THOROUGHLY
DISCUSSED OVER THE NEXT FEW DAYS BY THOSE MUCH BETTER
QUALIFIED TO DO SO. HOWEVER, I DO WANT TO TALK A
LITTLE ABOUT WHAT IS NEXT, ANOTHER MOTIVATION FOR
THIS MEETING. THE INITIATION AND SUCCESS OF LARGE
OBSERVATIONAL PROGRAMS IN THE EARTH SCIENCES USUALLY
DEPENDS ON THE VISION AND PERSEVERANCE OF ONE OR TWO
SCIENTIFIC LEADERS WITH SUPPORT FROM THEIR HOME
INSTITUTIONS, GOVERNMENT, AND INTERNATIONAL AGENCIES,
AND PERHAPS PHILANTHROPIC SUPPORT. MANY OF YOU AT
THIS MEETING HAVE DEMONSTRATED SUCH LEADERSHIP. AN
EXAMPLE OF SUCH A PROGRAM IN THE OCEAN SCIENCES IS
ARGO, THE GLOBALLY DISTRIBUTED ARRAY OF APPROXIMATELY
3,000 PROFILING FLOATS THAT MEASURE PRESSURE,

TEMPERATURE, SALINITY, AND CURRENTS OVER THE FIRST
1 TO 2 KILOMETERS OF THE OCEANS AND SEND DATA BACK
VIA SATELLITE. ARGO IS ANOTHER EXAMPLE OF NOAA
WORKING WITH SCRIPPS AND OTHER SCIENTIFIC
INSTITUTIONS AND INTERNATIONALLY TO PROVIDE GLOBAL
DATA PRODUCTS THAT WILL BENEFIT MANY AREAS OF CLIMATE
SCIENCE. HOWEVER, THERE IS CONSIDERABLE ROOM FOR THE
ARGO PLATFORMS AND THE RELATED OCEAN GLIDERS TO
SUPPORT NEW INSTRUMENTS TO MEASURE NEW VARIABLES IN
THE OCEAN. FOR EXAMPLE, IN RECENT YEARS SPECIALIZED
VERSIONS OF THESE PROFILING FLOATS HAVE BEEN
AIR-DEPLOYED AHEAD OF HURRICANES TO MEASURE UPPER
OCEAN HEAT CONTENT AND HURRICANE-INDUCED OCEAN
MIXING, WHICH WILL ULTIMATELY LEAD TO IMPROVED
HURRICANE FORECASTING. BUT THERE ARE ALSO POTENTIAL
DEVELOPMENTS OF ARGO THAT COULD ADDRESS THE
CONSEQUENCES FOR THE WORLD’S OCEANS RESULTING FROM
INCREASING ATMOSPHERIC CO2. THESE INCLUDE AN
INCREASING TRANSFER OF HEAT FROM THE ATMOSPHERE TO
THE OCEANS AND OCEAN ACIDIFICATION.

MY COLLEAGUES AT SCRIPPS WHO WORK ON
ANOTHER LONG-TERM COLLABORATIVE EFFORT WITH NOAA,
CALCOFI, THE CALIFORNIA COOPERATIVE FISHERIES
INVESTIGATION, TOLD ME THERE ARE CONCERNS ABOUT
POTENTIAL SUPPRESSION OF UPWELLING AND THE NUTRIENT
SUPPLIES TO SURFACE WATERS BY STRONGER THERMAL
STRATIFICATION OF THE UPPER OCEAN. THIS, ALONG WITH
OCEAN ACIDIFICATION, MAY HAVE AN ADVERSE EFFECT ON
MARINE ORGANISMS, ECOSYSTEMS, AND COMMERCIAL
FISHERIES.

WHILE ARGO ALREADY MEASURES UPPER OCEAN
TEMPERATURE PROFILES, IT COULD ALSO CONTRIBUTE TO
STUDIES OF CO2 UPTAKE AND OCEAN ACIDIFICATION BY THE
DEVELOPMENT OF SMALL, LOW-POWER SENSORS THAT COULD BE
DEPLOYED ON PROFILING FLOATS AND OTHER DISTRIBUTED
PLATFORMS LIKE GLIDERS. THIS IS JUST ONE EXAMPLE OF
HOW WE CAN BUILD ON THE GLOBAL CO2 PROGRAM, AND I'M
SURE THAT THERE ARE MANY OTHERS THAT WILL BE
DISCUSSED AT THIS MEETING AND BEYOND.

As Dave Keeling unequivocally demonstrated, the development of new methods to precisely measure important geophysical variables can profoundly affect our scientific understanding of our planet, the consequences of our actions on it, and the data to seek solutions for adaptation and mitigation.

Like you, I look forward to attending talks over the next couple of days by leaders in the global CO2 program, related sciences, business and government.

I wish you all a very successful meeting.

Thank you.