Using Data to Improve Safety

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利用数据提高安全性

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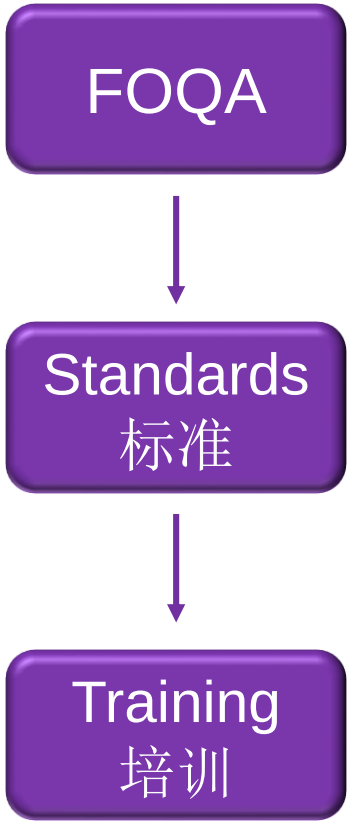
- We have access to more data than ever before
  可用数据量超过以往

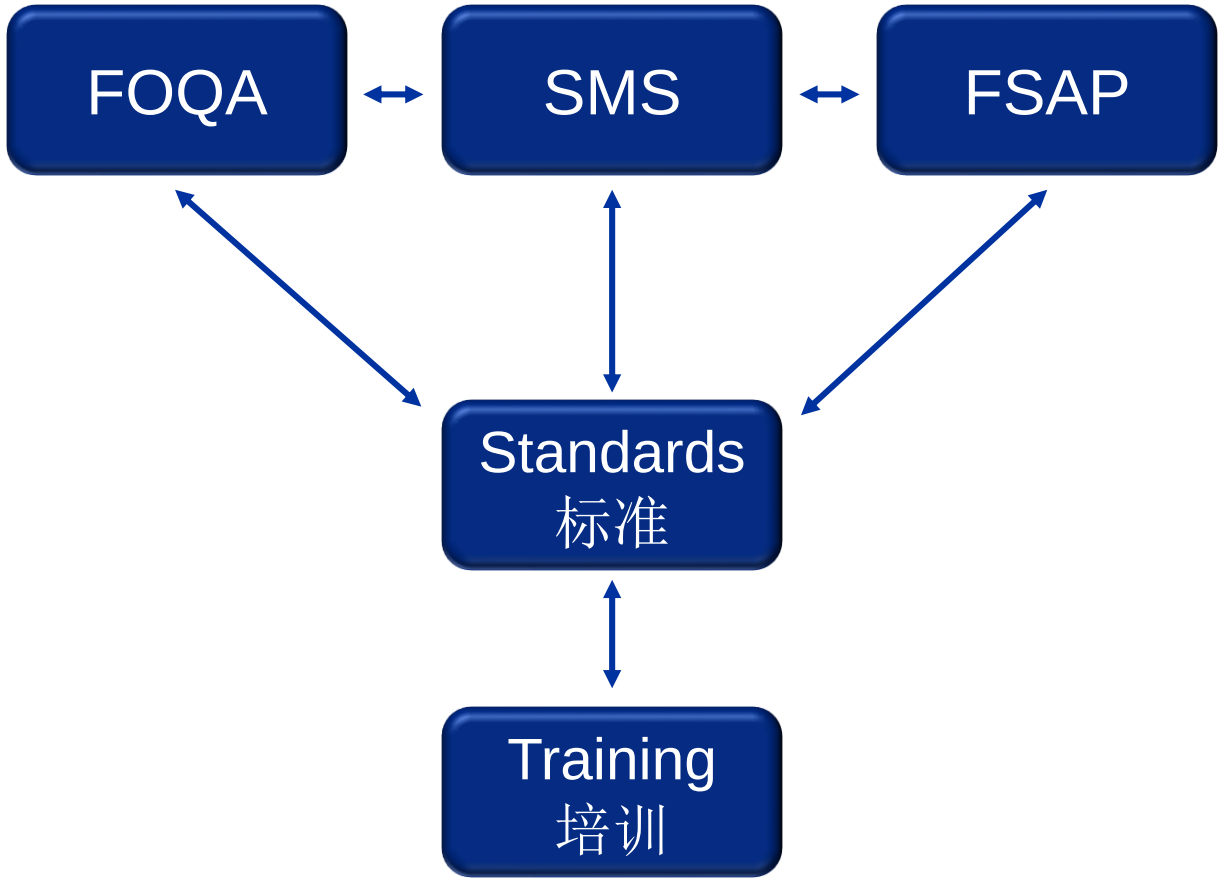
- Finding useable data is challenging
  获得有效数据越来越具挑战性

- The flow of data has changed over time
  数据流随时发生变化

Then
以往



Now
现在



B737 Tail Strike
B737机尾擦地

- Analyzed event data in the 737-900ER fleet and found correlation between tail strike and power-on landing
  分析737-900ER事件数据，找到机尾擦地和带油门着陆间的相关性

- Reduced power-on landings from 7% to less than 1% and as a result reduced tail strike occurrences
  将带油门着陆间发生率从7%减少到不足1%，从而降低机尾擦地发生率

B787 Tire Overspeed
B787 轮胎超速

- FOQA data indicated tire overspeeds when departing DEN at heavy weights and during hot weather
  飞行品质监控数据显示，离开DEN时，在重物和炎热天气下状况下轮胎会超速

- Analysis revealed rotation was initiated up to 3 seconds after Vr and rotation rate of 1.8º/sec in overspeed events
  分析表明，在超速情况下，Vr和旋转率1.8º/秒，旋转上升至3秒

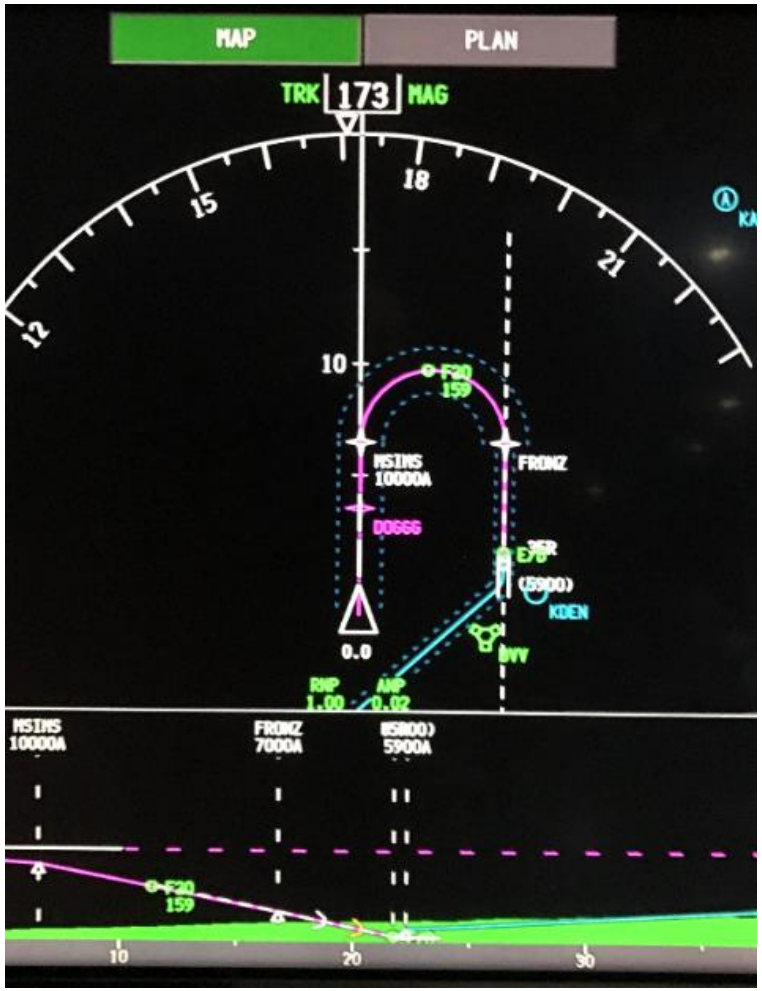
- Reduced DEN tire overspeed rate from 16% to 3% YOY
  DEN轮胎超速率从16%减少到3%（按年计算）

RNV RNP Approach Transitions
RNV RNP进近过渡

- FSAP data and ATC pilot deviation reports indicated an issue with flying RNAV RNP approach transitions
  FSAP数据和ATC飞行员偏差报告显示，RNAV RNP进近过渡存在问题

- Data highlighted several contributing factors:
  数据重点提及了几个影响因素：
  - Late approach assignment by ATC
    ATC分配的深进近任务
  - Pilots briefing and programming the ILS rather than RNAV
    飞行员概述和编写ILS而非RNAV
  - FMC programming difficult to do on short notice
    短期内编写FMC困难重重

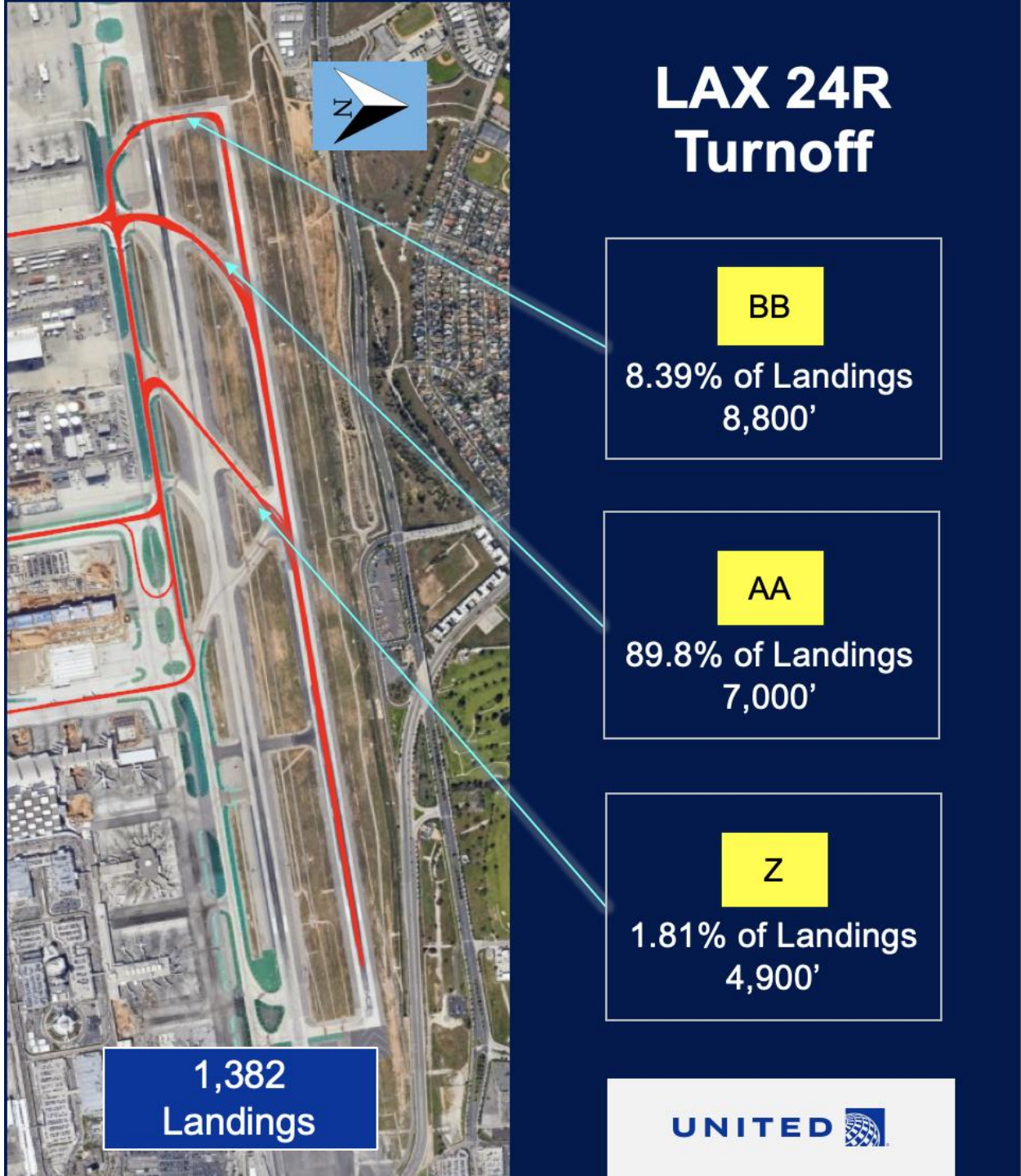
- Reduced occurrences by over 50% YOY
  减少50%以上的发生率（按年计算）



Using Data Proactively
主动地使用数据

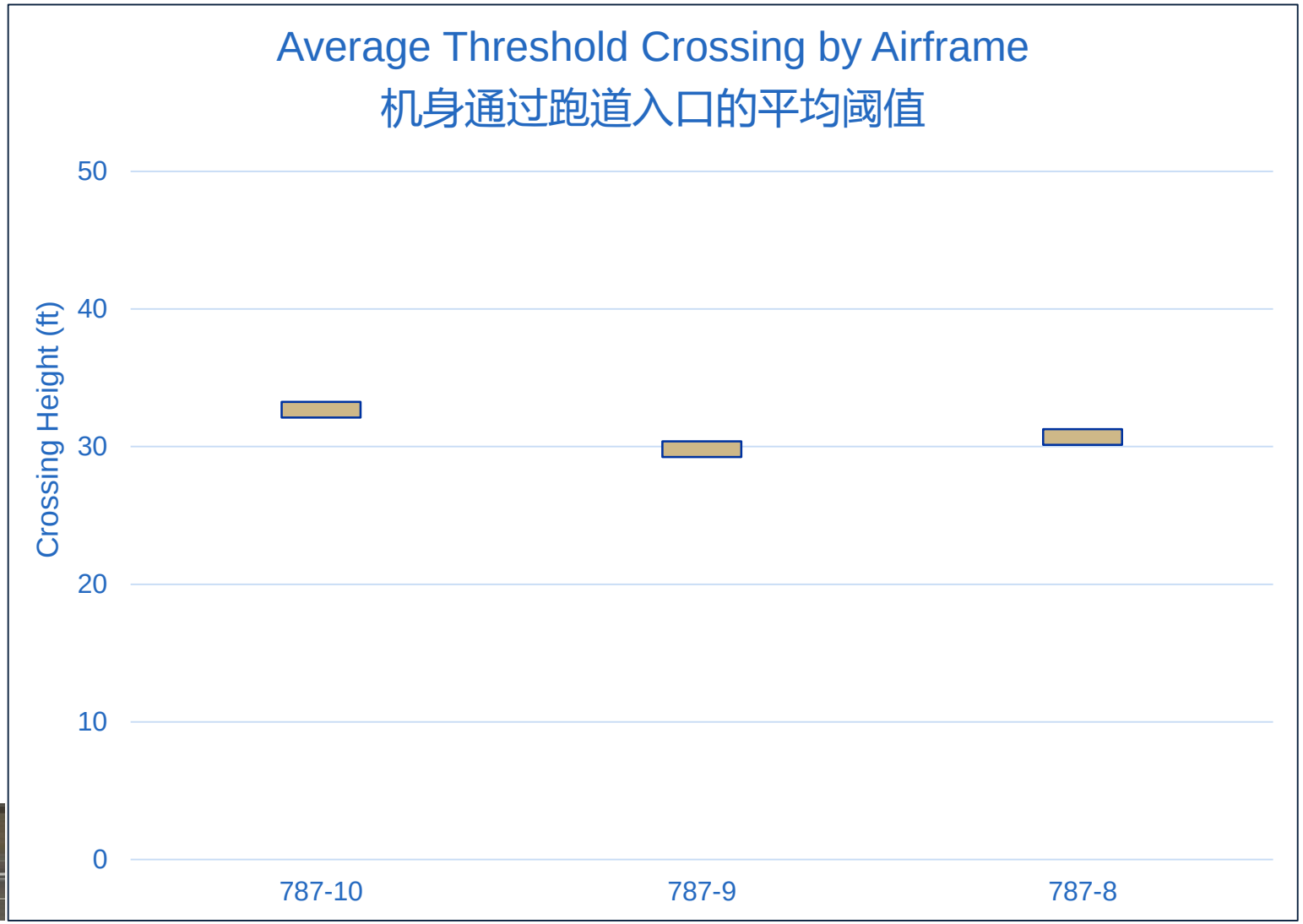
- FOQA Study-787 Landings
  FOQA研究-787着陆

- Utilized FOQA data to determine:
  利用FOQA数据确定：
  - Threshold Crossing Height
    跑道入口通过高度
  - Speed at touchdown
    接地速度
  - Touchdown Point
    接地点
  - Thrust reverser and autobrake use
    反推装置和自动制动装置的使用
  - Runway exit location and speed
    跑道出口位置和速度

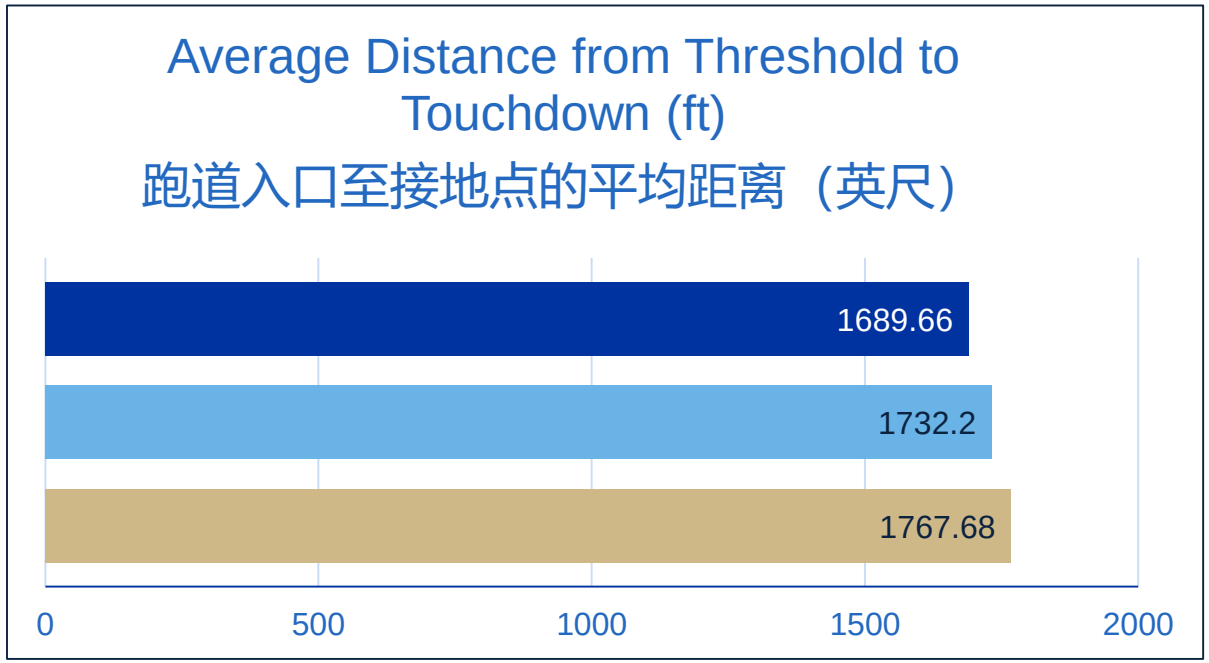


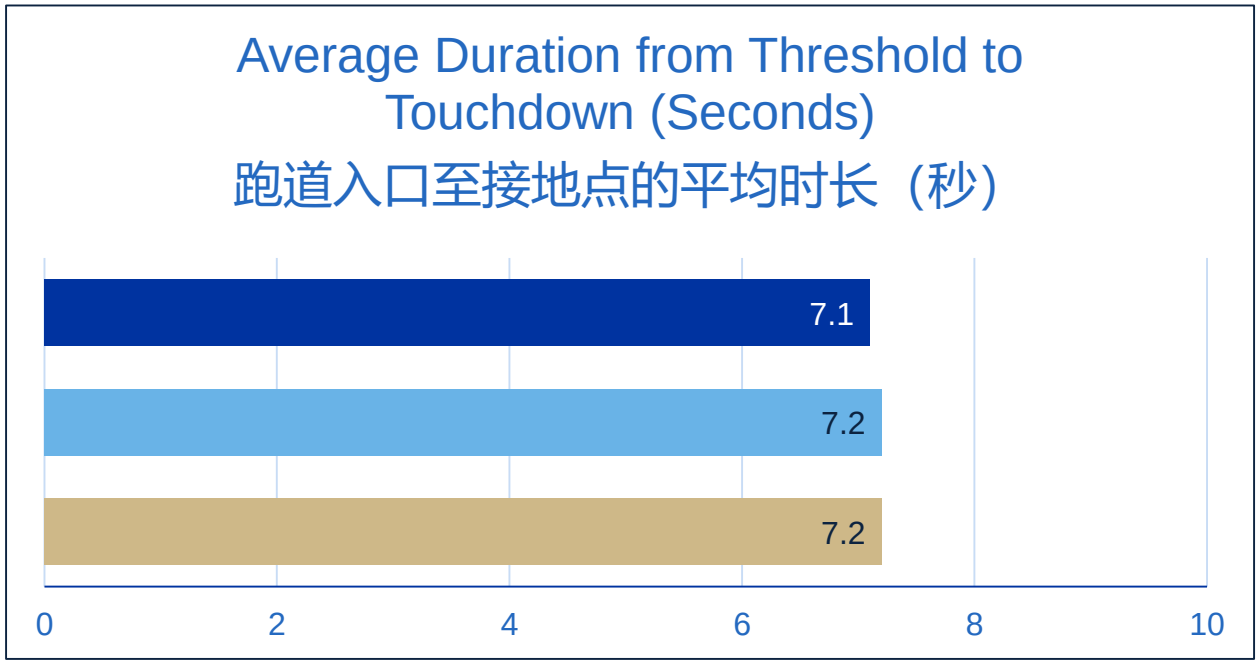
787 Crossing Heights
787通过高度

Fleet Average:
机队平均值：



787 Threshold to Touchdown
787跑道入口至接地点





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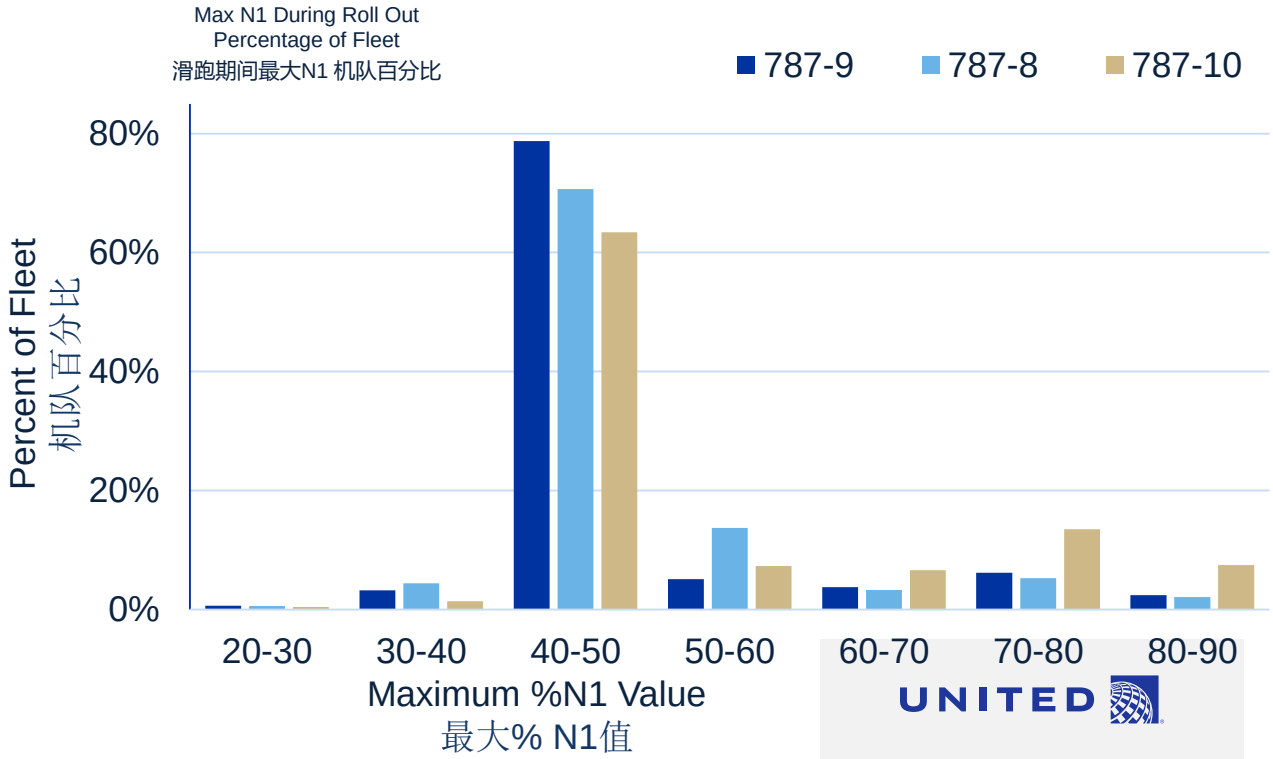
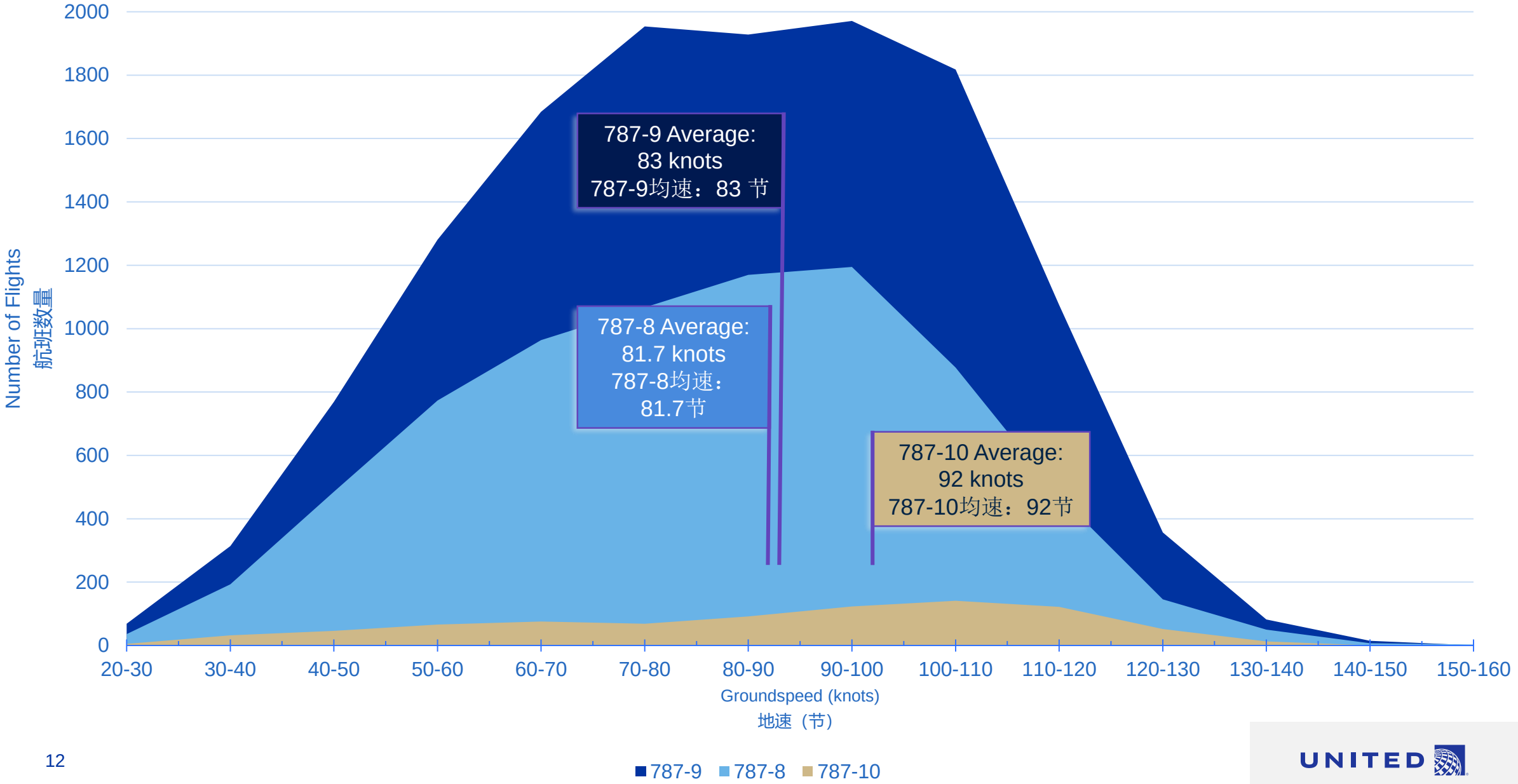
787 Thrust Reverser Deployed After Touchdown
接地后787反推力装置部署

Measurement 衡量	Fleet Average 机队平均值
Average Thrust Reverser Deployment 平均推力反向器部署	15.66 Seconds 15.66秒
Time from Sustained WOW to T/R Commanded 从持续WOW到T/R命令的时间	4 Seconds 4秒
Groundspeed of T/Rs Commanded Stowed T/R命令装舱的地速	68.4 knots 68.4节
Groundspeed of T/Rs Stowed T/R装舱的地速	59.6 knots 59.6节



787 Autobrake Disengaged Groundspeed
787自动制动地速



UNITED

Ongoing FOQA Studies
FOQA现阶段研究

- B737 Speed at runway exit
  B737跑道出口速度

- All Fleet Harmonization
  各机队协调

- High rates of descent below 500’
  500’以下下降率高

- Flight Level Change (FLCH) below 1000’
  1000’以下飞行高度层更改（FLCH）

- Airspeed decay below Vref
  Vref以下空速衰变

Taking Action
采取行动

Thank you
谢谢

Questions?
欢迎提问！