Herzlich Willkommen

“CRYSTAL” TWR-APP and Meteo needs

skyguide

with you, all the way.
AGENDA

- **ATFCM** (Air Traffic Control Management)
- What is CRYSTAL
- Why do we need CRYSTAL
- How does WX influence CRYSTAL
- CRYSTAL needs in terms of WX data
Air Traffic Flow and Capacity Management

It is an ongoing process to provide the users with the highest available capacity in the most efficient way and avoiding overloads within the European ATM network.

First priority: SAFETY

The main task given to skyguide by the Swiss confederation says; provide a SAFE, ORDERLY and EFFICIENT flow of traffic. This may require regulations and delaying traffic, but prior doing that all possible optimizations have to be analyzed and implemented. CRYSTAL is an next step to improve the situation for Zürich and Geneva. The area control center relies for quite some time on a similar prediction tool.
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What is CRYSTAL

CRYSTAL predicts the upcoming air traffic situation for Zürich and Geneva TWR/APP units, considering:

- Traffic (numbers, types of aircraft, approach path according landing concept, crossing traffic, leaving and joining traffic)
  → For each sector, Approach East/ West and Departure

External factors:
- Staff
- Airspace elements (e.g.: military activity, gliders, SUAs...)
- Maintenance activities
- WX data

With this information, the TWR supervisor:
- Can better organise the upcoming traffic management
- Reduce delays
- Improve safety
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Why do we need CRYSTAL

### ECAC - Grand Total

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### IFR Movements (Growth)

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How does WX influence ATC operations

Weather is responsible for:

ca. 30% (CB/TS, and Wind for CH) ATM delays in Europe

25.5% ATFM delays

80% increase in delay minutes
How does WX influence CRYSTAL

Each time a new WX report arrives:
- SPVR will reassess the situation (CBs, wind, fog...)
- Forecast still correct?! Measurements correct?!
- What is/are the impacts on the airspace.

WX impacts:
- Traffic complexity in the APP (storms, winds)
- Minimum distance between 2 aircraft on final approach (visibility, runway condition, wind)
- Handling stop

As a consequence, TWR SPVR:
- Could implement measures ➔ DELAY
- Stop/limit activities (SUA, gliders, para) within the airspace

The better the predictions, the more efficient we can be.
Anflug-Konzepte Zürich

DVO=Deutsche Verordnung

Nordanflug=Normalkonzept (höchste Kapazität)
Piste 16 oder 14

RWY10 Bisenstart

DVO28 am Morgen
Ostanflug

WIND28 bei zu starkem Westwind

DVO34 am Abend
Südanflug
Der Luftraum

- Fallschirmsprung-Zonen
  - Triengen
  - Beromünster
  - Buttwil
  - Speck-Fehraltdorf
  - Sitterdorf

- Flugplätze mit Y/Z-Flügen
  - Buochs (Pilatus)
  - Emmen
  - St. Gallen
  - Friedrichshafen
  - Donaueschingen
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The necessary data (but not all used in CRYSTAL)

- temp/dew point
- fog
- QNH
- ground wind
- wind at 1000ft
- wind at 5000ft
- precipitation (mm)
- snow altitude (airport) (only in GVA)
- ground wind gusts
- ceiling (altitude)
- Octans at 200ft
- Octans at 900ft (only in ZRH)
- Octans at 1500ft
- Octans at 4600ft (only in GVA)

- visibility
- vis probability <5km
- vis probability <800m (only in GVA)
- vis probability <400m
- airport CB probability
- airport TS probability
- TMA CB probability (planned to be split into three areas, West, East and South)
- TMA TS probability
- WX airport alerts
- surface condition (probability of surface contamination)
- FL100 and FL180 corrections (only in GVA), and FL140 (only in ZRH)
Prob30 and Prob40 = likely
Skyguide and METEO CH werden das METEOGRAMM auch weiterhin verbessern und ergänzen um eine hochqualitative Grundlage zu schaffen.

Die neuen METEO CH Produkte sollen, wenn für CRYSTAL nutzbar, eingebunden werden können.

Es bestehen zum Beispiel Bestrebungen die CB und TS Prognose von einer reinen Warnung für den Flugplatz/CTR auf die drei Regionen West, Ost und Süd(Alpen) auszuweiten. Diese geografische Aufteilung entspricht auch der Aufteilung des Luftraums für Zürich An- und Abflug und soll eine präzisere Komplexitätsberechnung sowie eine realistischere Kapazität erlauben.

CRYSTAL profitiert automatisch von allen relevanten Verbesserung (Modell, Genauigkeit, Auflösung etc.) da die Daten von METEO CH in bestmöglicher Qualität gestreamt werden.
Fragen?