European ATM and VLJs

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European ATM and VLJs: Presentation summary

1. The challenge
2. European VLJ Statistics
3. VIP – VLJ Integration Platform
4. VIP activities

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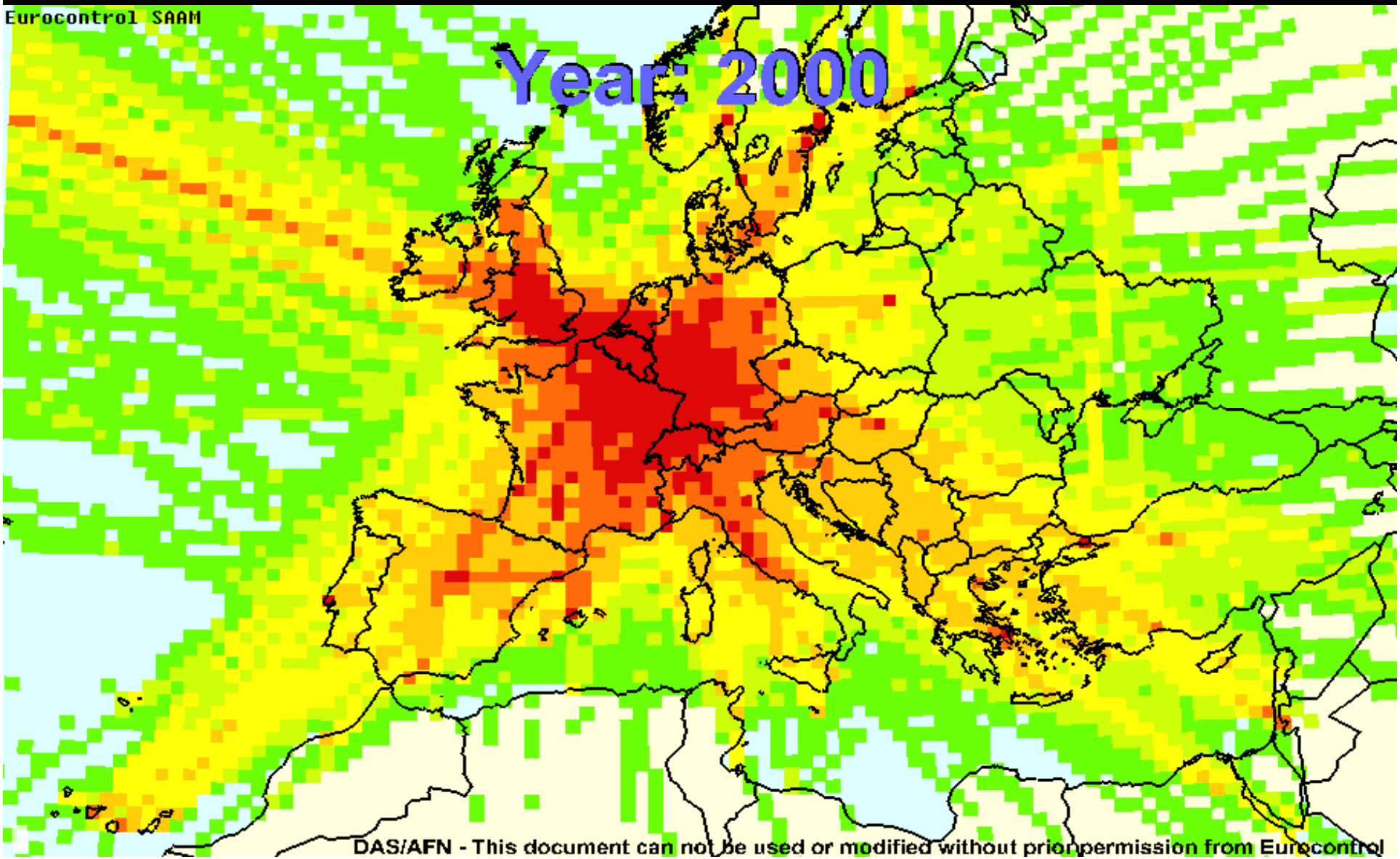
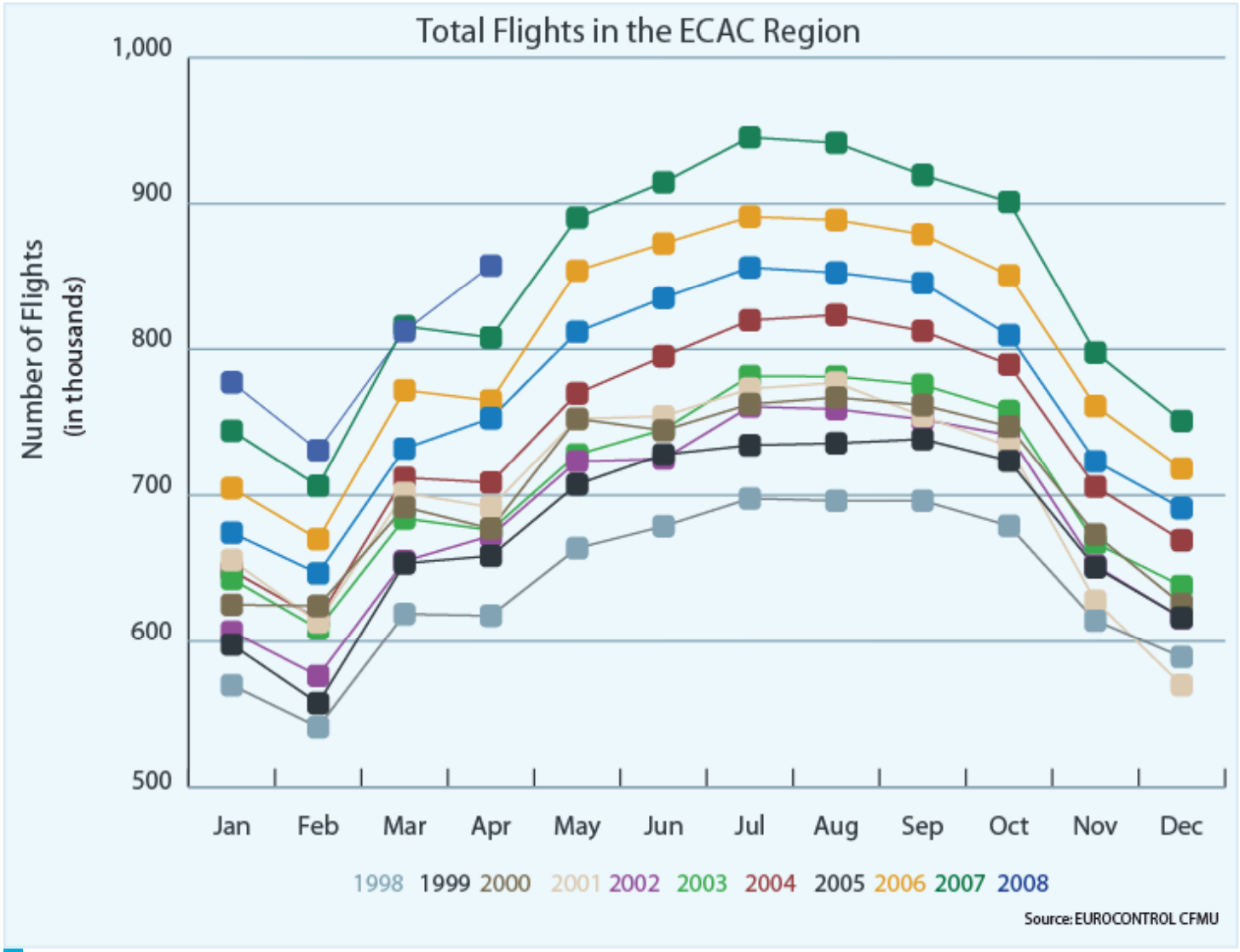
ECAC traffic increase challenge – 2000 > 2020



Total flights in the ECAC Region

(source CODA, April 2008 Update)



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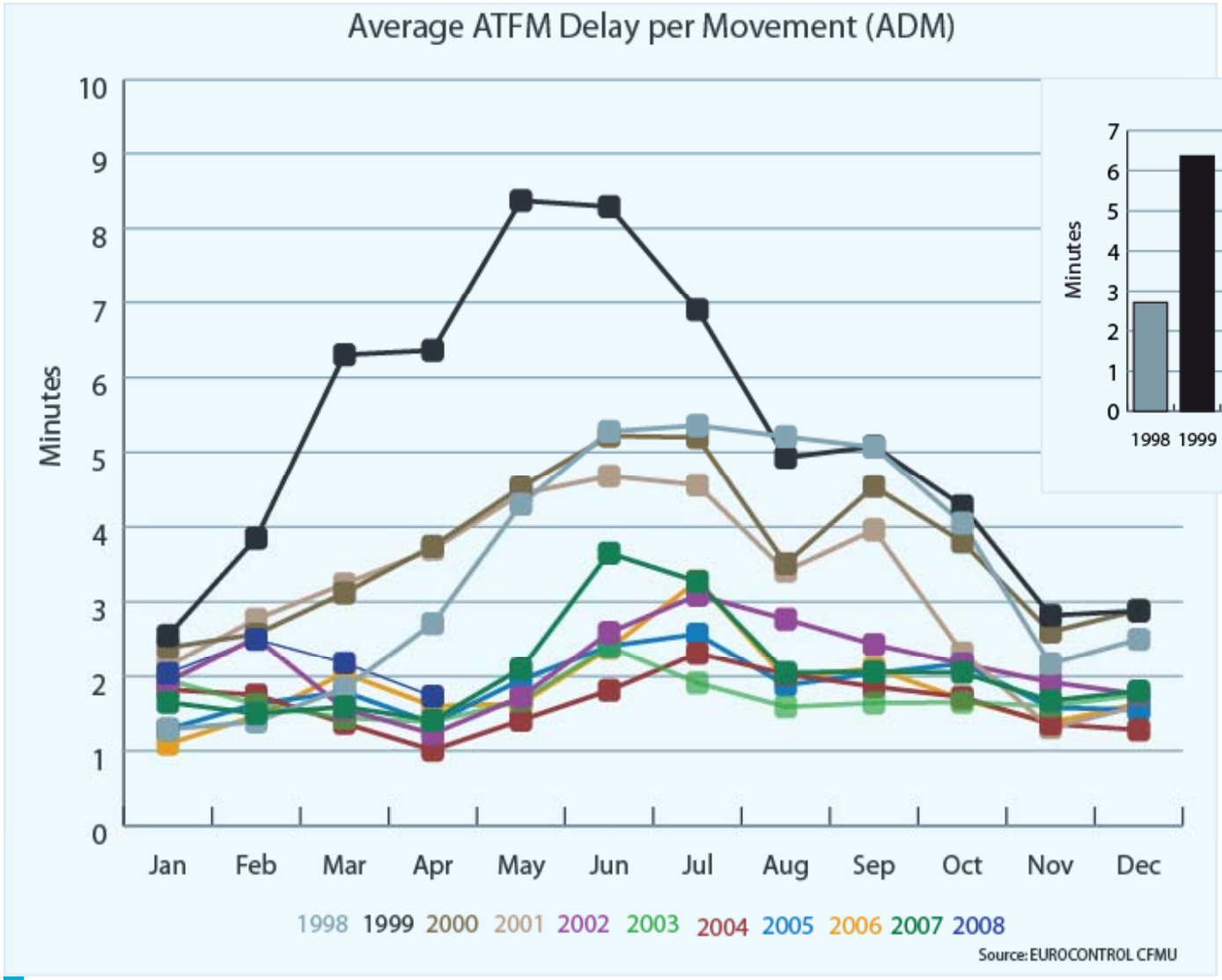
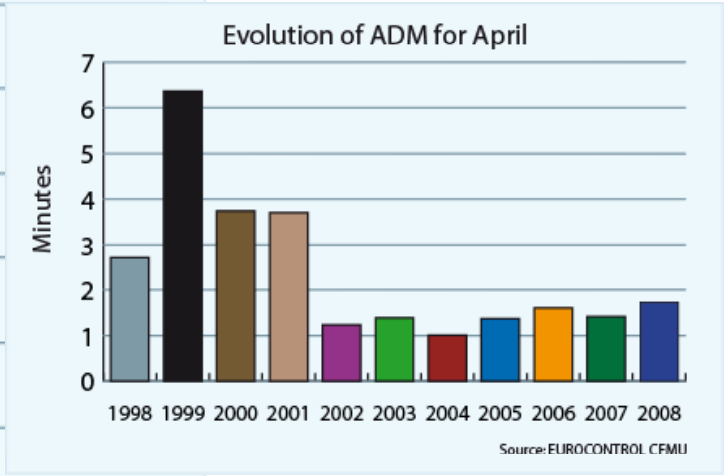
Average ATFM Delay per Movement

(source CODA, April 2008 Update)





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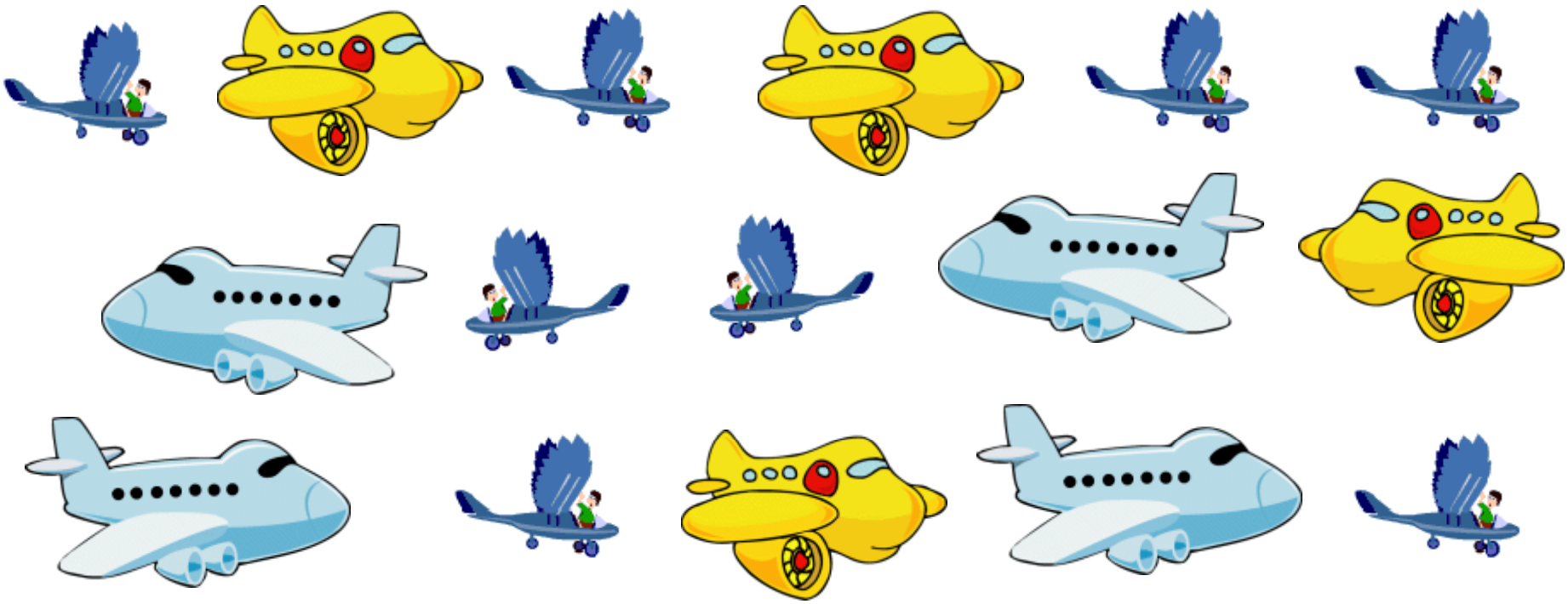
Is the European sky going black with VLJs?!?



<u>“Specialized” estimates are contradictory, with some predicting extreme high numbers of VLJs in operation until 2015. Reality or wishful thinking?!?</u>

VLJs – initial European estimates

Current EUROCONTROL estimates are that ~300 more movements / day / year due to VLJs can be expected in the 2008-2015 period

Impact factors on the VLJ numbers for the next years:

- **potential replacement of some existing turboprop fleet of similar size with VLJs in a rate of 4 to 1;**
- **according to EPATS, the demand from passenger side is actually much higher than the predicted numbers;**
- **VLJ production slots;**
- **Availability of airport capacity.**

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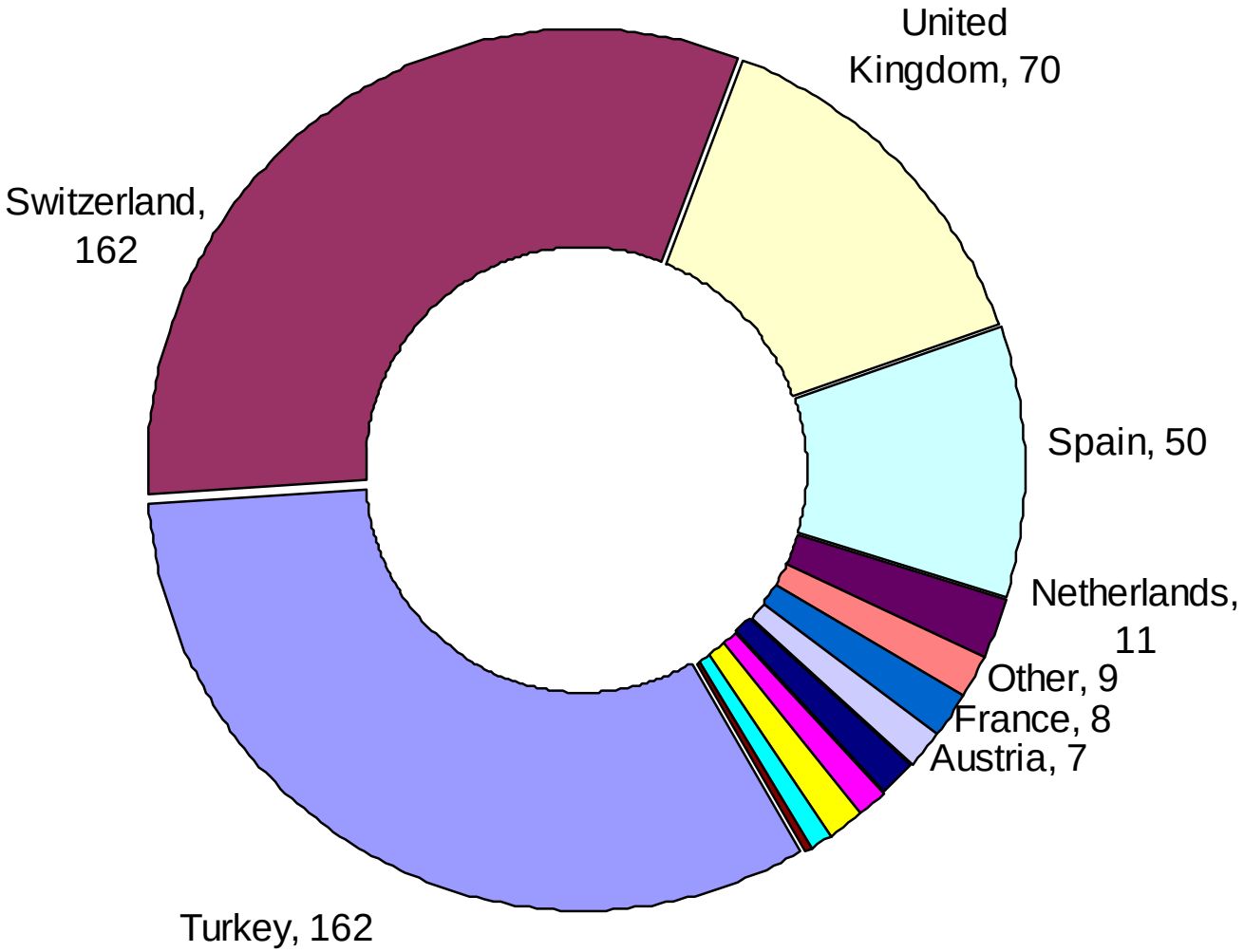
Orders for VLJs to be operated in Europe – Geo distribution



Known delivery timings

Year	Mustang, Eclipse, Phenom 100
2008	116
2009	94
2010	100

(Source: Airclaims (to 10/3/08) and others)

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EUROCONTROL is preparing!!!

VLJ Integration Platform (VIP)

- **initiation of the dialogue around the issue of safe and efficient integration of the VLJs in the European ATM environment;**
- **identification of areas to be further considered for analysis with respect to VLJ integration;**
- **propose solutions for VLJ integration.**

More info from: VIP@eurocontrol.int

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VLJs - serious issue in the crowded European airspace

	Eclipse 500	Cessna Mustang	Adam A700	Embraer Phenom 100	HondaJet	Diamond D-Jet
IFR Range w/4 Occupants	1,300 nm	1,300 nm	1,200 nm	1,320 nm	1,280 nm	1,350 nm
Max Cruise Speed (kt)	370	340	340	380	420	315
Takeoff Distance, Sea Level, ISA	2,342 ft	3,110 ft	3,400 ft	3,400 ft	3,120 ft	2,372 ft
Landing Distance	2,250 ft	2,380 ft	2,520 ft	3,000 ft	2,500 ft	Not announced
All Engine Rate of Climb	3,424 fpm	3,010 fpm	2,500 fpm	Not announced	3,990 fpm	2,600 fpm
Max. Altitude (ft)	41000	41000	41000	41000	43000	25000

	PiperJet	Beechcraft Baron G58	Adam A500	Piper Meridian	Beechcraft King Air C90GT	EADS Socata TBM 850
IFR Range w/4 Occupants	1,400 nm	1,149 nm	1,150 nm	1,060 nm	931 nm	1,465 nm
Max Cruise Speed	360	202	230	260	270	320
Takeoff Distance, Sea Level, ISA	Not announced	2,300 ft	2,471 ft	2,438 ft	2,392 ft	2,840 ft
Landing Distance	Not announced	1,300 ft	2,471 ft	2,110 ft	2,355 ft	2,430 ft
All Engine Rate of Climb	Not announced	1,700 fpm	1,368 fpm	753 fpm	1,953 fpm	750 fpm
Max. Altitude (ft)	35000	20688	25000	30000	30000	31000

Performance greater than 80% of regional commercial airline (737-400)
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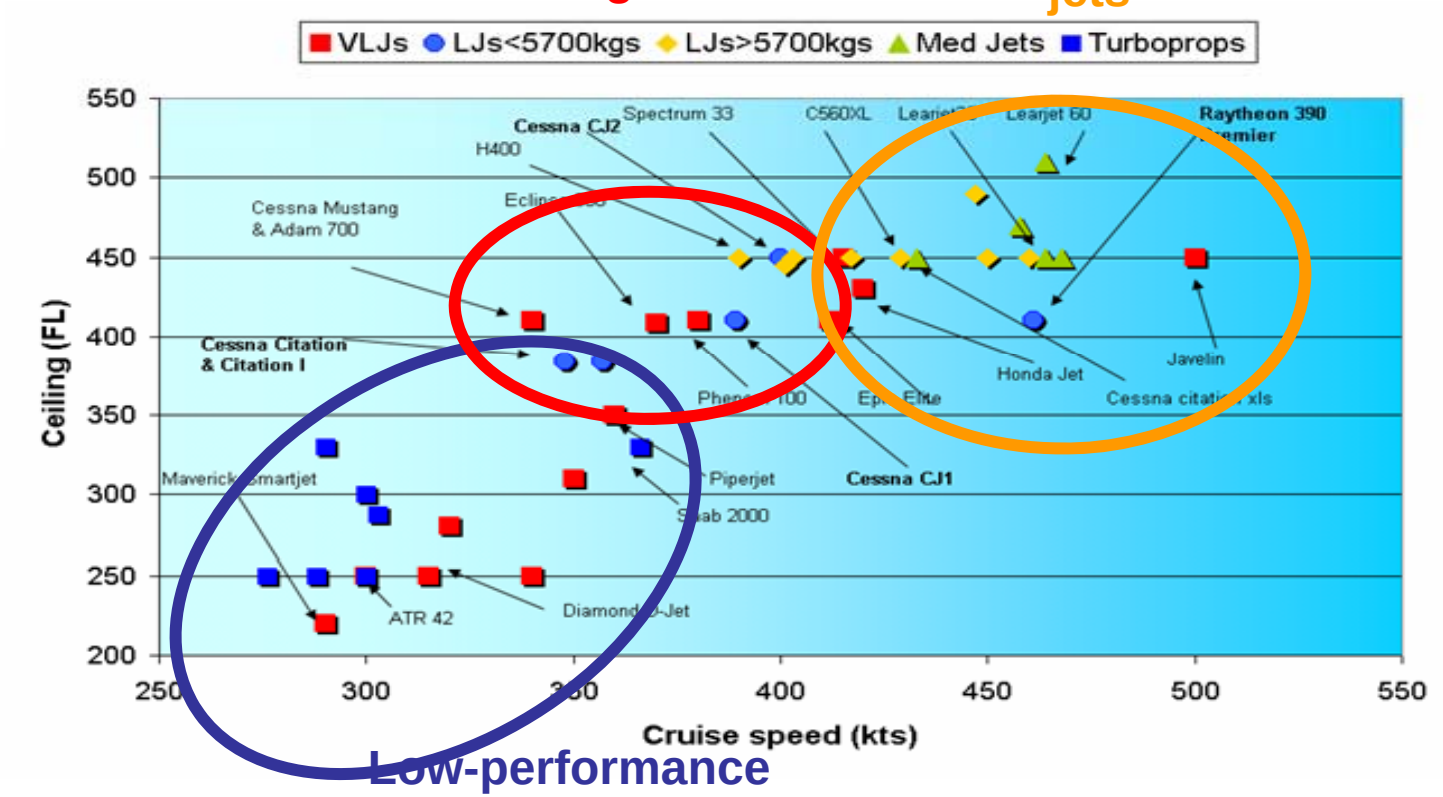
VLJs - Ceiling versus cruise speed

High-performance VLJs, LJs>5700kg & Medium jets

Mid-performance VLJs & LJs<5700 kg



Low-performance VLJs & turboprops

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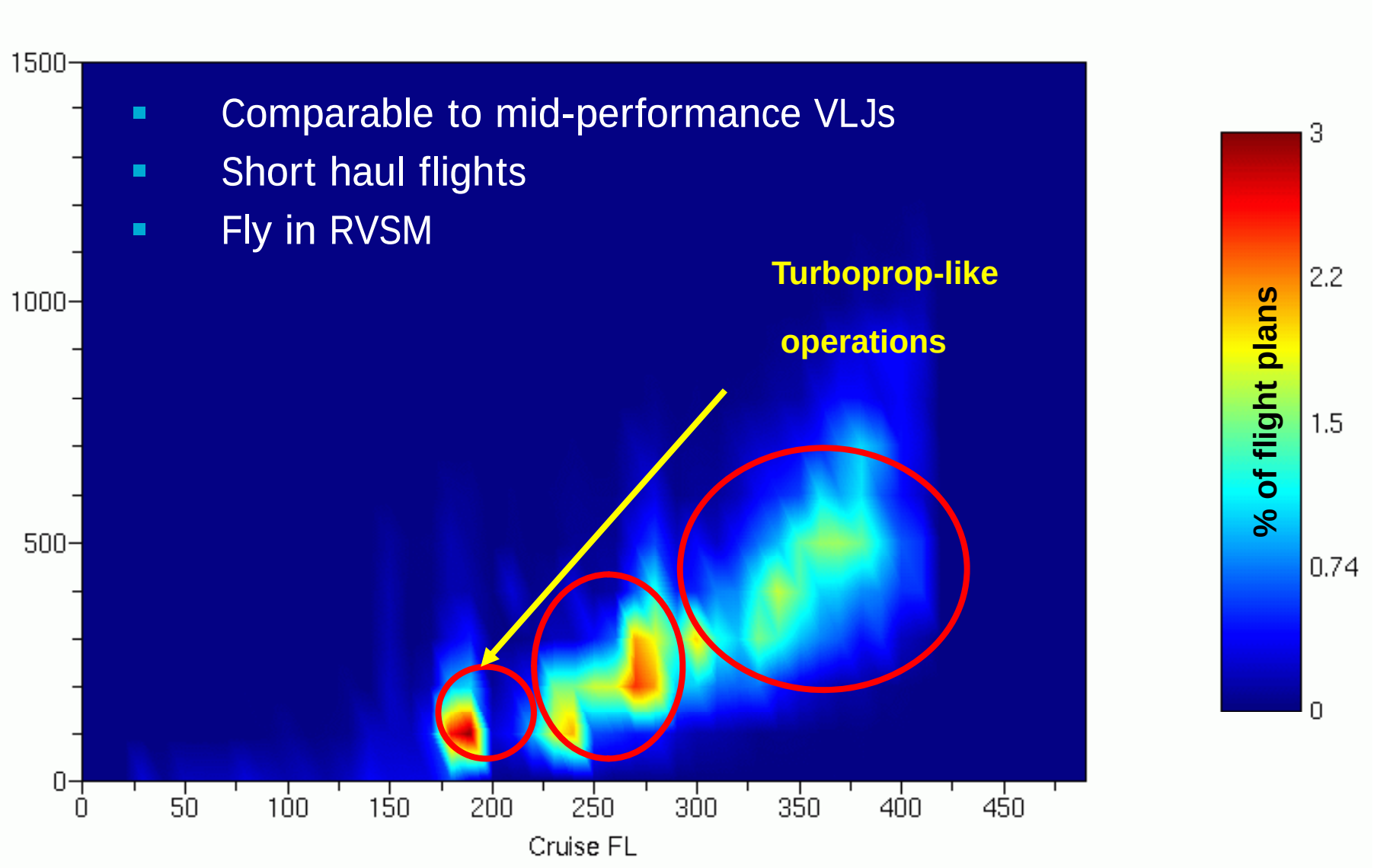
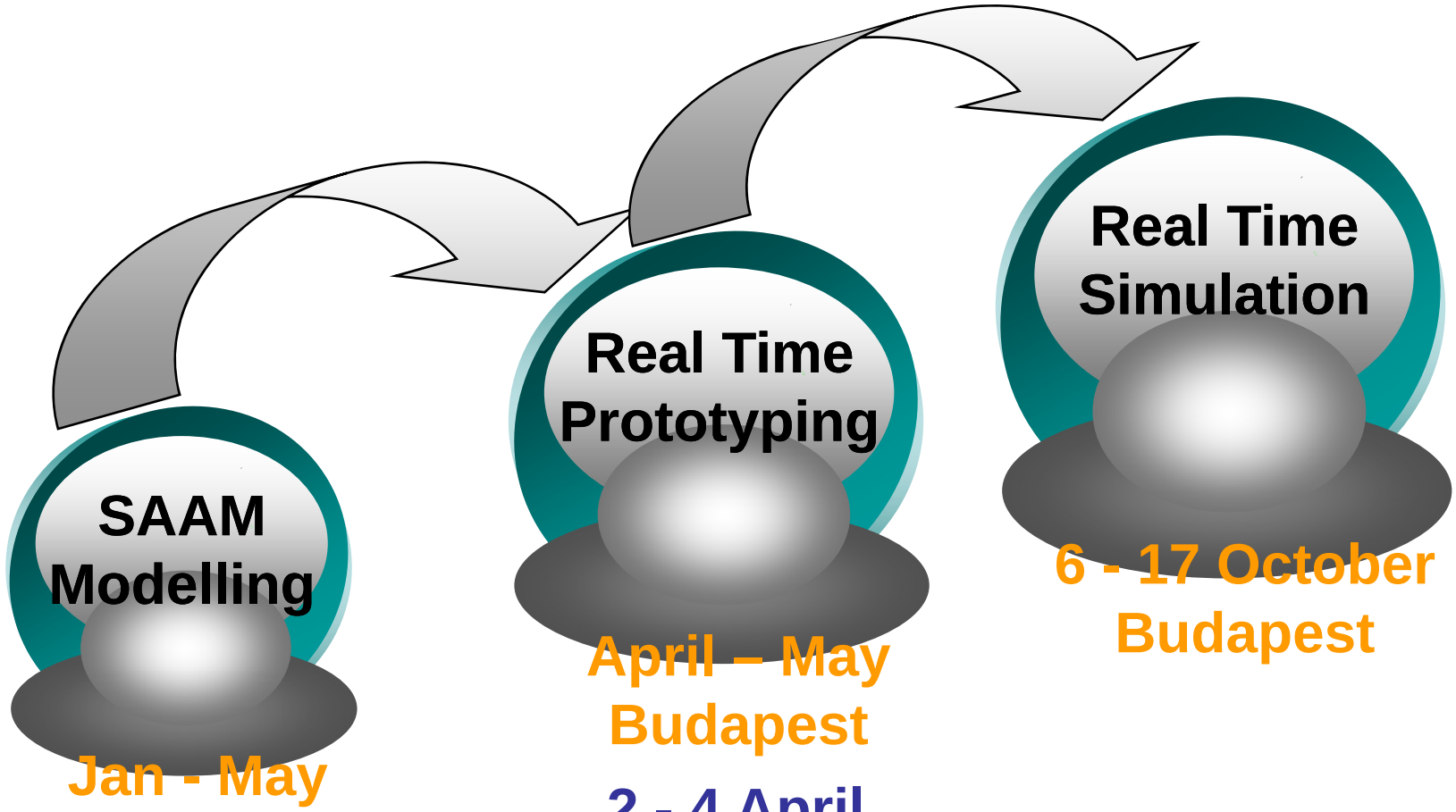
Distances and cruise FLs of small LJs



VIP addresses: VLJ Performance vs Airspace

EUROCONTROL initiated a series of airspace simulations to investigate the potential impact of VLJ operations on the airspace

Airspace evaluations



First Impressions

Terminal Airspace - Arrivals

VLJ essentially behave as turbo props but could not be sequenced early on to the ILS because of noise abatement restrictions.

Terminal Airspace - Departures

VLJ was put on a direct track soon after departure but following a/c were kept on the SID for separation - incurred a delay because they could not go direct track. Doing that the other way round with the VLJ staying on the SID and the others on direct track did not work.

En-Route Airspace

Controller response - at an early stage and not scientific - was that monitoring the speed difference between VLJ against other traffic in was not easy.

Overtake likely to be noticed only via STCA alert.

Off-sets (Strategic or Tactical) could be a requirement.

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VIP addresses: Top Down overview of the VLJ avionics (focus on navigation capabilities)

EUROCONTROL initiated a review of the planned avionics for the VLJs with the aim of identifying their compliance with the navigation requirements.

VIP addresses: VLJ onboard safety equipment ACAS / TCAS

In order to address the impact on safety of VLJ operations with no ACAS equipment, EUROCONTROL initiated the AVAL Study:

ACAS on VLJs and LJs – Assessment of safety Level (AVAL)

AVAL Study - ACAS on VLJs and LJs – Assessment of safety Level

The **AVAL Project** has been constructed in two Phases:

- **Phase 1 –** 2007/8 Initial work to evaluate and confirm whether the impact of VLJ operations on ACAS performance needs further investigation (deliverable for beginning of April 2008).

- **Phase 2 -** 2008/9 In depth safety analysis of ACAS (TCAS II) safety performance in the airspace, if VLJs are not equipped with ACAS, and if they are equipped with ACAS. This will provide the basis to determine the best ACAS policy approach for VLJ and LJ aircraft.

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AVAL study: Phase 1 Conclusion

- There is evidence that the new VLJs and small LJs will have an effect on the overall performance of ACAS as a safety net

- If not equipped with ACAS, the VLJs will not benefit from the safety provided by this system
  - May also influence the safety of aircraft equipped with ACAS

- Safety benefits derived from an extended ACAS mandate need to be quantified
  - Pilot response to RAs will be an important consideration
  - Pilots need to be trained carefully in the operation of ACAS

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AVAL study: Phase 1 Recommendations

- Quantify implications of VLJ introduction in the European airspace on the performance of ACAS
  - For VLJs and small LJs
  - Other aircraft already equipped with ACAS
- Investigate the use of speed along with MTOM as a determinant for requiring ACAS carriage
- Proceed with Phase 2

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AVAL study: Proposed Phase 2 work

- In-depth investigation using the established encounter model approach
- Adapt model to reflect operation of VLJs and small LJs in the European ATM system
- Define a set of operationally realistic scenarios
  - Possible scenario target date = 2015
- Sensitivity study on influential factors
  - Pilot reaction to RAs
  - TCAS equipage
- Provide elements for future ACAS policy decisions regarding VLJs and small LJs

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Danger CO_2W

Climate change is a real problem and airlines are partly responsible.

Air transport produces 2% of global CO_2 emissions. But it might surprise you to know that this is actually less than the CO_2 produced worldwide by cattle.

Nevertheless, we're working hard to limit the environmental impact of flying by investing in new, more fuel-efficient aircraft and pushing for shorter routes and improved air traffic control.

For more info on the VIP initiative & activities contact EUROCONTROL:

VIP@eurocontrol.int