Aviation in a dual role:

Contributing both to Climate Change and its Mitigation

Presentation to

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by

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THE FACTS OF CLIMATE CHANGE

Aviation was contributing about 2 % of global CO_2 in 1999

- With vigorous growth, this share is expected to increase to about 3 % around 2010-2015
- Further effects on O_3 ,NO_x , Contrails & Cirrus (large uncertainty)
- Climate change is more than "warming"
  - increased volatility affects occurrence and predictability of extreme events
  - emerging awareness of impact on demand side (tourism, finance)
  - competition for diminishing resources (fossil fuel and bio-fuels)

The Mitigation Options

Technology: Despite impressive past gains of efficiency, technology entering a stage of "diminishing returns" and trade-offs

Alternative fuels: emerging global food shortages limit use of "primary bio-fuels", 2nd generation in early stages of development

Emissions trading: In "open systems", Aviation would be required to buy increasing quantities of credits

Operational Measures: Considerable potential (8-10%) for savings in CO_2, even larger potential in reduction of Contrails and Cirrus

BUT: Optimal use of meteorology in cooperation with ATM a pre-requisite to materialize potential!!!

Operational Measures

More flexibility to fly optimal routes by introducing « free flight »

Revolutionary ATM Concepts being developed (NextGen, SESAR)

Minimize circular holdings by optimizing « arrival managers »

« Green approaches » using Continuous Descent Approach

Optimal « minimum time tracks »

Meteorological Requirements for operational mitigation measures

Increase accuracy and update rate of upper wind and temperature forecasts (optimal use of jet streams)

Higher precision and reliability of significant weather (turbulence, icing, thunderstorms) to minimize deviations

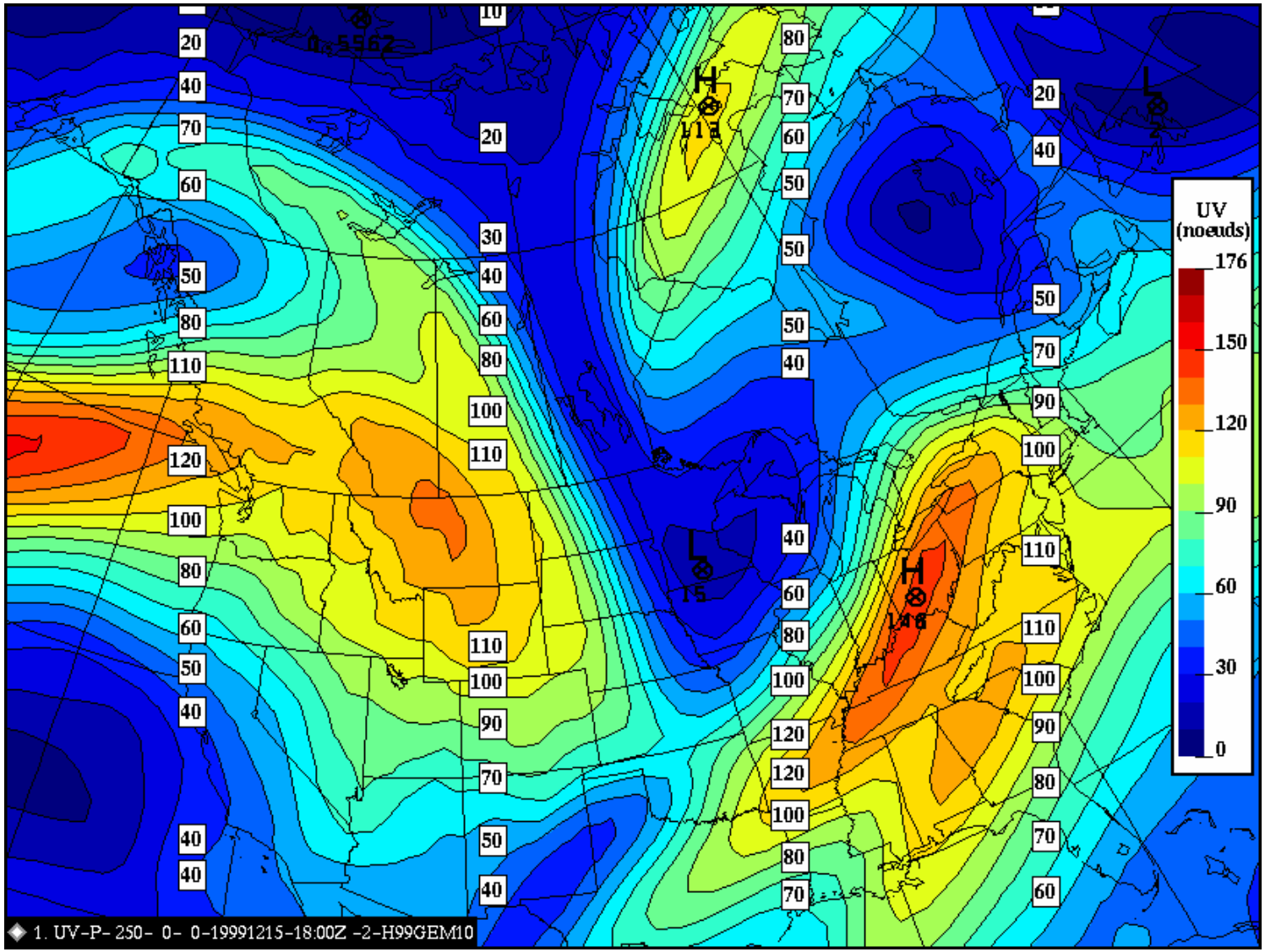
Accurate forecasts of wind conditions for optimal runway selection

Accurate winds for optimal approaches

Precise information of layers conducive to icing, contrail formation

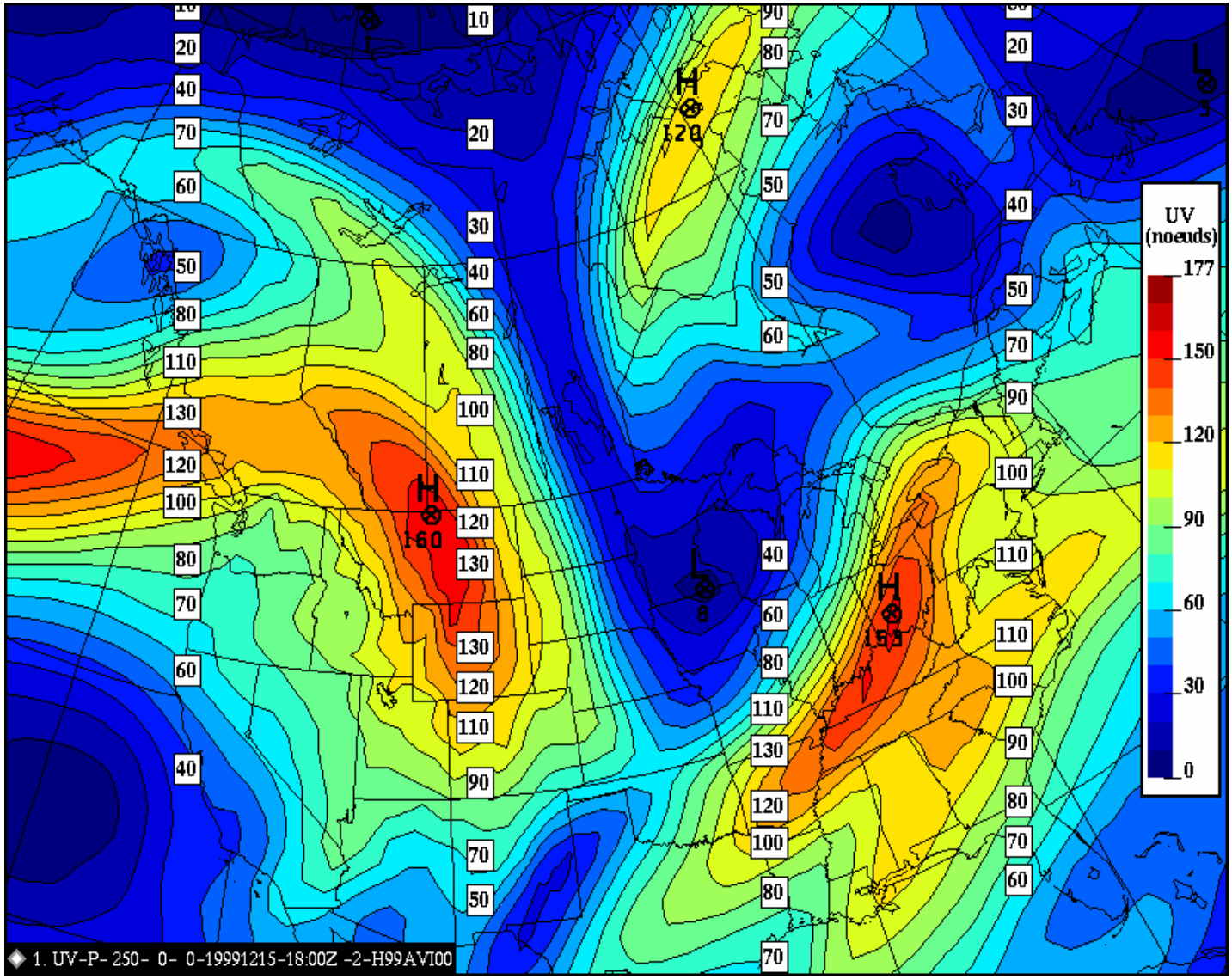
Precise forecasts of weather affecting ground operations (thunderstorms, snowfall, de-icing of runways)

Wind Speed analysis for AIREP only cycle, no AMDAR (1999121518)



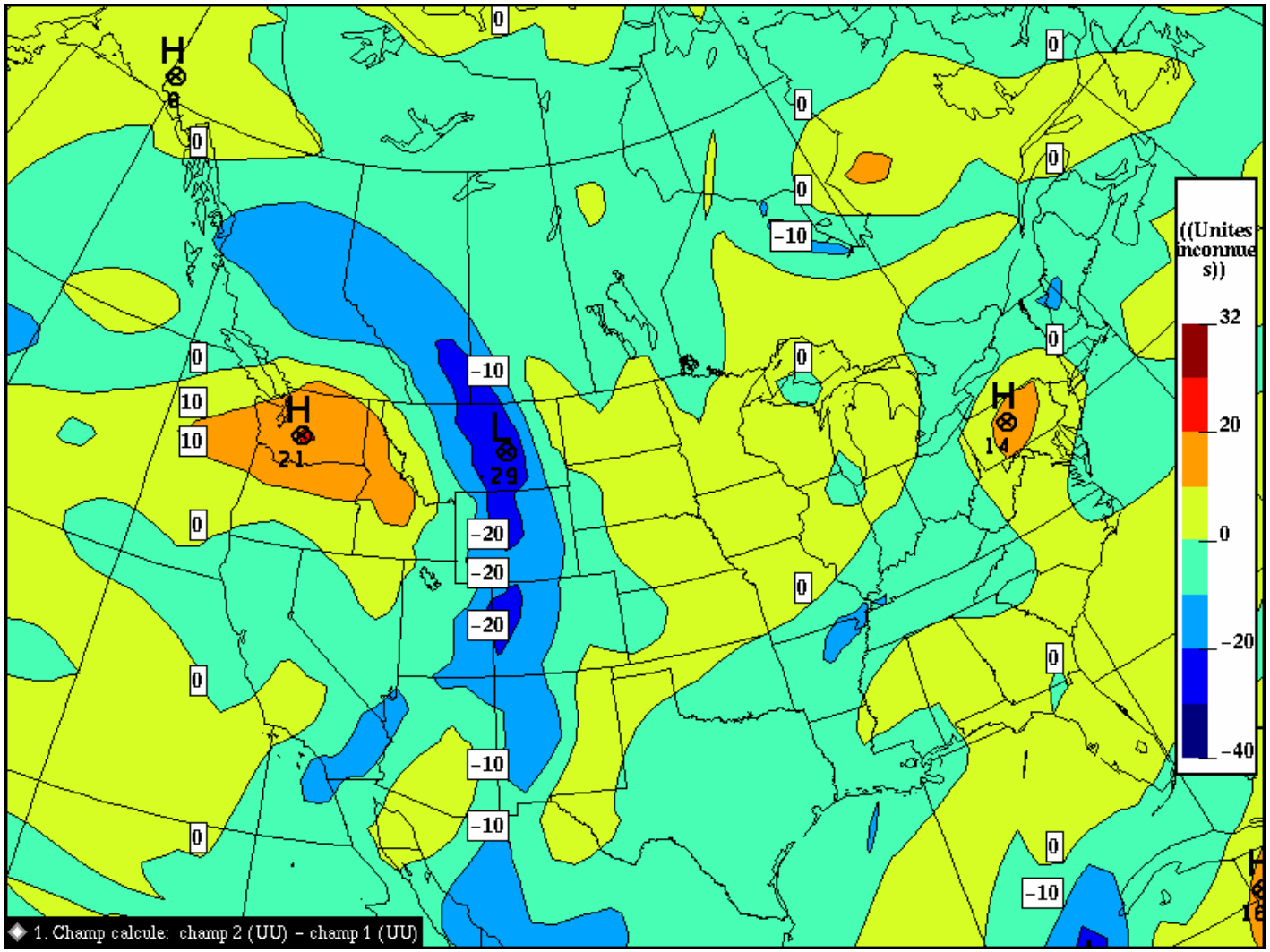
Model output without AMDAR from any airline on any scale (global, regional, local)

Wind speed analysis for AIREP and AMDAR cycle (1999121518)



Model output with AMDAR from contributing airlines. No Canadian data yet in 1999. Compare with previous slide: Without AMDAR, models underestimated jet stream by 10-30 kts over southern Alberta!

Wind speed difference map (1999121518)



Canadian Meteorological Centre

Without AMDAR from contributing airlines, model underestimated jet by 10-30 kts over southern Alberta.
Today there are more AMDAR data globally, including from 1 Canadian air carrier primarily operating over southern Canada.

Data Requirements

Despite advances in satellite technology, in situ data still extremely important for aeronautical meteorology!

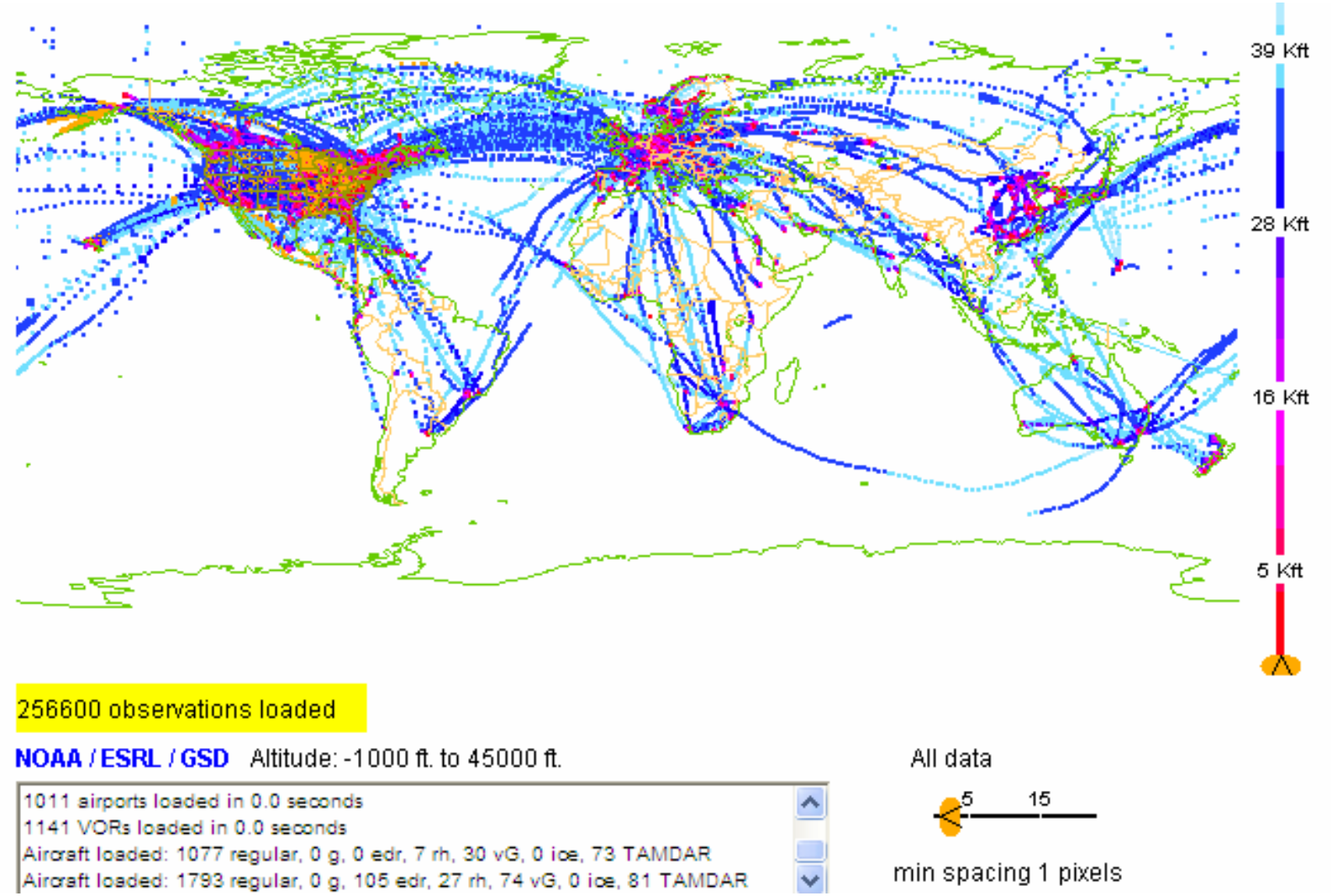
WMO AMDAR Programme providing 250 000 + observations / day from commercial aircraft

Only limited number of participating airlines!

Need for considerable investment in humidity sensors, generic software for downlinking from all aircraft types

Only affordable source of humidity data at vertical resolution sufficient for contrail prediction

Global AMDAR data, 24 hrs, 11 June 08



The essential role of aviation in a changing climate

With a strong observed and projected increase in the number of natural disasters, aviation is the only available rapid intervention mechanism for stricken communities

- o Tourism often main source of income for small island states
- o Where surface transport infrastructure is lacking, aviation key factor in sustainable development (Africa, Island states, parts of Asia, South America)
- o Climate adaptation will require a large degree of flexibility of economical systems, thus speed and availability of transport remaining essential

Role of carbon markets in ensuring fair distribution of costs and benefits of Meteorological Data Requirements

Currently airlines contributing to global data base on a voluntary basis

Equity and fairness needed where investments (sensors, software) become necessary to maintain and improve system

Carbon Credits ideal “currency” to reward participating operators and aircraft

This solution avoids additional burden on essential aviation services

Ensures equity and fairness for participating operators

Contributes to sustainable development