SPACE WEATHER
AND
POLAR OPERATIONS

AN AIRLINE'S PERSPECTIVE

GENE CAMERON
MANAGER – GLOBAL SUPPORT
FLIGHT DISPATCH
UNITED AIRLINES

March 6, 2007 United Completed it's 6000th POLAR Flight
UA 829 Chicago - Hong Kong

UNITED

1996 - CHICAGO TO HONG KONG

Unable Year Round non-stop due to Strong Winter Headwinds

1997 – POLAR routes were identified as viable non-stop alternative

1998 - FIRST POLAR FLIGHT New York – Hong Kong (Cathay Pacific)

1999 - FIRST United Polar Demo Flights from Chicago to Hong Kong

POLAR BENEFITS

FASTER ! Flight time reductions of 1 to 3 hours over the North Pacific and Russian routes

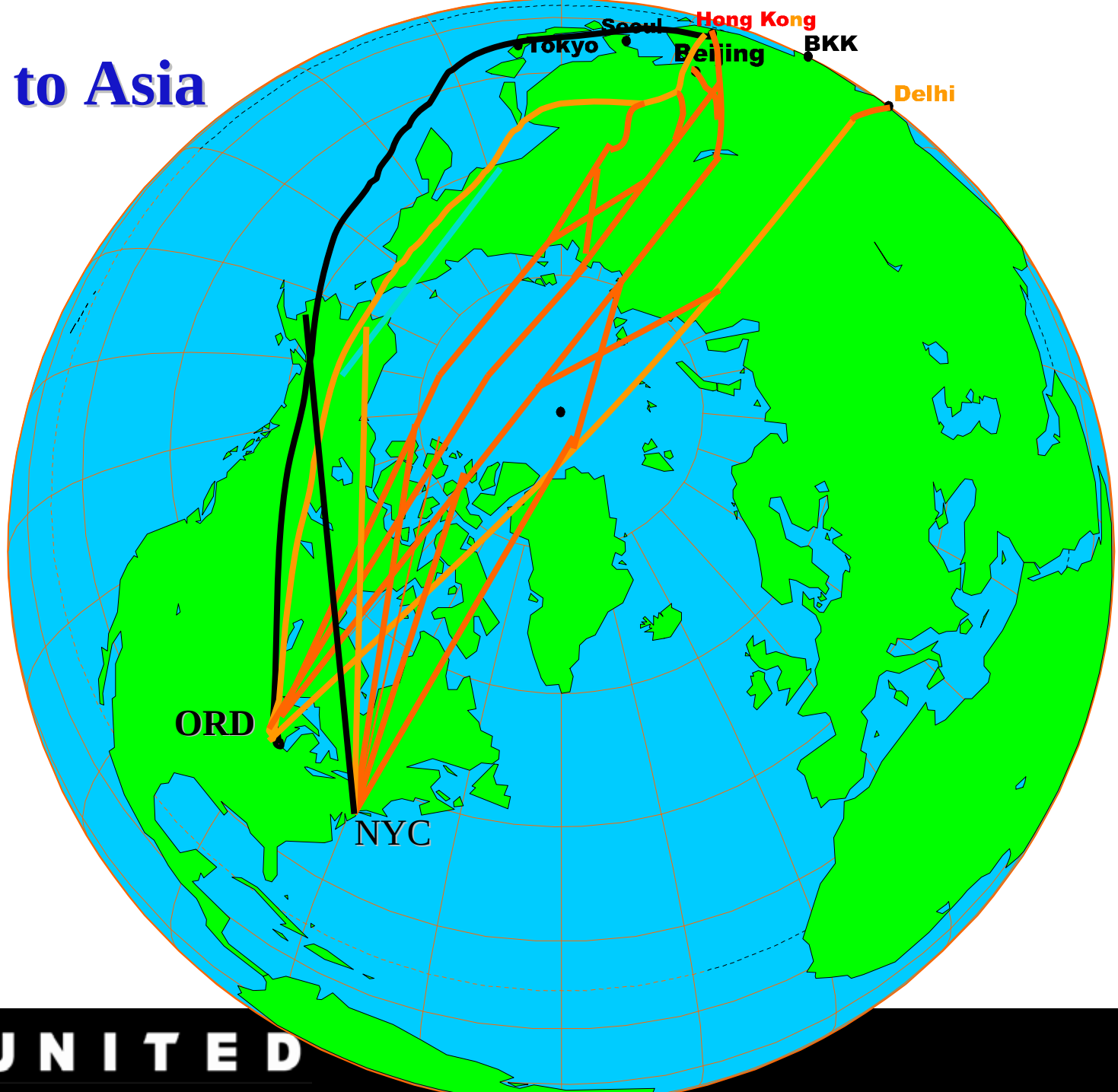
SMOOTHER ! Absence of turbulence in the polar region

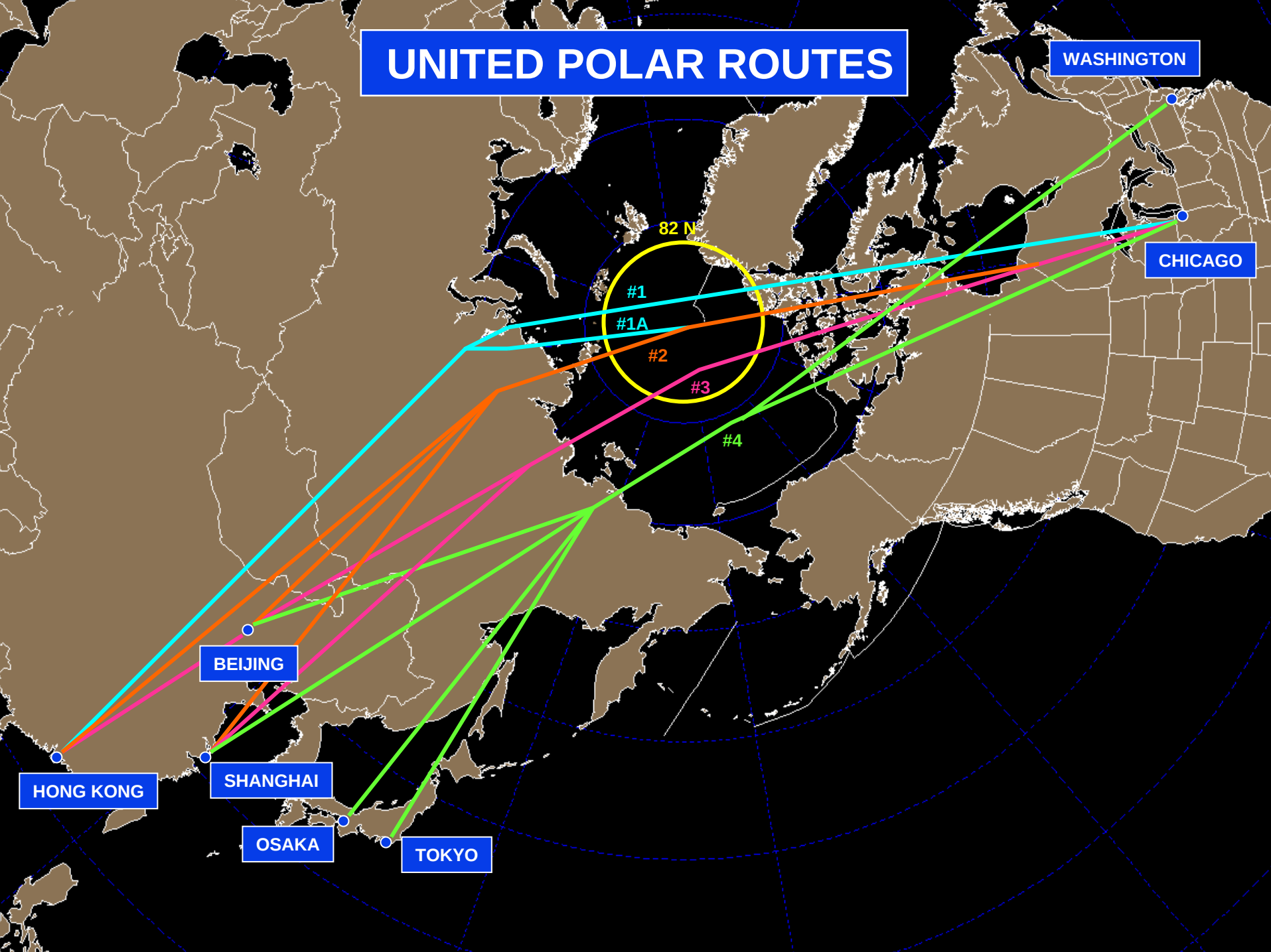
POSITIVE AFFECT ENVIRONMENTALLY ! Reduced emissions and reduced fuel use

NEW SERVICES ! New markets open up between North America and Asia

Airlines now flying polar routes: In addition to United, Air Canada, American, Cathay Pacific, Continental, Delta, Korean, Northwest, Singapore, and Thai now fly polar routes.

Polar to Asia




UNITED POLAR ROUTES
WASHINGTON
CHICAGO
82 N
#1
#1A
#2
#3
#4
BEIJING
HONG KONG
SHANGHAI
OSAKA
TOKYO

United Year to Year Performance

1999 - 12 POLAR DEMO FLIGHTS
2000 - 253 Polar Flights
2001 - 466 Polar Flights
2002 - 471 Polar Flights
2003 - 578 Polar Flights
2004 - 1096 Polar Flights
2005 - 1402 Polar Flights
2006 - 1484 Polar Flights
2007 – 903 Polar Flights

Total 6653 United Polar Flights 1999 Thru June 30, 2007

Total for all airline Polar Flights in 2006 – 5308

A 47 percent increase over 2005 for all polar operations

Polar route usage will continue to grow at above average rates

Economic Comparison of Non-Stop Options

(March 2007 baseline) (Affect of typical winter headwinds)

FLIGHT 829 ORD-HKG B747-400 AIRCRAFT

Operating via Polar 3 routing
316 PSGRS AND 5000 lbs CARGO (14:32)

Operating via the Russian Routes
246 PSGRS AND NO CARGO (15:41)

Operating via the North Pacific Routes
NO PSGRS OR CARGO (17:18)

CAN NOT OPERATE NON-STOP UNDER THESE CONDITIONS

WHAT ARE THE ISSUES WHEN ADVERSE SPACE WEATHER OCCURS?

INCREASED EXPOSURE TO RADIATION – Flying polar routes during increased levels of radiation is not recommended.

The Safety of passengers and crewmembers is essential

LOSS OF COMMUNICATIONS – Radio blackouts are possible

FAA mandates reliable communications over the entire route of flight. When Radio Communications are poor or non existent, flights must operate over less optimum routes

DEGRADED NAVIGATION CAPABILITY –

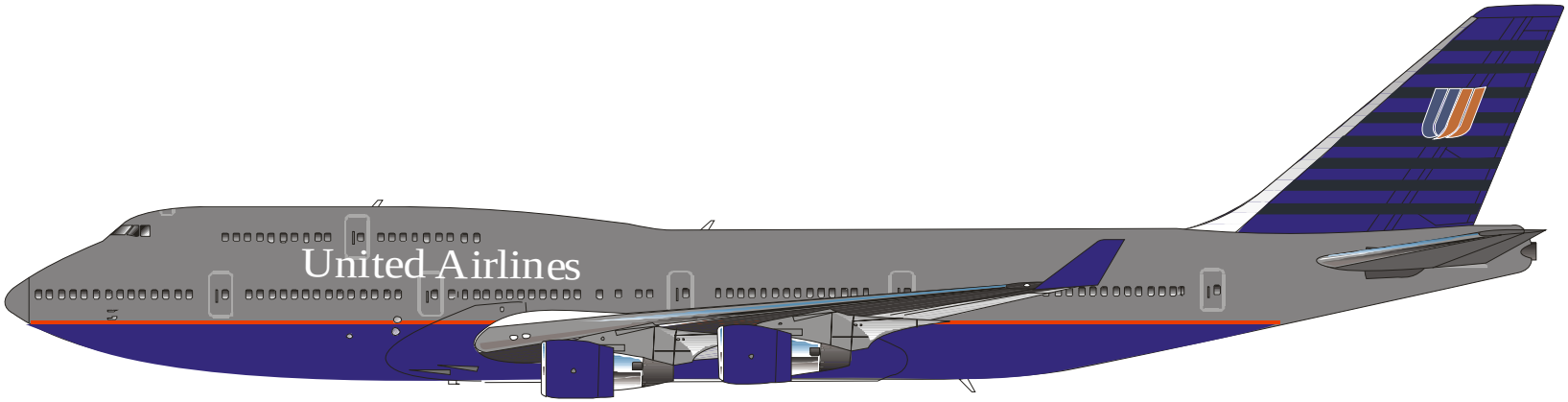
United Airlines International aircraft are equipped with Inertial Reference Units that are dependent on Global Positioning Satellites

A Polar Weather Briefing is provided to our flight crews and dispatchers that contains forecast or actual solar activity, including NOAA Space Environment Center recommendations

United has on site meteorologists that also monitor the NOAA/SEC website

The NOAA/SEC ensures United has timely information

DURING ADVERSE SOLAR ACTIVITY, UAL POLICY RESTRICTS FLIGHTS TO SPECIFIC ROUTES AND ALTITUDES.



UAL POLICY IN PART, IS DERIVED FROM AND BASED ON THE NOAA SPACE WEATHER SCALES AND SPACE WEATHER PRODUCTS FROM THE NOAA SPACE ENVIRONMENT CENTER

What happens when we experience a Solar Weather event?

Many flights operate on less than optimum routes to ensure communications capability and reduce potential increased radiation exposure. – This increases flight times and operating costs

Chicago to Hong Kong flights have made technical stops in Anchorage when unable to fly polar routes.

(This has occurred 10 times during solar events)

Passenger Disservice

Flights arrive at destination up to 3 hours later than schedule due to routing restrictions or technical stops.

Miss-connections can occur

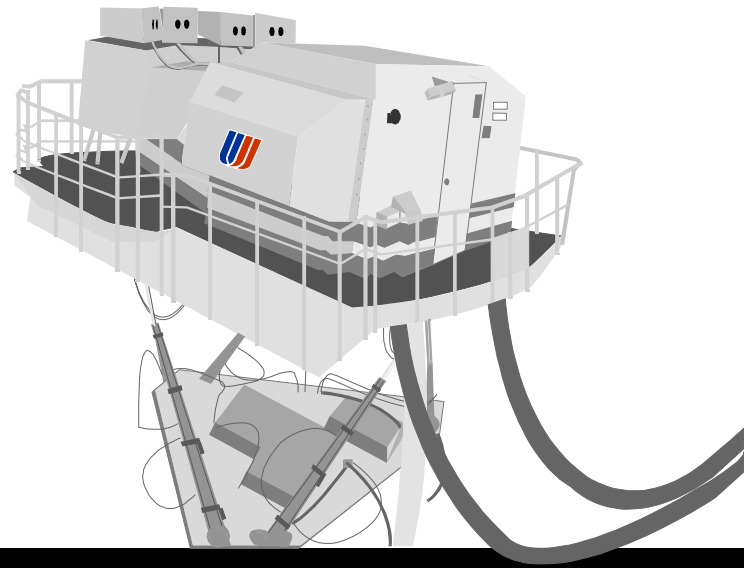
A decade ago there was no need or requirement to take Space Weather into operational consideration.

Today, United closely monitors Space weather and is constantly enhancing procedures to meet criteria that recent research and data mandate.

The Safety and Schedule Integrity of these flights are top priorities.

Research funded through the National Space Weather Program provides the best available space weather information to reduce risks and maintain safe and cost-effective operations.

In particular, products and services provided by NOAA/SEC are essential to polar operations.



Thank You !