

*Airborne Integrated Systems for Safety Improvement,
Flight Hazard Protection and All Weather Operations*

Why FLYSAFE?

Aviation accidents, efficiency and the role of atmospheric hazards

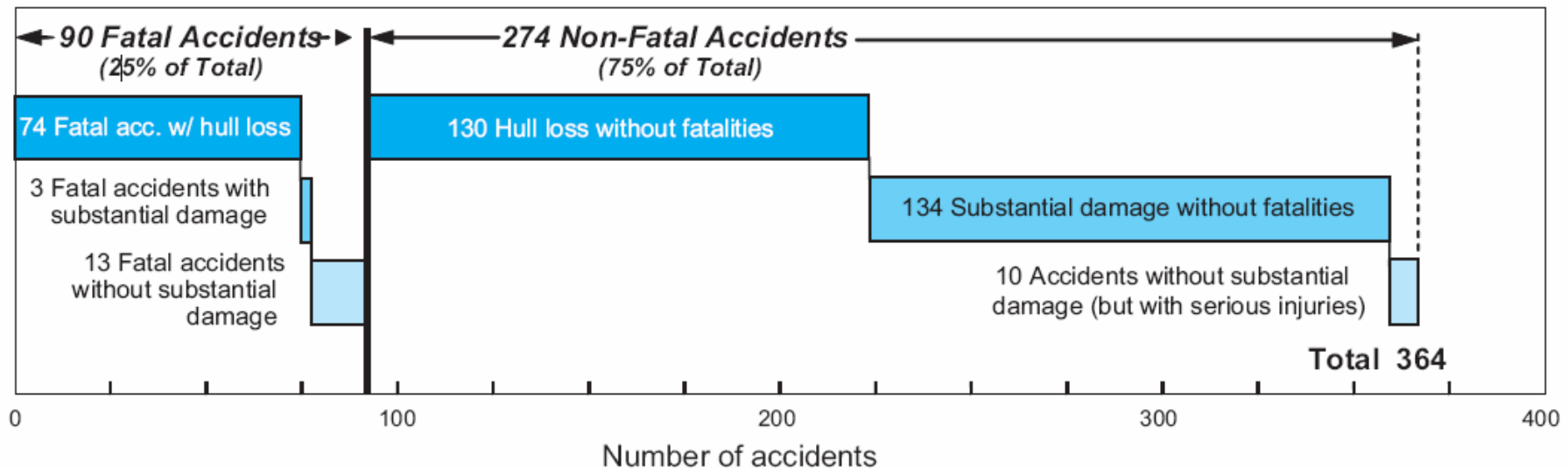
Leibniz Universität Hannover

FLYSAFE Final Forum, NLR, Amsterdam, 25 March 2009

Worldwide number of commercial jet aircraft accidents

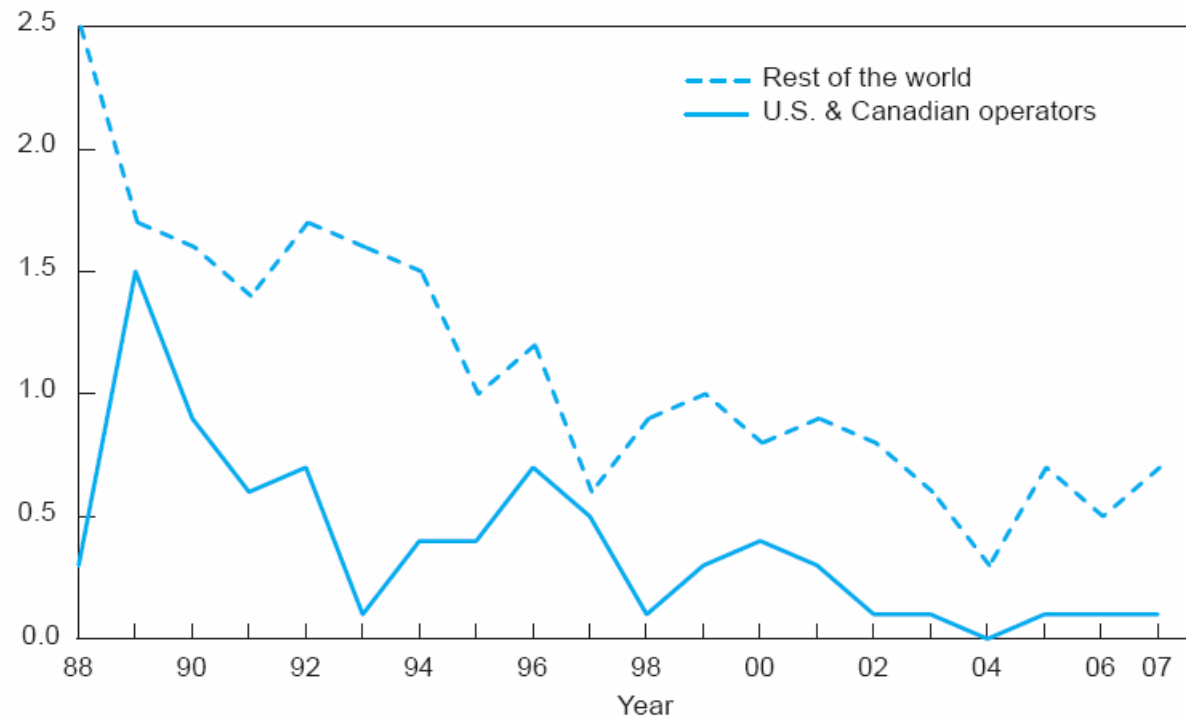
- More than 5000 fatalities (1998-2007)

1998 Through 2007

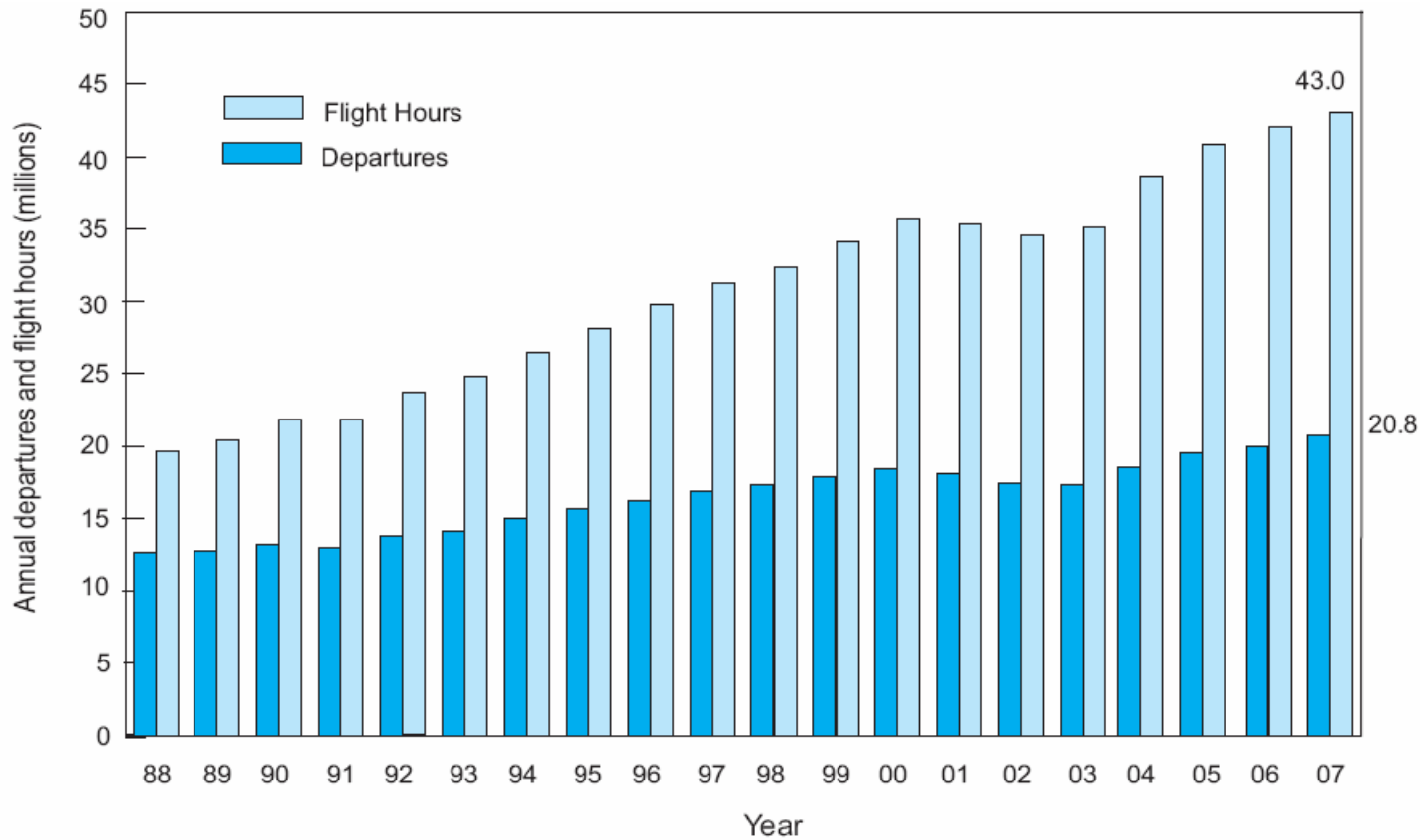


- Accident rate is low
- Significant decrease of accident rate over the last 20 years
- Much has already been achieved!
- Unchanged/slow decrease since about 1998

1988 Through 2007



- Volume of air traffic still increasing
- Doubling expected until 2020

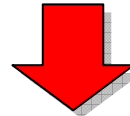


Motivation

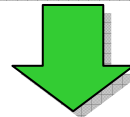


Low, near constant accident rate

Increasing air traffic volume expected.

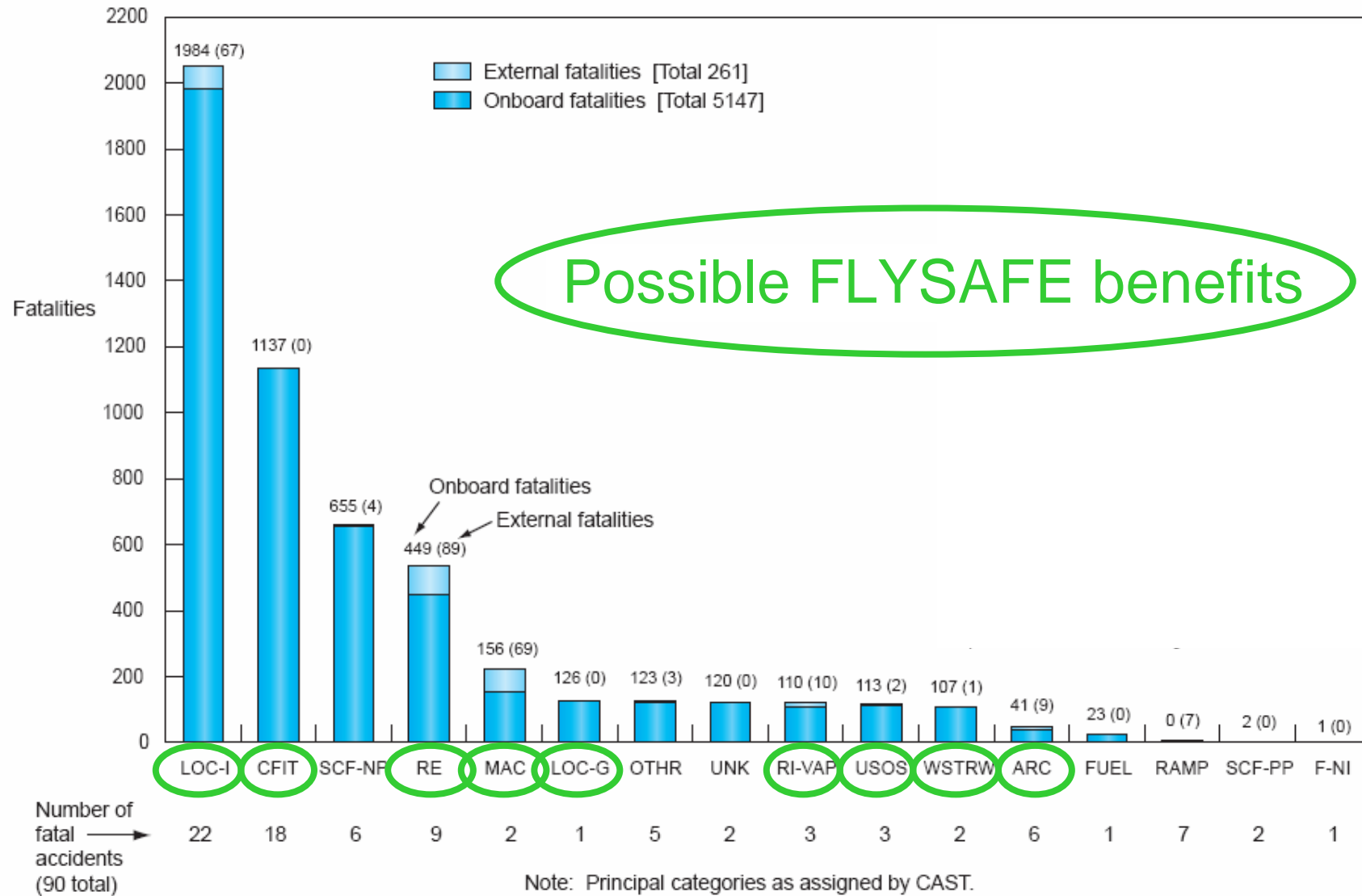


**Risk of unacceptable increase
of absolute number of accidents!**

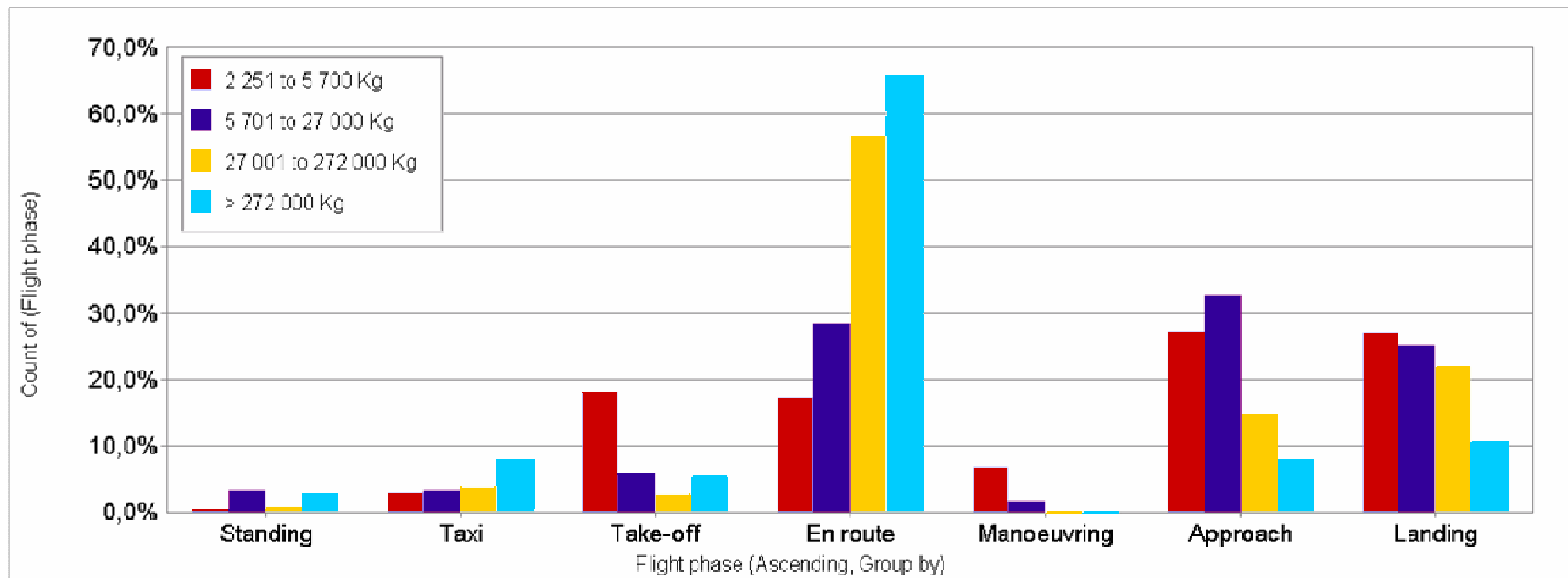


FLYSAFE (NG-ISS, WIMS)

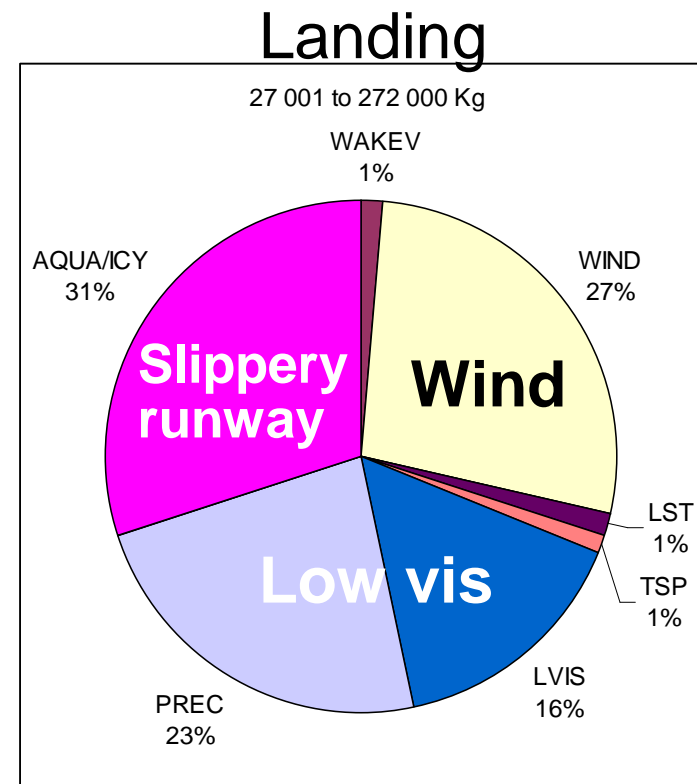
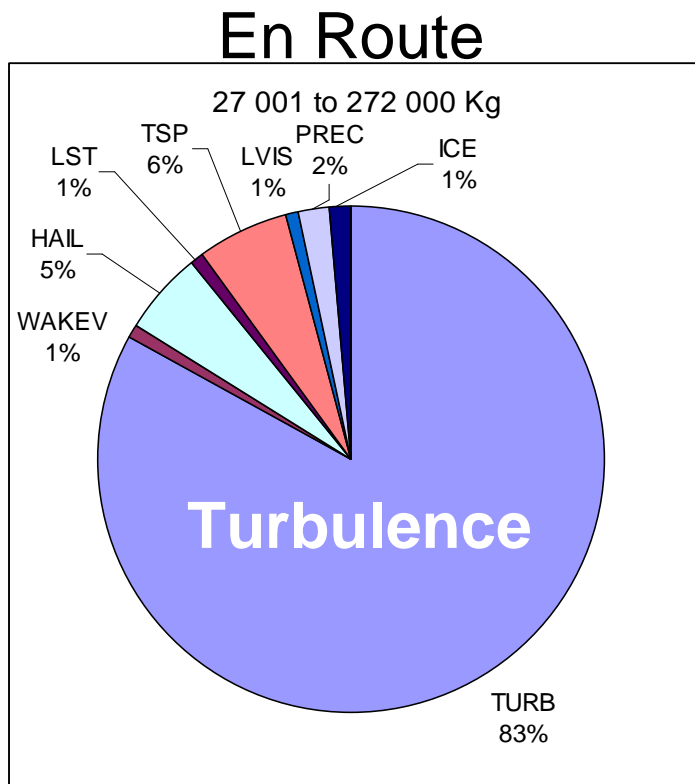
- Development of new integrated systems.
- Reduce accident rate.
- Prevent increase of absolute number of accidents!



- Weather impact: 43.8% non-fatal, 13.3% fatal accidents (heavy a/c > 27 t)
- Strong mass group and flight phase dependence of weather related accidents
- Large a/c: Most accidents during en route (>55%)
- Small a/c: Most accidents during approach and landing (~27% each)



■ Flight phase dependency of weather related accidents (a/c > 27 t)



The role of weather in air traffic delays



- Weather impacts safety and efficiency of air traffic
 - Cb as a threat => aircraft changing their route => delay is produced
- Relation between safety and efficiency!
- The WIMS also generate efficiency benefits and help to reduce delays!
- Detailed studies on the role of weather in air traffic delays:
 - Determine the general role of weather in air traffic delays
 - Quantify the weather impact on delays using new methods
 - Investigate what knowledge about actual and future weather is required where and over which time scales and with which accuracy to reduce weather-related delays

The role of weather in air traffic delays

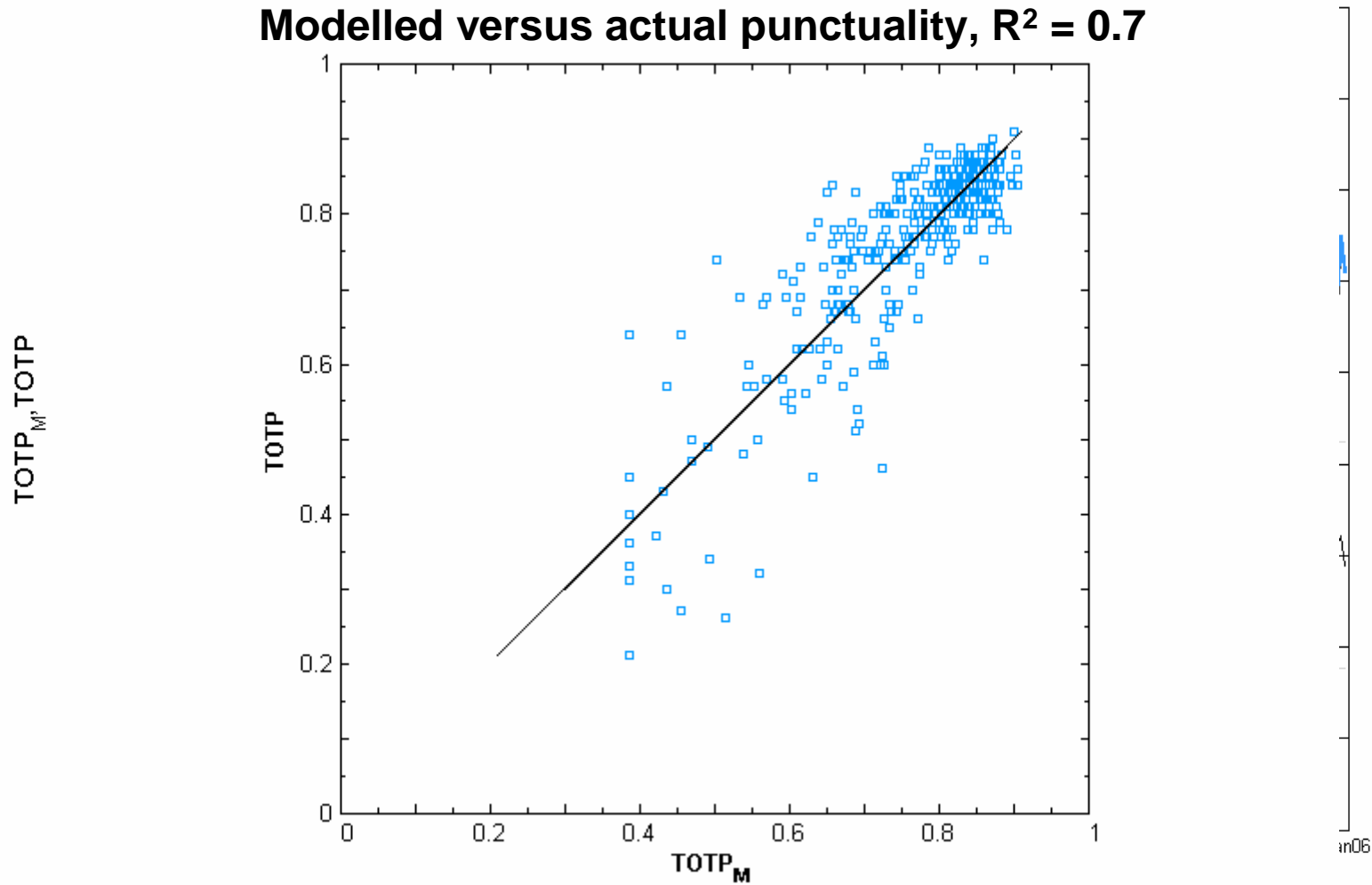


WEATHER PHENOMENA	EFFICIENCY			SAFETY		
	strong	moderate	weak	strong	moderate	weak
Visibility	strong			strong		
In-flight icing		moderate	weak	strong		
Wind	strong				moderate	
Thunderstorms	strong			strong		
Turbulence			weak		moderate	
Snow and ice		moderate			moderate	
Volcanic ash			weak	strong		
Sandstorms	strong	moderate	weak	strong		
Wake vortices	strong				moderate	

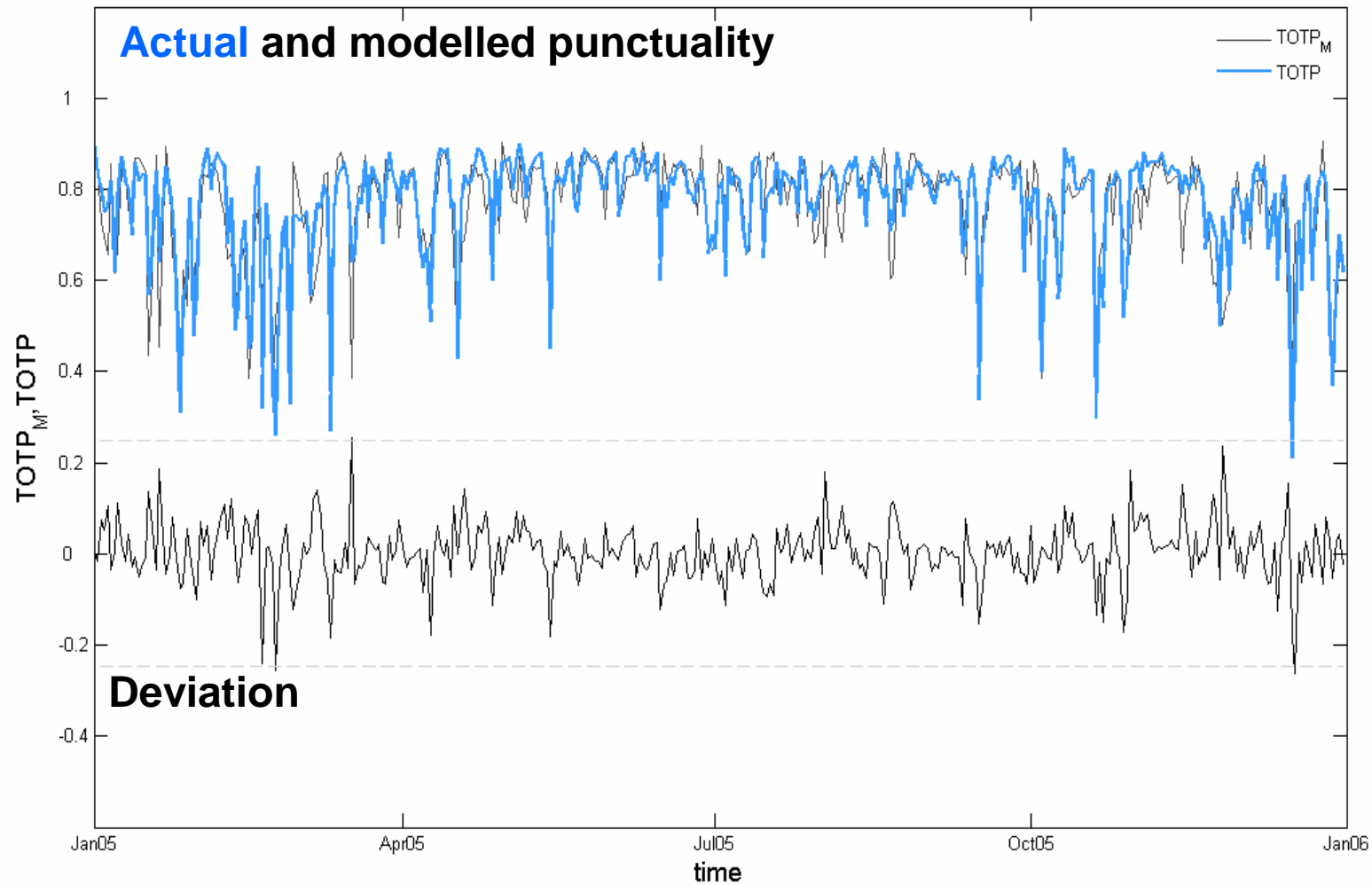
The role of weather in air traffic delays



Modelled versus actual punctuality, $R^2 = 0.7$



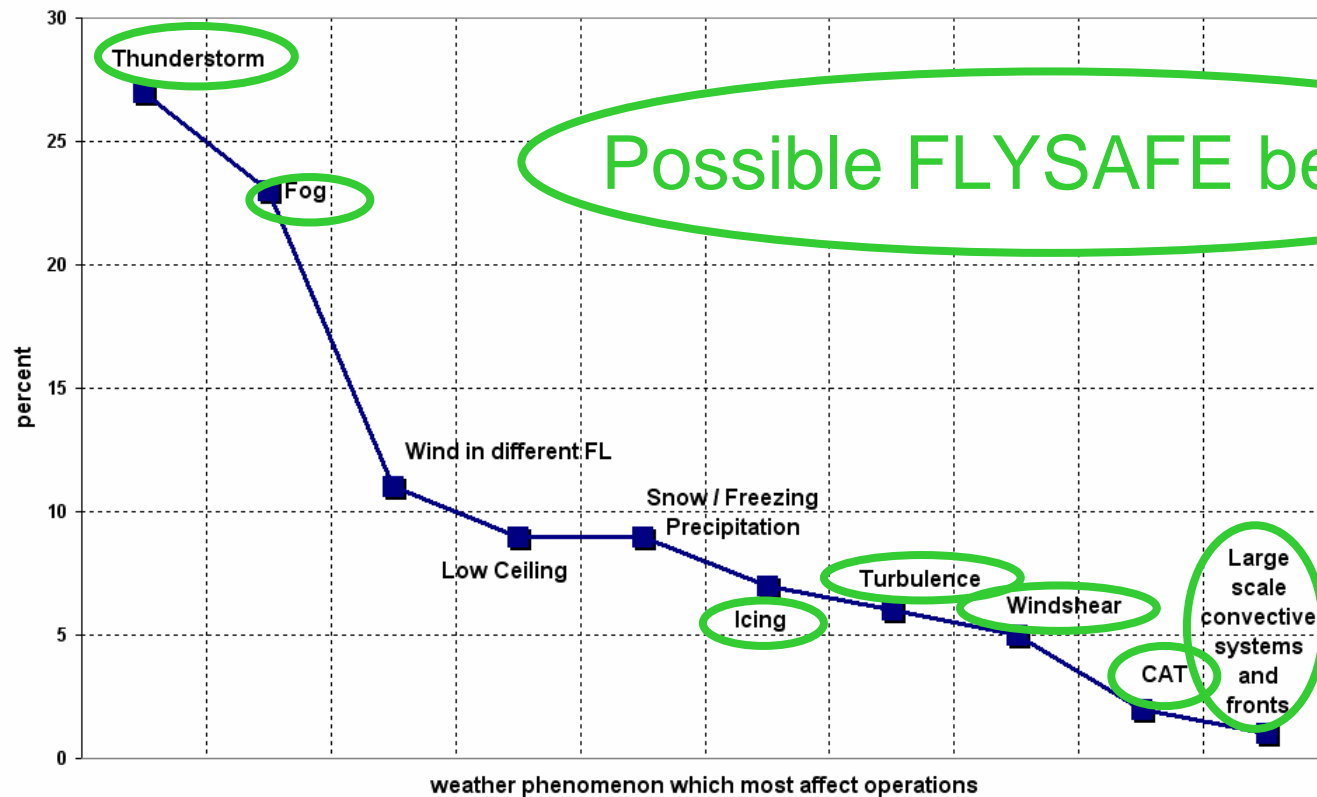
The role of weather in air traffic delays



The role of weather in air traffic delays



- Questionnaire to ATM, ATC and airport operators
- Weather situations with strongest impact:



Possible FLYSAFE benefits

The role of weather in air traffic delays



- Questionnaire to ATM, ATC and airport operators (cont'd)
 - Radar images including Cb + lightning information
 - Short term weather info updates
 - Better access to wind charts (at different flight levels)
 - Continuous information on
 - ◆ Turbulence conditions
 - ◆ Icing at different flight levels
 - ◆ CAT and wind shear

The WIMS exactly meet the requirements named

Weather impact on aviation Summary



- Weather contributes to **one third** of nonfatal accidents
- Weather contributes to **every sixth** fatal accident

- **Turbulence** prime cause for most weather related **nonfatal injuries**
- **Low visibility** prime cause for most weather related **fatal injuries**
- Weather impacts **efficiency** and can cause **delays**
- Weather impact **can be modeled**
- **FLYSAFE products (NG-ISS / WIMS) reduce negative impacts!**

