



ALASKA PACIFIC
OFFICE

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**Climate Change and Occupational
Safety and Health
WestON
Sept 11, 2014**

Max Kiefer, MS, Director, Western States Office

Jennifer Lincoln, PhD, Director, Alaska Pacific Office



Program

- Climate Change Review
- Climate Change and Workers
- Occupational Health and Safety Response
- NIOSH Climate Change Initiative
- Discussion

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Climate Change

- Increased temperature
- Heavy precipitation events
- Ecosystem shifts
- Extreme weather
- Drought
- Wildland Fire
- New and modified industries



Photo courtesy of USGS

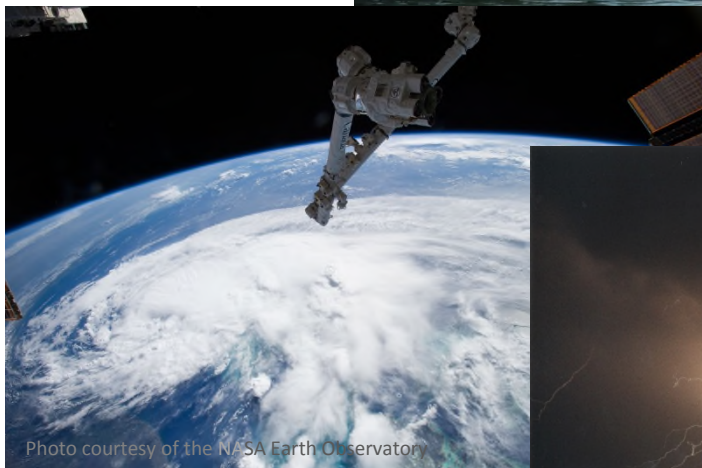


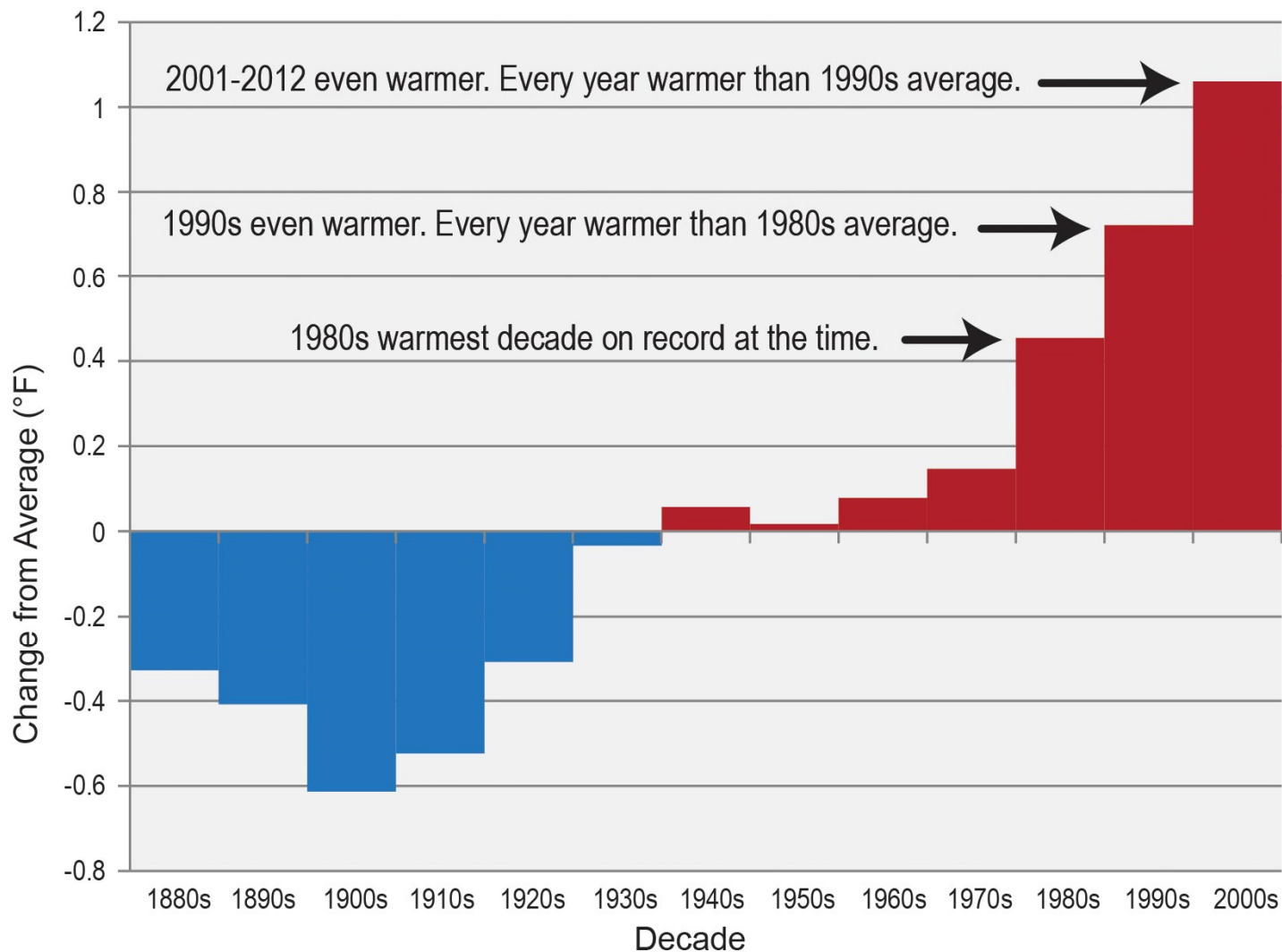
Photo courtesy of the NASA Earth Observatory



Photo by James Minot, courtesy of NWS



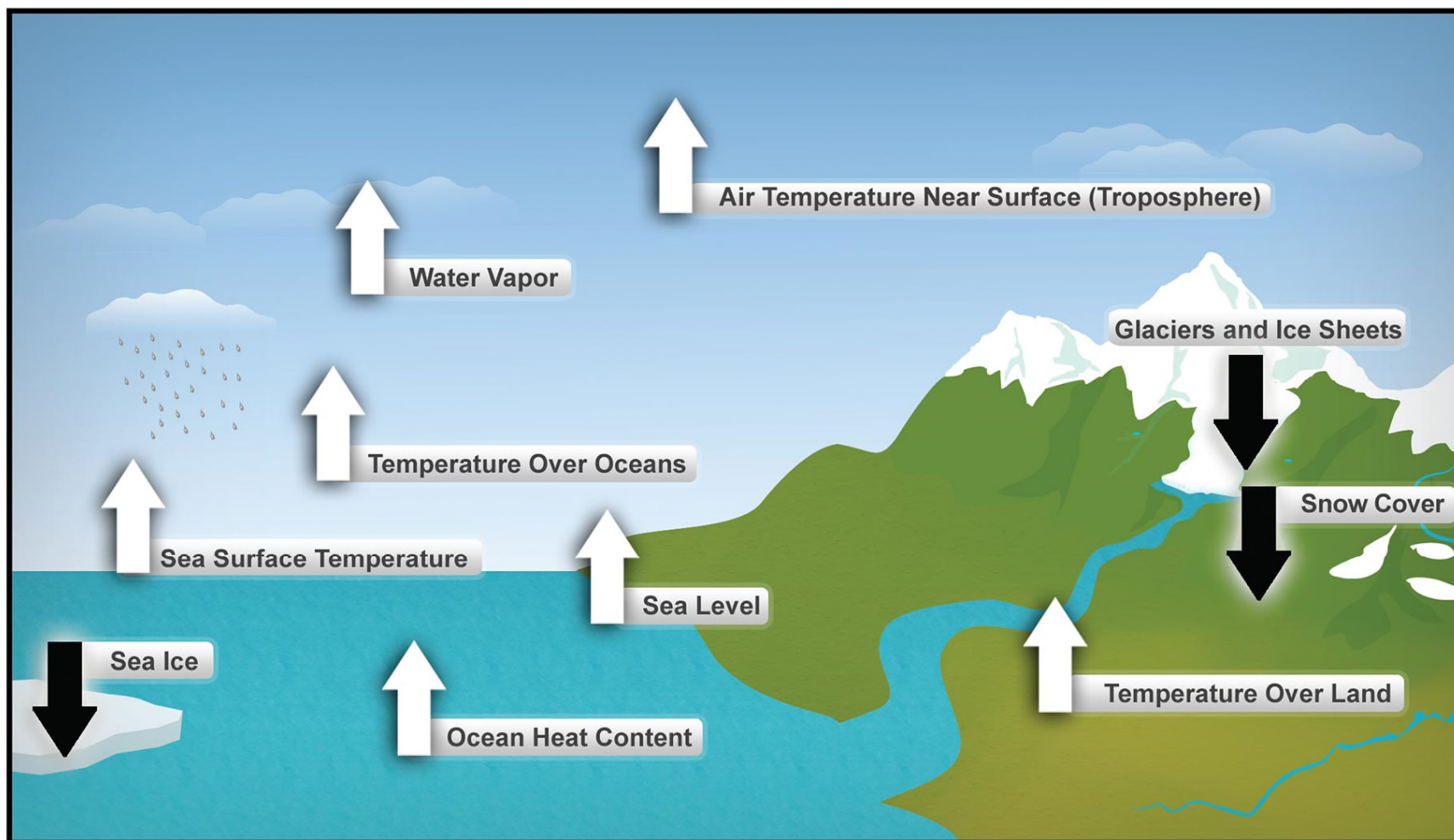
Global Temperature Change: Decade Averages



Source: NOAA NCDC: <http://nca2014.globalchange.gov/highlights/report-findings/our-changing-climate>



Ten Indicators of a Warming World

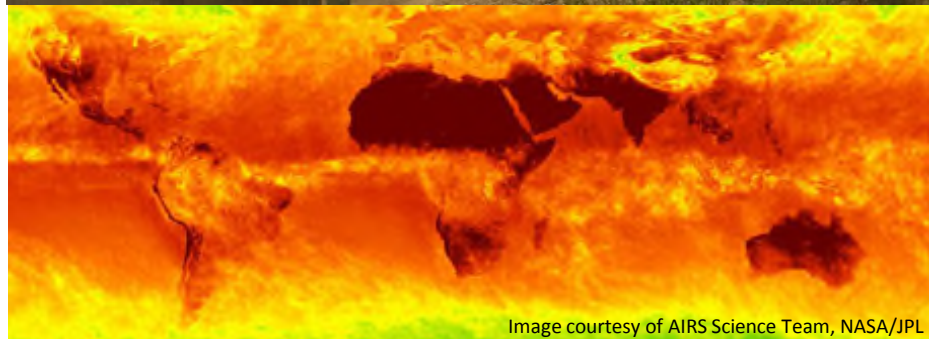


Source: 3rd National Climate Assessment <http://nca2014.globalchange.gov/report>



Climate Change and Workers

- Temperature Extremes
- Air Pollution
- UV Radiation
- Extreme Weather
- Wild-land Fire
- Vector-borne and other Infectious Disease MK1
- Changes in Built Environments
- Industrial transitions



Slide 6

MK1

e.g., valley fever, dengue, chikungunya virus
Max Kiefer, 8/7/2014



Heat Events

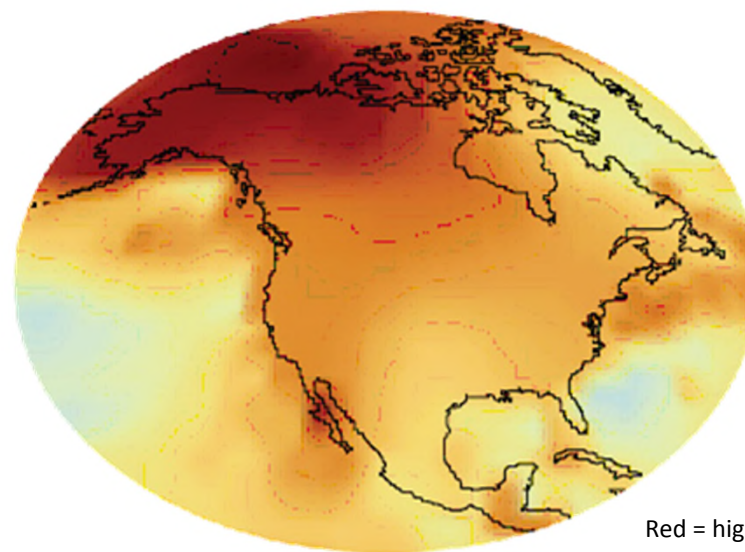
- The association between climate change and the frequency and intensity of extreme heat events is now well established
- Climate change models predict that heat waves will become more frequent and intense, especially in the higher latitude areas that are not well adapted to them
- Exposure to extreme heat is already a significant public health problem and the primary cause of weather-related mortality in the U.S.



Increased Ambient Temperature

- Heat exhaustion
- Heat stress/stroke
- Decreased chemical tolerance
- Fatigue, Impaired Judgment
- Increased risk of Injury
- Other

Rate of Global Warming



Red = higher rate

Image courtesy of the National Academy of Science and was created with data from the Goddard Institute for Space Studies.



Air Pollution

- Elevated temperature can increase levels of air pollution
 - e.g., ground level ozone, particulate matter
- Impact on both outdoor and indoor workers
- Aeroallergens and asthma
- Expanded geographic range





Ultraviolet Radiation

- ❑ Direct effect of climate change
 - Depletion of stratospheric ozone
- ❑ Sunburn
- ❑ Skin Cancer
- ❑ Eye Damage
- ❑ Enhanced photo-toxicity
 - Combined exposures to UV and PAHs
- ❑ Number of outdoor workers at risk will increase





Extreme Weather Events



Photo courtesy of USGS

- ❑ More frequent
- ❑ Heavy precipitation, storms, floods
- ❑ Droughts
- ❑ Emergency response and clean-up workers
 - New and unanticipated hazards
 - More frequent and longer in duration
- ❑ Disruption of infrastructure
- ❑ Worker risks include traumatic injury, stress, fatigue, exposure to chemical, physical, and biological agents



Wildland Fire

- ❑ Climate change will result in increased numbers and expansion of wildland fires
 - Hot, dry and windy conditions are factors conducive to fires
 - Increased numbers of fire fighters will be required
- ❑ Extended fire season
 - Increased work duration
- ❑ Climate change influences fire and fire activity can influence climate
- ❑ Occupational risks include: Heat stress, fatigue, smoke exposure, burns, injury



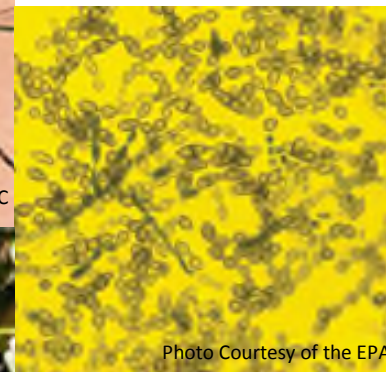
Satellite Image of California Wildland Fires





Vector-Borne and other Disease Hazards

- ❑ Climatic variables influence pathogen and disease patterns
- ❑ New and expanded vector ranges
 - Longer periods of vector activity
- ❑ Lyme disease, Hantavirus, West Nile Virus, Malaria, Dengue, Chikungunya





Vector-Borne and other Disease Hazards

- Outdoor work increases vulnerability
- Wide variety of disciplines potentially affected
- Increased pesticide use
- Valley Fever (Coccidioidomycosis)
 - Associated with dust storms, dry condition



Culex tarsalis: Vector for West Nile Virus



Lyme Disease

Reported Cases of Lyme Disease -- United States, 2001



1 dot placed randomly within county of residence for each reported case

Confirmed Cases in 2001 = 17,029

Reported Cases of Lyme Disease -- United States, 2011

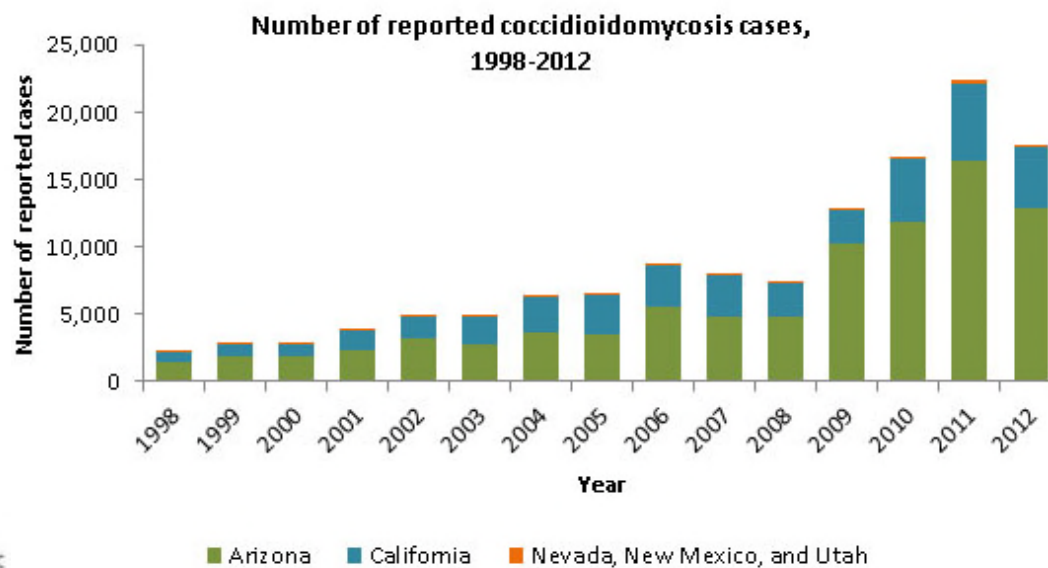
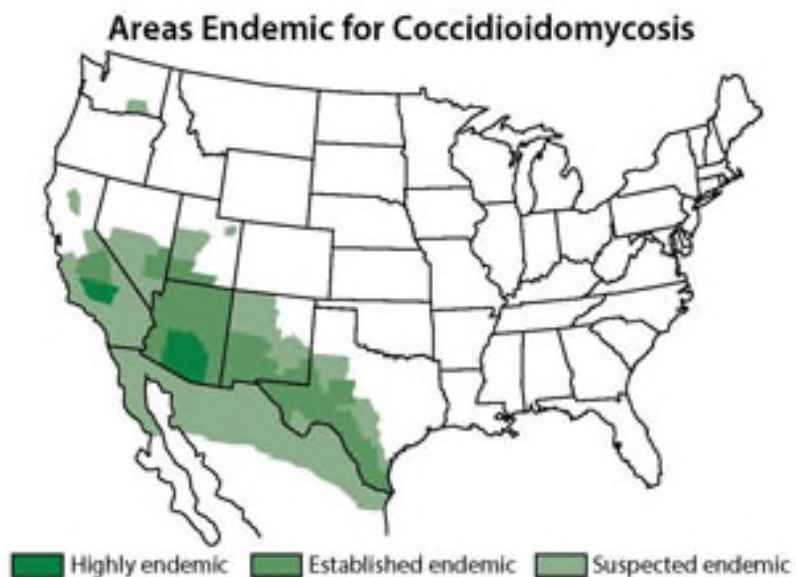


1 dot placed randomly within county of residence for each confirmed case

Confirmed Cases in 2011 = 24,364



Valley Fever



Source: CDC, <http://www.cdc.gov/fungal/diseases/coccidioidomycosis/causes.html>



The New York Times

September 11, 2009

A Shortcut Across The Top of the World

The Northeast Passage, across the Arctic Ocean, provides a shorter alternative for cargo vessels travelling between Europe and Asia than using the Suez Canal. It is shorter than the Panama Canal route for some voyages between the North American west coast and Europe.

LENGTH OF A VOYAGE TO ROTTERDAM FROM:

YOKOHAMA, JAPAN
12,894 miles via Suez Canal,
8,452 miles via Northeast Passage

SHANGHAI, CHINA
12,107 miles via Suez Canal,
9,297 miles via Northeast Passage

VANCOUVER, CANADA
10,262 miles via Panama Canal,
8,038 miles via Northeast Passage



UNITED STATES

NORTH AMERICA

Atlantic Ocean

Arctic Ocean

Rotterdam

EUROPE

RUSSIA

Suez Canal

ASIA

CHINA

Northeast Passage

8,452 MILES

Pacific Ocean

Yokohama

Southerly route

12,894 MILES

AFRICA

Indian Ocean

Source: The Russian Ministry of Transport

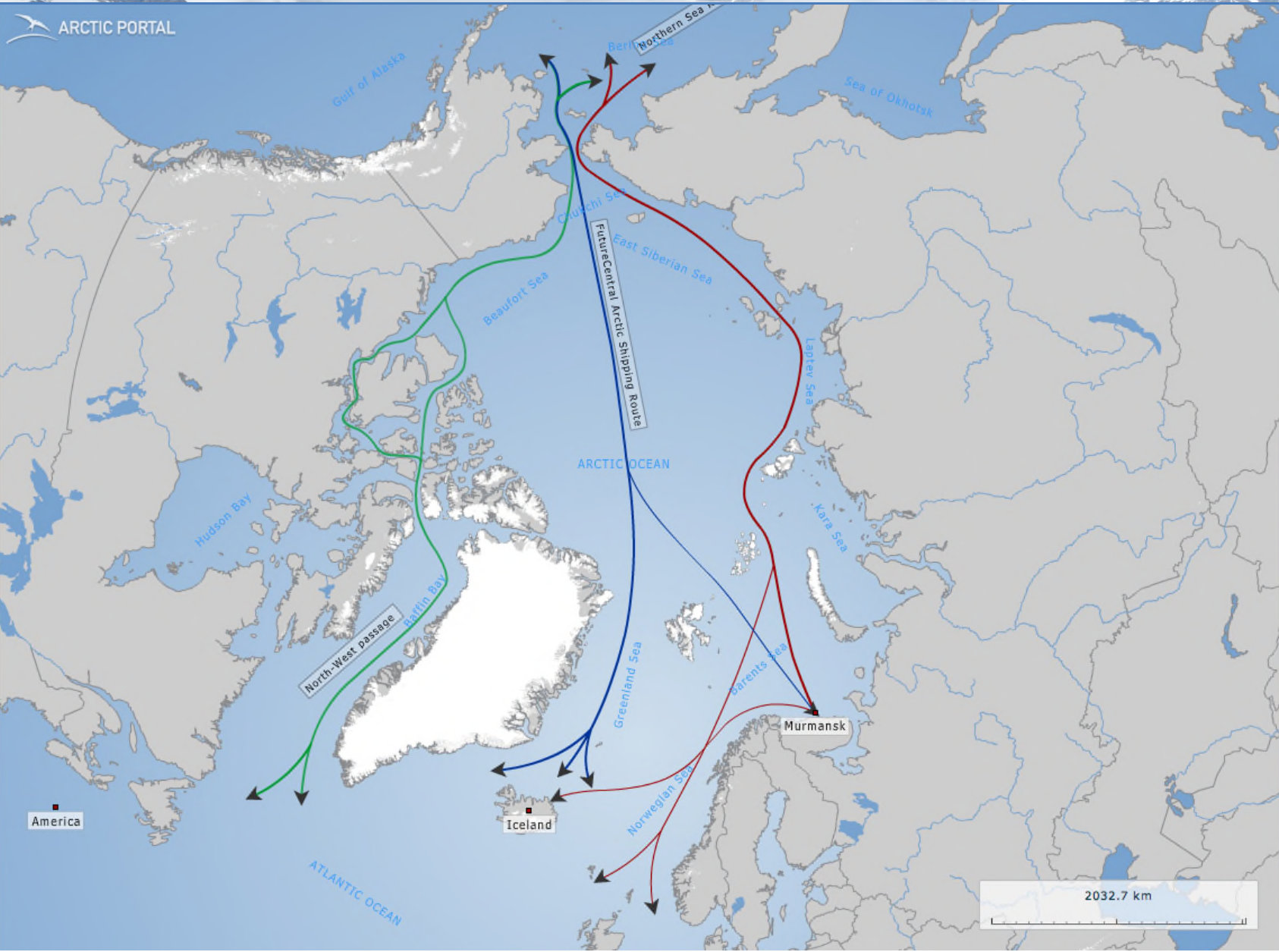
THE NEW YORK TIMES

SIGN IN TO RECOMMEND





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Developments in Arctic Region

- Oil & Gas Exploration
- Mining
- Shipping
- Commercial Fishing
- Tourism
- Support services – (associated)
- Emergency Response



Industrial Transitions and Emerging Industries

- Shift in industrial investments
 - New capacities and skills will be needed
- Geographical shifts
 - Agriculture
- Recycling
- Emerging industries
 - Biodiesel
 - Nuclear
 - Solar
 - Wind
 - Carbon Capture and Sequestration



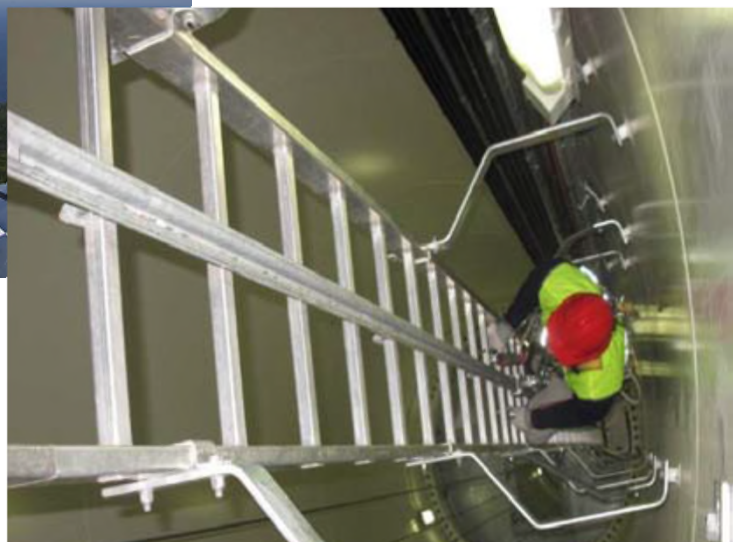


Wind Towers with In-Situ Recovery Uranium wells - Wyoming





NIOSH





NIOSH



How do we eliminate hazards and minimize risks in emerging industries and technologies?





NIOSH



How do we transfer existing successful practices to these new jobs?

- Fall protection
- Crane safety
- Control of hazardous energy
- Permit-required confined space



Changes in the Built Environment – Indoor Air Quality

- Tight buildings
 - Radon
 - Mold
- Unconditioned Factories
 - Heat
- Unanticipated impacts of new building designs



ThyssenKrupp Steel USA factory in Calvert, Alabama. Photo courtesy of Reuters





Possible Solutions:

- Integrate sustainable construction safety and health within green design and construction practices
- Incorporate worker safety and health into LEED or alternate rating system
 - Construction, maintenance and use
- Involve energy and environmental professionals and students in design and planning (Prevention by Design; chapters in engineering books)



NIOSH Climate Change Workgroup Formation

Ensure current, emerging, and anticipated worker safety and health issues associated with climate change are appropriately identified and prioritized, and to determine the most important actions that are appropriate to address.



Photo courtesy of USGS



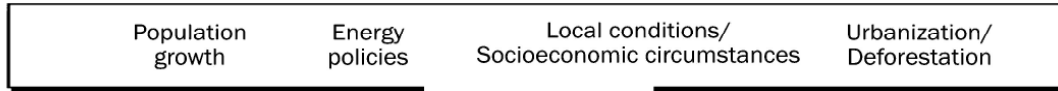
Photo courtesy of USGS



Photo courtesy of USGS

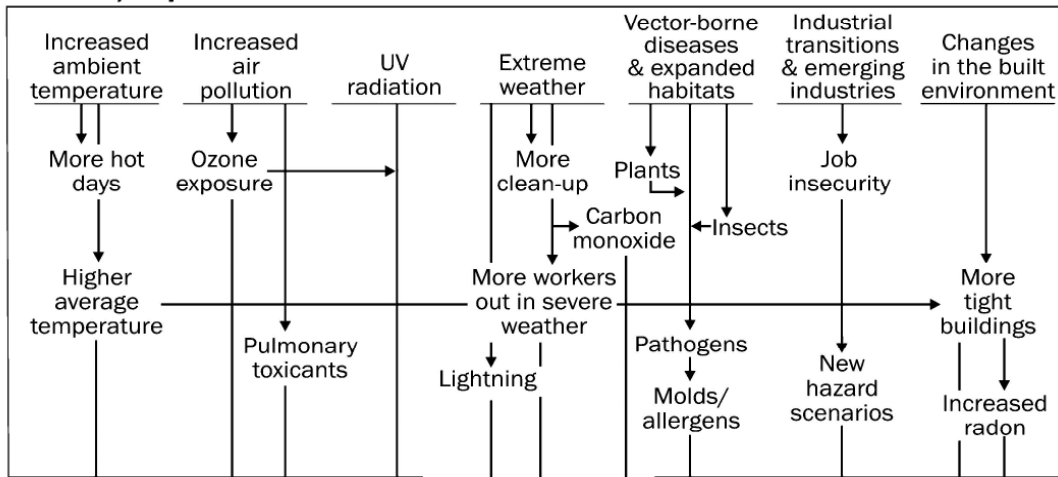


Contexts

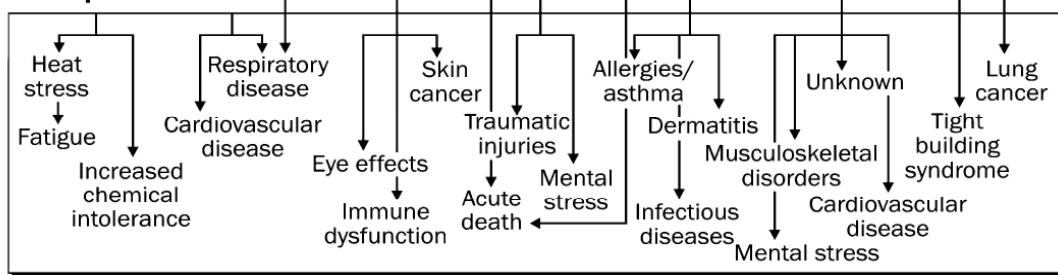


Global Climate Change

Hazards/Exposures



Occupational Health Effects



Impact on Occupational Safety and Health Research and Practice

- Conduct new research linking climate and occupational diseases
- Identify numbers of workers exposed
- Develop:
 - New hazard controls/ guidance
 - Occupational Exposure Limits
 - Risk communication
 - Expanded surveillance
- Collaborate with environmental scientists/ "green movement"
- Modify risk assessment methods
- Develop leading indicators of climate-potentiated health effects

FIGURE 1. Conceptual framework of the relationship between climate change and occupational safety and health



NIOSH Activities

- Climate change designated as a NIOSH Emphasis area
- Formation of NIOSH Climate Change Occupational Safety and Health (CCOSH) Work Group
 - Interdisciplinary
 - Determine occupational safety and health issues
 - Identify gaps in worker protection
 - **Develop a research agenda**



NIOSH Activities, cont.

- Other CCOSH work group goals:
 - Make recommendations for worker safety and health improvements
 - Topic Page and Blog
 - Establish and maintain a reference database
 - Develop and disseminate communication products
 - Participate on interagency initiatives to ensure occupational safety and health is included as a core component of public health



Elements of a Research Agenda

- Determine the links between climate change and occupational hazards
 - Identify, evaluate, and characterize these links
- Identify the number of workers and subpopulations affected by direct and indirect effects of climate change
- Identify, evaluate and categorize control methods and adaptive responses to reduce or eliminate the impact of climate change on worker safety and health
 - Develop recommendations and guidance
- Develop new and risk assessment methods



Elements of a Research Agenda, cont.

- Develop and assess risk communication mechanisms and strategies
- Develop leading indicators of climate-potentiated health effects
 - Sentinel event/early warning systems
- Determine mechanisms for establishing a surveillance system
 - identify climate change safety and health injuries and illness,
 - track workers
 - maintain records of exposure/impacts related to climate change



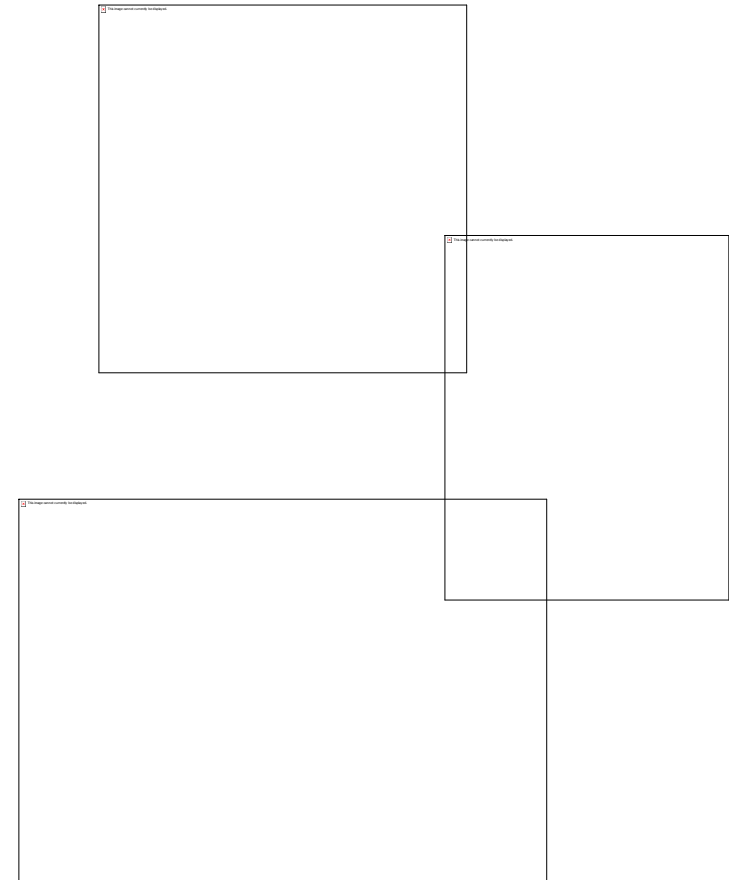
Identifying Workers and Facilities Likely to be Impacted by Severe Weather Events Stemming from Climate Change: a Geospatial Approach





Key Domestic Partners

- National Center for Environmental Health
- National Institute of Environmental Health Sciences
- National Oceanic and Atmospheric Administration
- Environmental Protection Agency





OSH inclusion in the Interagency Climate Change and Human Health Report



Summary

- There is strong evidence that climate change is and will present OSH hazards
 - Amplification of existing hazards (prevalence, distribution, and severity)
 - Unanticipated hazards
 - interactions of known hazards and new conditions leading to new hazards and risks
- Research is needed to better characterize and understand how OSH may be associated with climate change events
 - Specific hazards, populations at risk, surveillance, sentinel events, risk assessment and management, indicators and preventive actions and options, communication
- There is much we can do using established tools and strategies
- Integrating climate change and OSH into a comprehensive adaptation planning process will yield the largest health improvements and savings



Max Kiefer
Western States Office
(303) 236-5944
mkiefer@cdc.gov

Jennifer Lincoln
Alaska Pacific Office
(907) 271-2382
jlincoln@cdc.gov

Questions/Discussion?

