

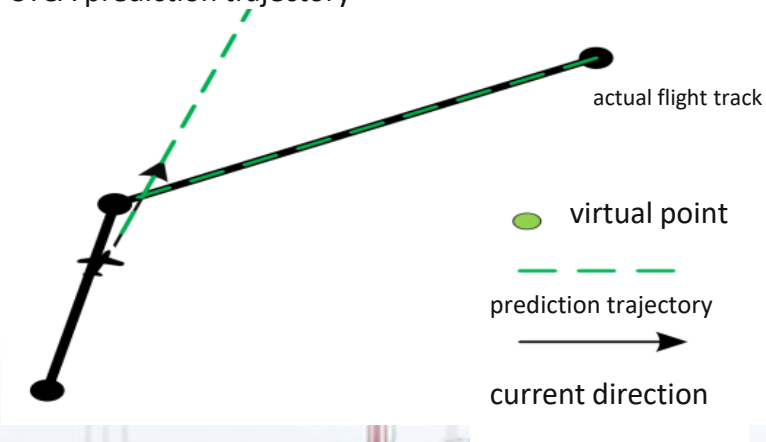
ICAO Asia/Pacific Regional Webinar  
Implementation of ATM Automation System in APAC Region  
7th June 2022 (Indochina Time, UTC+7)

# Application of Forewarning Based on CFL

Presented by China

## Problems with STCA ?

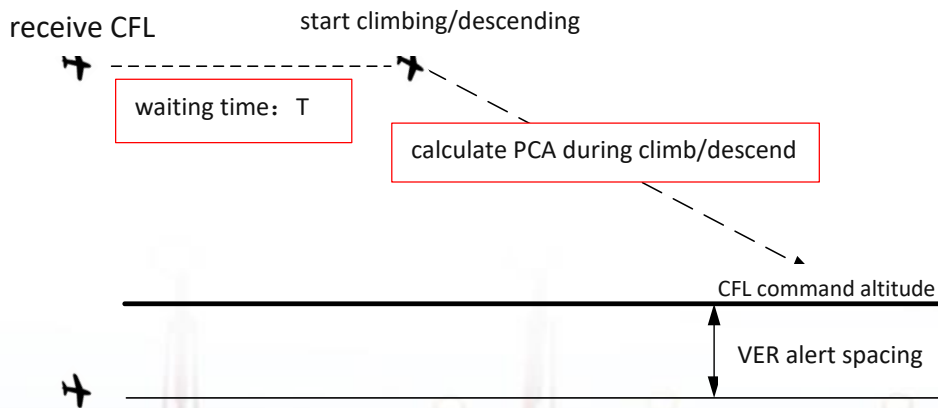
STCA prediction trajectory



- Short prediction time
- Planned routes not take into account



## Problems with MTCD ?

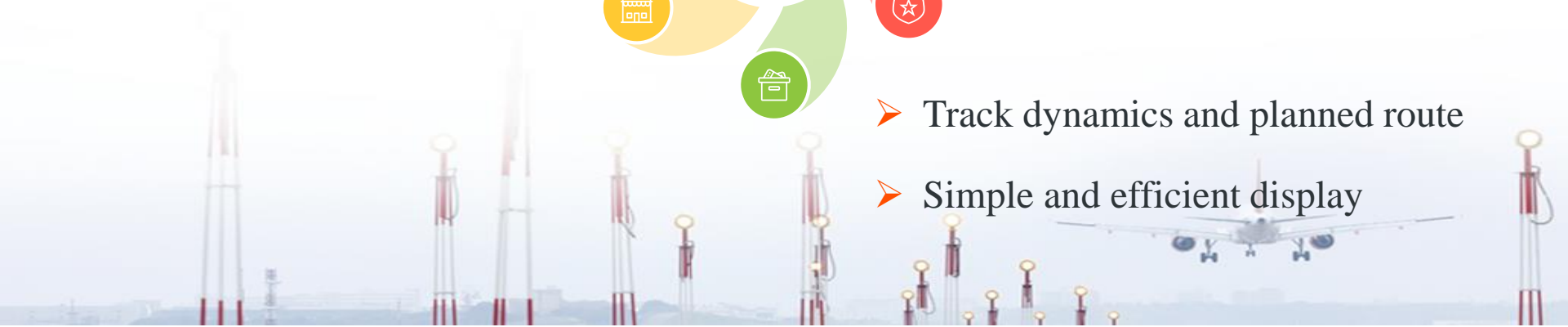


- Longer prediction time
- More uncertain factors
- Rate of climb (ROC) and rate of descent (ROD) uncertain

- Controller CFL intent data
- Horizontal and vertical

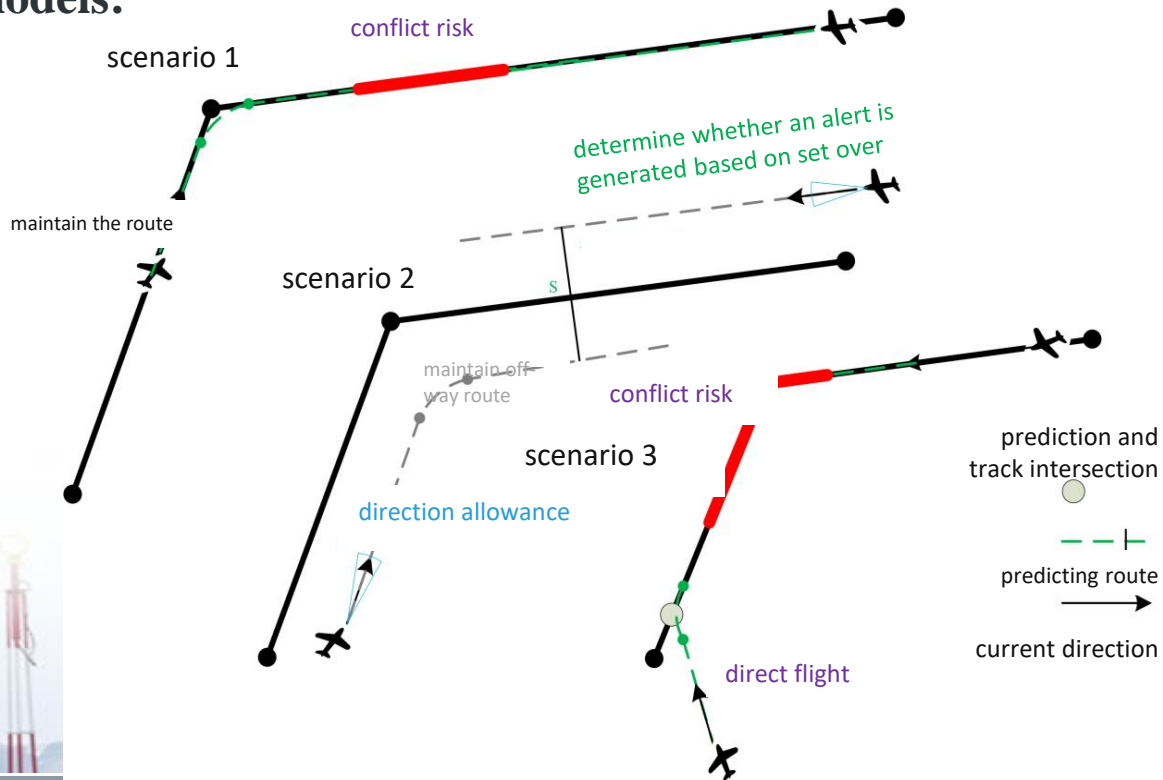


- Track dynamics and planned route
- Simple and efficient display



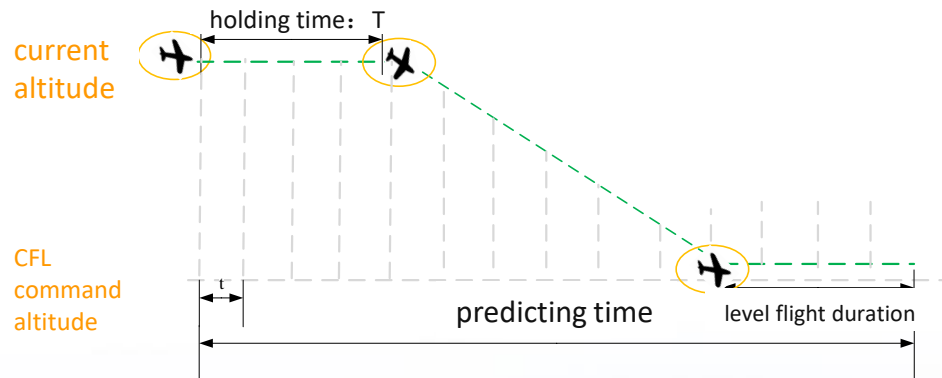
## 5 type of Horizontal Prediction models:

- Along Route Model
- Off-Way Route Model
- Return Route Model
- Direct Flight Model
- Maintain Heading Model



## The aircraft attitude change stage:

- Level flight (CFL delay)
- Climbing and descending
- Level flight (CFL completed)



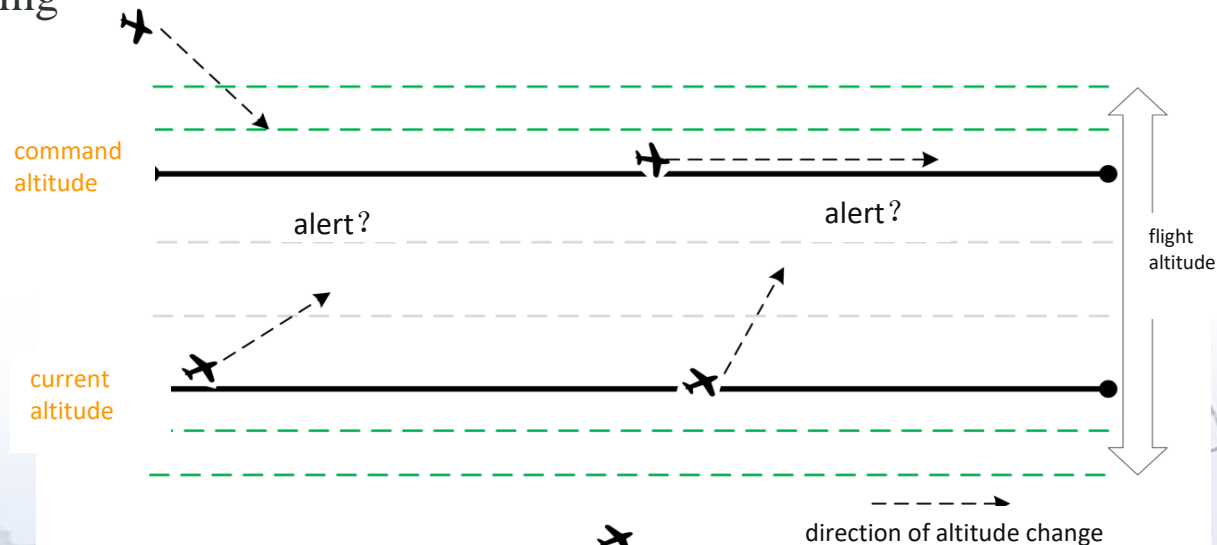
Closer to the operational situation of the aircraft





## Uncertainty of aircraft attitude variation:

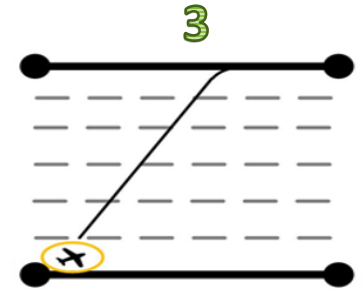
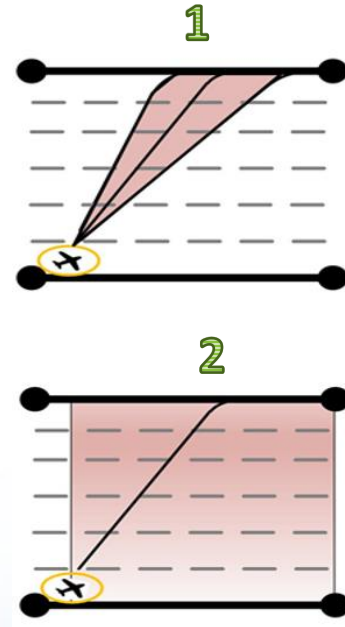
- ROC&ROD Inaccurate
- Aircraft attitude change timing





## 3 type of Vertical Prediction models:

- 1. Linear Model (loose)
- 2. Conical Model (relatively strict)
- 3. Matrix Model (extremely strict)

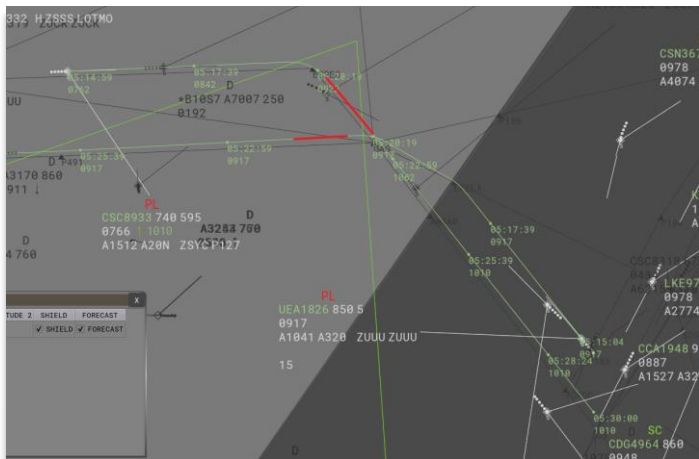


Solve the inaccuracy caused by ROC&ROD uncertainty

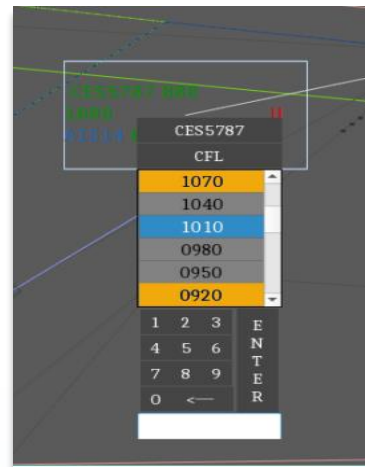


# Forewarning Display

Alert is displayed on SDD in various ways:



Characters&route



List of CFL







In the actual control work of Chengdu, it has accurately identified the conflict risk for many times and assisted the controller to find and solve the potential conflict.



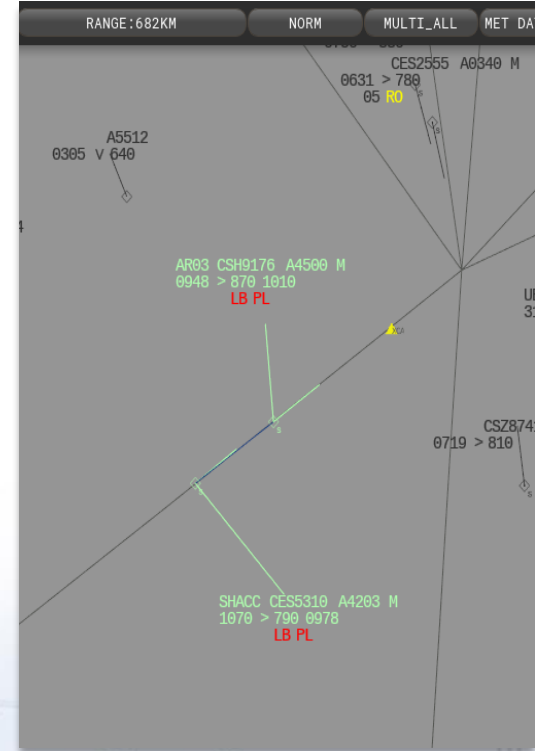
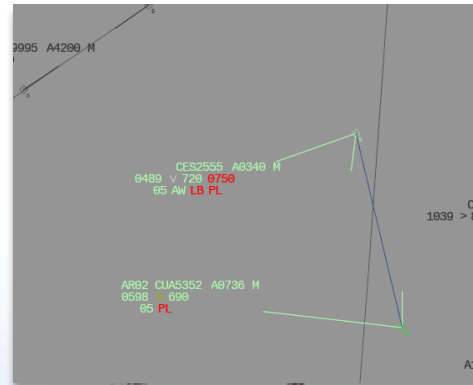
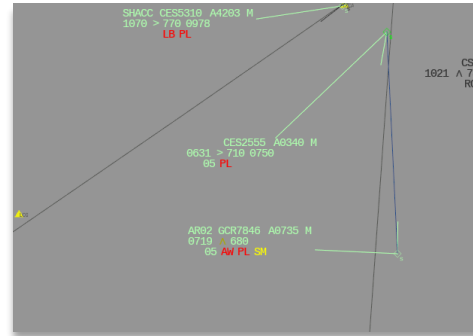
**Chengdu ACC has been put into use.**





# Application

According to the actual operation statistics, the effective alarm rate has reached more than 95%, and meets the requirements of the control on the alert prediction time.





- **The forewarning based on the CFL takes account of controller intent.**
- **The function can detect the possibility of conflict in the next 3-5 minutes from the horizontal and vertical directions.**
- **The function can be as a supplement means of STCA and MTCDD.**





| ICAO



中国民用航空局

空中交通管理局

Air Traffic Management Bureau, CAAC

Thanks!

