Project HRRF

Results and Analyses (Part 2)

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Content

› GNSS Interference
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  • GNSS Interference Source Localization
  • Impact of RF Interference on SBAS Aviation Receiver

› Verification of GNSS Simulations

› Helicopter Vertical Flight Distribution
GNSS Interference
GNSS Interference
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GNSS Interference

- Impact of helicopter attitude on C/No

![Diagram of GNSS interference showing satellite, roll axis, pitch axis, yaw axis, and nadir with color scale indicating dB-Hz values ranging from 35 to 55.]
GNSS Interference

› Normalized C/No (black lines)
› Mean of normalized C/No (red line)
› Potential RFI detectable when red line decreases
GNSS Interference
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- Measured C/No (top) and Averaged Normalized C/No (bottom)
GNSS Interference
Behavior of RFI on SBAS Receiver - Example

- Relation between C/No decrease, HPL and number of tracked satellites
Modelling of RFI Impact HPL Degradation

› Initial situation: 10 tracked satellites
Verification of GNSS Simulations
Verification of GNSS Simulations

› 20 approaches at each airfield

Number Satellites

- Dübendorf
  - 98.3% with 1.4% and 0.4%

- Alpnach
  - 76.2% with 14.9% and 9.8%

HPL

- Dübendorf
  - 24.7% with 45.8% and 8.7% for -0.001 to 0.001

- Alpnach
  - 12.2% with 33.0% and 44.5% for -0.001 to 0.001
Helicopter Vertical Flight Distribution

- Probability of RFI exposure depending on distribution of flights
- Dwell time per square of 250m by 250m
Helicopter Vertical Flight Distribution

› Vertical distribution of flights – height above ground level (AGL)
Conclusions

Thanks to the large dataset

- development of a simple RFI detection tool
- approach of a RFI localization tool
- deeper insight into RFI situation referred to helicopter operations
- understanding of behaviors of an SBAS receiver exposed to RFI
- verification of in-house GNSS simulation tool
- insight into helicopter occupancy density distribution

Dataset allows to perform further assessments