



**Final Report
of the Aircraft Accident
Investigation Bureau**

concerning the incident (Airprox)

between AFR222J and DLH5431

on 16th July 2002

6 NM NW ZUE

FINAL REPORT

AIR TRAFFIC INCIDENT REPORT (ATIR)

AIRPROX (NEAR COLLISION)

THIS REPORT HAS BEEN PREPARED FOR THE PURPOSE OF ACCIDENT/INCIDENT PREVENTION. THE LEGAL ASSESSMENT OF ACCIDENT/INCIDENT CAUSES AND CIRCUMSTANCES IS NO CONCERN OF THE INCIDENT INVESTIGATION (ART. 24 OF THE AIR NAVIGATION LAW)

PLACE/DATE/TIME 6 NM NW ZUE, 16.7.2002, 19:39 UTC

AIRCRAFT AFR222J, A320, F-GFKM, Air France
 LFPG - EDDM

 DLH5431, CRJ1, D-ACLW, Lufthansa City Line
 LSGG - EDDH

ATC UNIT Zurich area control centre

AIR TRAFFIC RE Upper 2/3 (Radar Executive)

CONTROLLERS RP Upper 2 (Radar Planner)

 RP Upper 2 (Trainee)

Airspace C

HISTORY

The two aircraft involved in this incident were flying in Swiss airspace. AFR222J was en route from Paris to Munich, whilst DLH5431 was flying from Geneva to Hamburg. For these two aircraft, because of the flight-plan routing, there was a crossing point to the north-west of the Zurich East (ZUE) omnidirectional radio range.

The DLH5431 reported for the first time after the hand-over from Geneva air traffic control to Upper 2/3 Sector in Zurich during its climb when approaching flight level (FL) 300. It immediately received a further clearance to climb to FL 320 and somewhat later clearance to climb to FL 340.

The AFR222J was flying into Swiss airspace at its cruising altitude of FL 330. The commander (CMD) was pilot not flying (PNF); the first officer (F/O) was pilot flying (PF). Shortly after this aircraft had flown over Trasadingen (TRA) omnidirectional radio range, it received clearance to descend to FL 310 from the competent Upper 2/3 Sector air traffic control officer (ATCO). This measure was necessary to allow this aircraft to begin its descent in good time, in accordance with the usual procedures for flights into Munich airport. After confirmation of this clearance, AFR222J was instructed by the ATCO for this sector to change frequency to Upper 1 Sector. This sector would subsequently allow the Air France aircraft to descend further, in order finally to clear it for the hand-over level of 270 agreed with Munich.

Contrary to the instruction to descend which had been given, AFR222J, according to the radar plot, initiated a climb to at least FL 334. The crew only became aware of their mistake, regarding their climb instead of a descent, and the risk of collision with DLH5431 approaching from the right and stable at FL 340 on a north-easterly heading, as a result of a traffic advisory (TA) on their airborne collision avoidance system (ACAS). The CMD of the Air France aircraft then immediately switched off the autopilot and manually initiated a rapid descent.

For their part, the pilots of DLH5431 were also made aware of the Air France aircraft by an ACAS TA. This TA was followed seconds later by a resolution advisory (RA) with the instruction to initiate a climb. The pilots of the Lufthansa aircraft did not obey this instruction, since in the meantime they had established visual contact with the Air France aircraft and wished to avoid losing this visual contact by obeying the climb manoeuvre ordered by the RA. Furthermore, the two Lufthansa pilots' assessment of the situation was that the Air France aircraft would cross behind them in a climb.

The competent radar executive for Upper 2/3 Sector was made aware of the dangerous situation by the short term conflict alert (STCA) on his radar monitor. Just as he was about to warn the Lufthansa crew, the latter reported the ACAS RA which they had just received. At this time, the Lufthansa aircraft had just left the crossing point in a north-easterly direction, while the Air France aircraft was heading east approximately 0.4 NM to the west of it.

As a result of the sequence of events described, there occurred a distinct violation of separation rules; according to the radar plot, the two aircraft approached as close as 0.6 NM; with a simultaneous altitude difference of 600 FT. Since the radar plot available shows a point in time about 1.5 s before the closest approach, the actual violation was probably even more serious, at least in terms of lateral separation.

Both skyguide (air traffic control) and Lufthansa City Line subsequently submitted an ATIR.

All times are specified in the universal time coordinated (UTC) format (local time – 2 hours).

FINDINGS

- Both the aircraft involved were flying in reduced vertical separation minimum (RVSM) class C airspace.
- Both aircraft were in uninterrupted radio contact with Upper 2 Sector until the instruction to descend to FL 310 and the subsequent instruction to AFR222J to change frequency to Upper 1 Sector.
- AFR222J correctly confirmed the clearance to descend to FL 310 and the frequency change to Upper 1 Sector.
- At 19:39:38, 40 seconds after AFR222J had received clearance to descend to FL 310, the radar plot shows this aircraft at FL 332 and it was about 2.5 NM from the crossing point with the Lufthansa aircraft. Twelve seconds later the AFR222J shows FL 334 according to the radar plot and the Air France aircraft was just before the crossing point.
- 1:44 minutes elapsed before the Air France aircraft made contact for the first time with Upper 1 Sector. At the time of this contact, AFR222J was descending through FL 315. It was now about 6 NM to the east of the crossing point.
- The DLH5431 reached FL 340 assigned to it by the ATCO more than 3 minutes before the point at which the two machines would cross.
- At 19:38:35 the competent ATCO issued the following instruction to DLH5431: "DLH5431, call now Rhine Radar on 133 decimal 28, bye-bye". The aircraft was then still about 78 seconds from the crossing point. Seconds later, the following answer was given: "133 28, **5808**, good-day". At this point the ATCO did not notice that another Lufthansa aircraft, namely DLH5808, was responding to his radio message.
- At 19:38:49 this DLH5808 reported back on the original Upper 2/3 Sector frequency as follows: "er...just confirm the frequency again for DLH5808!". The ATC again did not realise that he was communicating with DLH5808 and not with DLH5431. Only about 1:30 minutes later did DLH5808 return again to the original frequency, when it was possible to resolve the misunderstanding.
- In the meantime, at 19:39:54, DLH5431 reported to the Upper 2/3 Sector ATCO and informed him of the ACAS RA just received. Then a dialogue developed between the ATCO and DLH5431, in the course of which the respective level of awareness of this incident was exchanged.
- According to the written statement of the CMD of AFR222J his first officer (F/O) as PF prepared for the descent as instructed by the air traffic control (ATC) by entering the FL 310 assigned by the ATC on the flight control unit (FCU). This entry was apparently checked by him. While the F/O should then have initiated the descent, he was busy looking for the name of the next control centre (which he apparently had not perceived at the time of the frequency change) on the navigation chart. He therefore neglected to check the display concerning the initiation of the descent on the flight mode annunciator (FMA) in the vertical column. In the meantime, during the intended initiation of the descent in vertical speed mode, his F/O apparently mistakenly initiated a climb with a target rate of 1000 ft/min as the result of an incorrect turn direction (clockwise for a climb entry instead of counter-clockwise for the entry of the instructed descent) on the vertical speed or flight path angle selector knob (V/S or FPA selector knob).

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The CMD was not able to provide any information as to why his F/O as PF selected vertical speed mode and not managed descent mode to initiate the descent. According to his statement, Air France does not specify any particular mode for initiating such changes in pitch.

- The Air France CMD furthermore stated that the increase in engine power to initiate the erroneous climb and the change in pitch were not initially noticed by him. Only as the result of a traffic advisory (TA) from their ACAS did they become aware that something might be wrong. After he realised what had happened, he immediately switched off the autopilot and initiated a manual descent.

Moreover, the Air France CMD mentioned that they had clearly received the clearance to descend to FL 310 before the top of descent (TOD). At this time the aircraft was flying under its own navigation.

- According to information from Air France, the CMD of AFR222J had a total flying experience of 8925 hours, 3162 of which as CMD. A total of 700 hours were on fly-by-wire (FBW) aircraft (A320); the remainder were on conventional aircraft (B727, B737, B747). Despite repeated enquiries, Air France has provided no information on the flying experience of the F/O.
- According to the "flight report" of the Lufthansa CMD, the pilots of this aircraft became aware of the incident as a result of a TA on their ACAS. This TA was followed a few seconds later by an RA, with an instruction to climb at a rate of 2700 ft/min. The Lufthansa crew then established visual contact with the Air France aircraft at about the 9 o'clock position and decided not to obey this RA, so as not to lose visual contact with it. The pilots' assessment of the situation was that the Air France aircraft would cross behind them in a climb.
- The air traffic control instructions for maintaining vertical separation between the two aircraft were given in good time.

ANALYSIS

Airmanship Air France Pilots

In its flight crew operation manual (FCOM), Airbus Industries recommends the use of managed descent mode to initiate a descent at or before TOD by means of corresponding entries in the FCU. This variant would have led to a descent at approximately 1000ft/min along the ideal, previously calculated descent profile. This would also have been the most appropriate procedure. The variant chosen by the F/O, to make the descent in vertical speed mode (selected descent), is indeed also possible but is associated with the possibility of an incorrect entry. This is what happened, when the F/O, after entering the cleared FL via the altitude selector knob, initiated a climb (instead of a descent) as the result of a mistaken clockwise (rather than counter-clockwise) turn of the V/S or FPA selector knob as far as the target rate of descent with a subsequent pulling of the knob. It remains an open question whether the F/O was affected by his previous experience on aircraft with less advanced navigation systems.

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Air traffic control

On two occasions, the competent ATCO did not in fact notice that he was communicating with the "wrong" Lufthansa aircraft, but this occurrence had no effect on the development of this incident. The other actions were appropriate under the circumstances.

CAUSE

The incident is attributable to the fact that the F/O as PF of the AFR222J chose a sub-optimal procedure to initiate the descent. As the procedure was being applied, a climb instead of a descent was erroneously initiated as a result of an incorrect entry. The absence of a closed loop (reciprocal monitoring of all inputs) meant that neither of the pilots noticed that a climb had been entered instead of a descent.

Berne, 26 February 2004

Aircraft Accident Investigation Bureau

This report has been established for the purpose of accident/incident prevention. The legal assessment of accident/incident causes and circumstances is no subject of the accident investigation (Art. 24 Air Navigation Law).

The language of the valid formulation of this report is German.

All times are specified in the universal time coordinated (UTC) format (local time – 2 hours).

Transcript of Original Tape Recording

Subject **AIRPROX AFR222J of July 16, 2002**

Call Signs **222J** → **AFR222J** → **Air France**
 5431 → **DLH5431** → **Lufthansa**
 5808 → DLH5808 → Lufthansa
 6433 → TRA6433 → Transavia
 U2RE → Zurich Upper2 Sector Radar Executive
 U1RE → **Zurich Upper1 Sector Radar Executive**

Frequency Zurich Upper2 Sector Radar / U2RE 134.605 MHz
 Zurich Upper1 Sector Radar / U1RE 132.815 MHz

The signer certifies the completeness of the present transcript

skyguide
Flugsicherungsbetrieb Zürich

ZZDA

sig. Bettina Comte

To From Time UTC Communication Observation/various 2

U2RE 222J 19:28:25 Swiss, good evening, AFR222J, level 330
222J U2RE :29 AFR triple two Juliett, Zurich hello, cleared TRA, BODAN, flight level 330
U2RE 222J :35 TRA, bonat,...BODAN, flight level 330, AFR triple two Juliett

6 stations in between

U2RE 5431 :30:58 Radar, „guten Abend“, DLH5431, approaching level three hundred
5431 U2RE :31:02 DLH5431, „guten Abend“, climb to flight level 320
U2RE 5431 :07 DLH5431, climb level 320

7 stations in between

U2RE 5808 :33:28 good evening, DLH5808, climbing three hundred
5808 U2RE :32 DLH5808, „guten Abend“, climb to flight level 310
U2RE 5808 :36 climbing 310, 5808

1 station in between

5431 U2RE :34:08 DLH5431, climb now to flight level 340
U2RE 5431 :13 DLH5431, climbing flight level 340

4 stations in between

5431 U2RE :35:19 DLH5431, set course to LOKTA
U2RE 5431 :22 DLH5431, on course to LOKTA

5 stations in between

5431 U2RE :38:35 DLH5431, call now Rhine Radar on 133 decimal 28, bye-bye
U2RE 5808 :40 133 28, 5808, good-day

the **wrong DLH5808** gives a readback!

To	From	Time UTC	Communication	Observation/various 3
U2RE	5808	19:38:49	äh... just confirm the frequency again for DLH5808?	it's still the wrong DLH5808
5808	U2RE	:53	äh.. it's 133 decimal 28	controller thinks he is speaking to DLH5431
U2RE	5808	:56	133 28, okay	
222J	U2RE	:58	AFR triple two Juliett, descend flight level 310	
U2RE	222J	:39:02	descend äh flight level 310, AFR222J	
222J	U2RE	:07	correct, for further descent call Swiss Radar 132 815, good-bye	
U2RE	222J	:11	132 815, AFR triple two Juliett, bye-bye	
U2RE	5431	:54	Radar, DLH5431, we just got a TCAS-climb instruction, we missed a probably swiss airplane by round about maximum 1 mile	
5431	U2RE	:40:09	DLH5431, that is correct, the crossing traffic has... should have descended to 310, but äh... it didn't follow the instruction and climbed, and I don't know why, I have to ask the pilot; it's on an other frequency... maintain äh... remain on this frequency shortly, please	
U2RE	5431	:29	thank you, and for my information äh... due to the fi..fire...file I have to report, I would like the aircraft äh... registration and flight number, please	
5431	U2RE	:39	„ja“, stand-by, I have to check that on the other frequency, call you back shortly, remain on this frequency, continue LOKTA, TGO	
U2RE	5431	:45	LOKTA, TGO, 5431	
U2RE	6433	:48	Radar, TRA6433, radio check?	
U1RE	222J	19:40:51	*Zurich Control, AFR triple two Juliett, good evening, we are descending flight level 310	*this is the first call of AFR222J on U1 frequency
222J	U1RE	:57	AFR triple two äh..Juliett, you are identified, call you back shortly for descent	
U1RE	222J	:41:02	thank you	
U2RE	5808	19:40:51	*.....again on your frequency	*first part of call is covered by the call of TRA6433
6433	U2RE	:54	TRA6433, I read you five	
U2RE	6433	:58	äh..6433, could you say again, only read you two by three, say again, please?	
6433	U2RE	:41:02	I read you five	
U2RE	6433	:04	roger, thank you	

1 satation in between

To	From	Time UTC	Communication	Observation/various 4
U2RE	5808	19:41:18	„Zürich“, just for confirmation, DLH5808 is back on your frequency again, you sent us to a wrong frequency	
5808	U2RE	:24	DLH5808, roger äh..., maintain äh 310, to BENOT	
U2RE	5808	:31	roger	
5 stations in between				
222J	U1RE	:42:29	AFR triple two „charliett“...Juliect, descend to flight level 280	
U1RE	222J	:34	will descend to flight level 280, AFR triple two Juliect	
1 station in between				
2 stations in between				
5431	U2RE	:43:08	DLH5431?	
U2RE	5431	:11	go ahead, DLH5431?	
5431	U2RE	:13	äh, according the pilot, äh he wasn't in a climb, he was in a descent to 315, actually, at the , the moment the mode Charlie read out was äh 333, so I'm still in con.. in coordination with the next sector, because we don't know what the problem was, but there was... most likely a wrong read out of the mode Charlie in the aircraft	
222J	U1RE	:43:19	AFR triple two Juliect, descend to flight level 270	
U1RE	222J	:23	will descend to flight level 270, AFR triple two Juliect	
222J	U1RE	:27	triple two Juliect, call Munich 133 55, good-bye	
U1RE	222J	:30	133 55, AFR triple two Juliect, bye-bye	
U2RE	5431	:43:37	äh, we had definitely äh 333, and it was almost our flight level, there was no way that it was two thousand five hundred feet below us , no way	
U1RE	222J	:43:42	äh, excuse-me, you äh.. would you please say again the frequency for triple two Juliect?	
222J	U1RE	:46	yes, 133 55	
U1RE	222J	:48	133 55, äh..bye-bye	
5431	U2RE	:43:49	and, äh, did you have visual contact to the aircraft?	
U2RE	5431	:52	affirm, that's why we did a... follow our TCAS Resolution Advisory, and I did perform a TCAS-climb and, if it would have been half a mile before, it would have exactly hit us, definitely	

5431	U2RE	19:44:07	DLH5431, roger, I'm äh going to ask the other pilot again, remain on this frequency and I give you the äh... data of the other aircraft shortly	
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U2RE	5431	:18	okay	
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1 station in between

5808	U2RE	:33	DLH5808, call now Swiss Radar on 132 decimal 315, bye-bye	
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U2RE	5808	:39	132 315, 5808, good-day	
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U2RE	6433	:43	TRA6433, standing-by for descent	
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6433	U2RE	:46	TRA6433, roger, descend to flight level 310	
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U2RE	6433	:50	leaving three seven for level 310, 6433	
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6433	U2RE	:53	for further descent call now Radar on 132 decimal 815, bye-bye	
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U2RE	6433	:58	32 815, 6433, good-day	
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4 stations in between

5431	U2RE	:46:47	and DLH5431, I have to send you now to Rhine Radar, you will get the necessary information by Rhine Radar in about three to four minutes, because I can't reach the other pilot now, is that okay with you?	
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U2RE	5431	:47:00	„ja“ is okay; and äh, just in case, would you be so kind and give me your name?	
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5431	U2RE	:06	DLH5431, yes of course, my name is Rigonalli, spelled r-i-g-o-n-a-ll-i, Andreas	
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U2RE	5431	:19	r-i-g ?	
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5431	U2RE	:22	stand-by a moment	
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1 station in between

5431	U2RE	:31	and DLH5431, the name is r-i-g-o-n-a-ll-i	
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U2RE	5431	:41	okay, DLH5431, and äh Rhine now on which frequency?	
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5431	U2RE	:48	is äh 133 decimal 28	
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U2RE	5431	:50	33 28, thank you, 5..äh 413, and I have to file a report about that, just for your information	
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5431	U2RE	:58	yes, that is äh fine with me, and I am going to file one as well, because äh that's, äh that's strange things happened, I don't know why, but äh it's okay and thank you	
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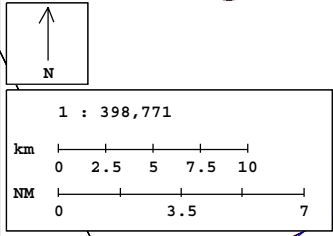
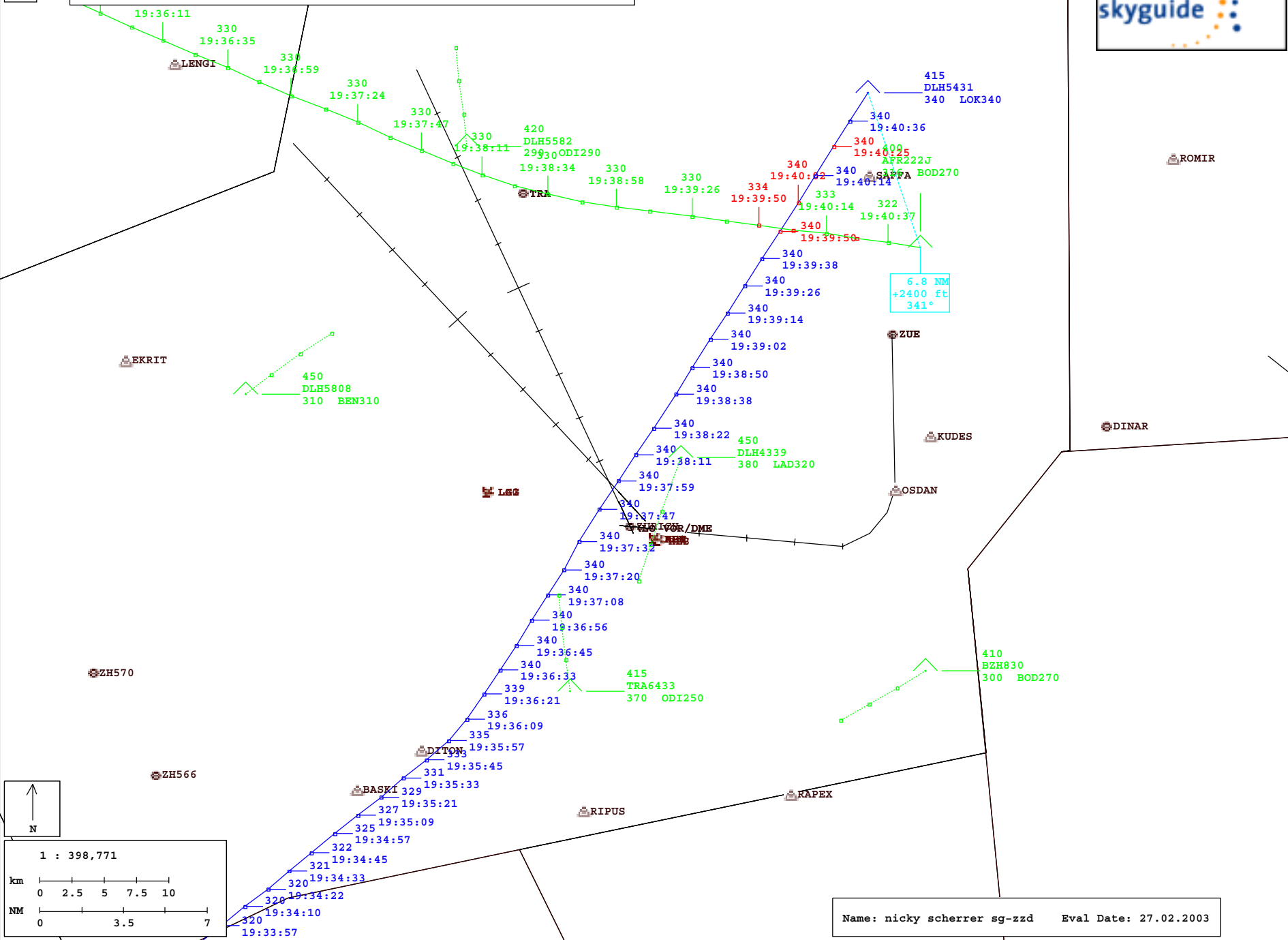
To From Time UTC Communication Observation/various 6

U2RE 5431 19:48:08 okay, thank you, and just for your information, we had a TCAS-climb, and we definitely saw the aircraft climbing, so that was strange as well, okay, bye bye

5431 U2RE :18 bye-bye, thank you anyway

- end -

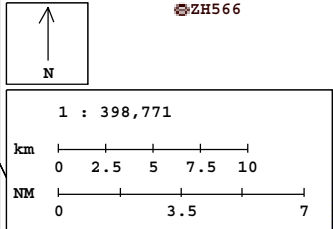
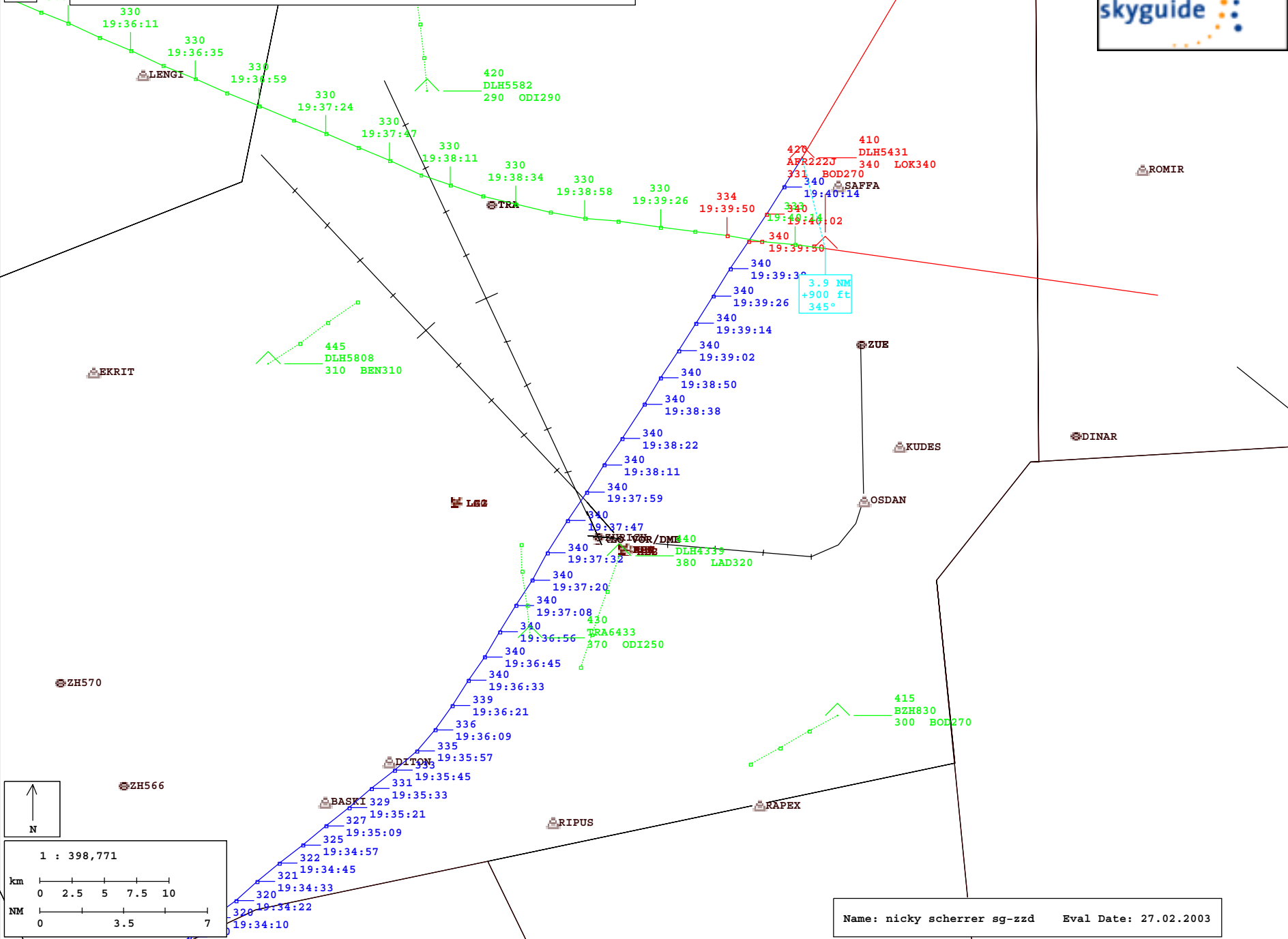
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Name: nicky scherrer sg-zzd Eval Date: 27.02.2003



Src ACN 33
 Analysis: airprox afr222j of july 16, 2002 Time [UTC]: 16.07.2002 19:40:30



Name: nicky scherrer sg-zzd Eval Date: 27.02.2003