

Annapurna I – an overview of the summit topography

8000ers.com

CONTENTS

1/ Introduction	p2
2/ Eastwards	p5
21/ At C0	p5
22/ Between C1 and C0.	p8
23/ Between C2 and C1.	p17
24/ Between C3 and C2.	p22
25/ Between ridges junction and C3-W	p26
3/ Westwards	p27
31/ Between ridges junction and northwest shelf	p27
32/ Between C3-W and ridges junction	p29
33/ Between C2 and C3	p35
34/ Between C1 and C2	p39
35/ Between south face exit and C1	p42
36/ At C0	p45
4/ Topographical detailing :	p46
41/ About C4-W/ridges junction area	p46
42/ About rock groups below C4-W on north side	p48
5/ In conclusion : for a tolerance summit zone on Annapurna I ?	p51
6/Annex	p52
61/ Ascents details of the expeditions quoted in this study	p52
6.2/ Sources (Video Links, Websites)	p53
Acknowledgments	p54

1/ Introduction :

Annapurna I (8091m) is the tenth highest mountain in the world. To Autumn 2017 it had been climbed 266 times (7 disputed and 11 death included ; 6 unrecognized not counted) as follows :

- **204 ascents in spring**
- no ascents in summer !
- 56 ascents in autumn
- 6 ascents in winter

It's been climbed :

- **207 times by the north face**
- 44 times by the south face
- 9 times by the east ridge
- 4 times by the northwest face
- 2 times by the northwest ridge

(Source : Himalayan Database)

In 2010, the successful Spanish team of Edurne Pasaban presented in its official account a **video**, shot from an helicopter by João Garcia filming team. For the first time, public could watch a clear view of the whole summit skyline from north side, revealing a very long and flat like aspect of it, barely troubled by bumps and cornices. A Finnish team would do a similar flight overview from the south side of the summit ridge later, despite the material wouldn't be published (that team couldn't be successfully contacted so far by the way). From that video of the north side, first studies about the summit of Annapurna I would emerge, in particular following the 60 anniversary of the first ascent, whose summit veracity had notably been questioned.

In 2016 the **DLR** (German Aerospace Center) published a remarkable book (« *Unseen extremes : Mapping the World's Greatest Mountains* ») showing satellites pictures of various peaks including Annapurna I. Eberhard Jurgalski could be shared the altitudes and coordinates of the whole Annapurna I summit ridge within a cm precision – despite the margin error actually remains of 10m according to the authors in private interview.



The summit of Annapurna I consists in a flat corniced summit ridge, sizing c.305m in length from C0 to the northwest shelf, for a height difference of maximum 26,8m between C0 and C2-C3 bumps. Note that the picture perspective affect the perception of altitudes drops given by the satellites, and that the cornices conditions in these conditions aren't the same during which the satellites worked.

As a personal start into the present study, in 2012 **Eberhard Jurgalski** shared me his questions about the summit pictures of various parties, starting a long term summit pictures recollection project. Annapurna I summit pictures often show some climber standing up or straight below a snowy ridge, the latter more or less sharpened, not allowing to locate these summit pictures on the ridge at a first glance. However additional pictures showing the proper summit ridge, eastwards or westwards, eventually allowed to distinguish some key different areas of the summit ridge, showing a first picture of its topography from terrain and ultimately questioning what could be considered as the summit of Annapurna I throughout mountaineers practicing of it.

Following images show the key places and names used in the present report.



The summit ridge from north side. Credit : João Garcia team.

Note the 3 main exits used so far with different combinations by climbers coming whether from east ridge, north face routes or northwest ridge (right to French couloir) : east ridge itself, gully to C1 or French Couloir.

Note that no ropes so far traversed the whole summit ridge !

C means cornice, whose shape regularly evolve in shape and possibly in height (in which extent ?).

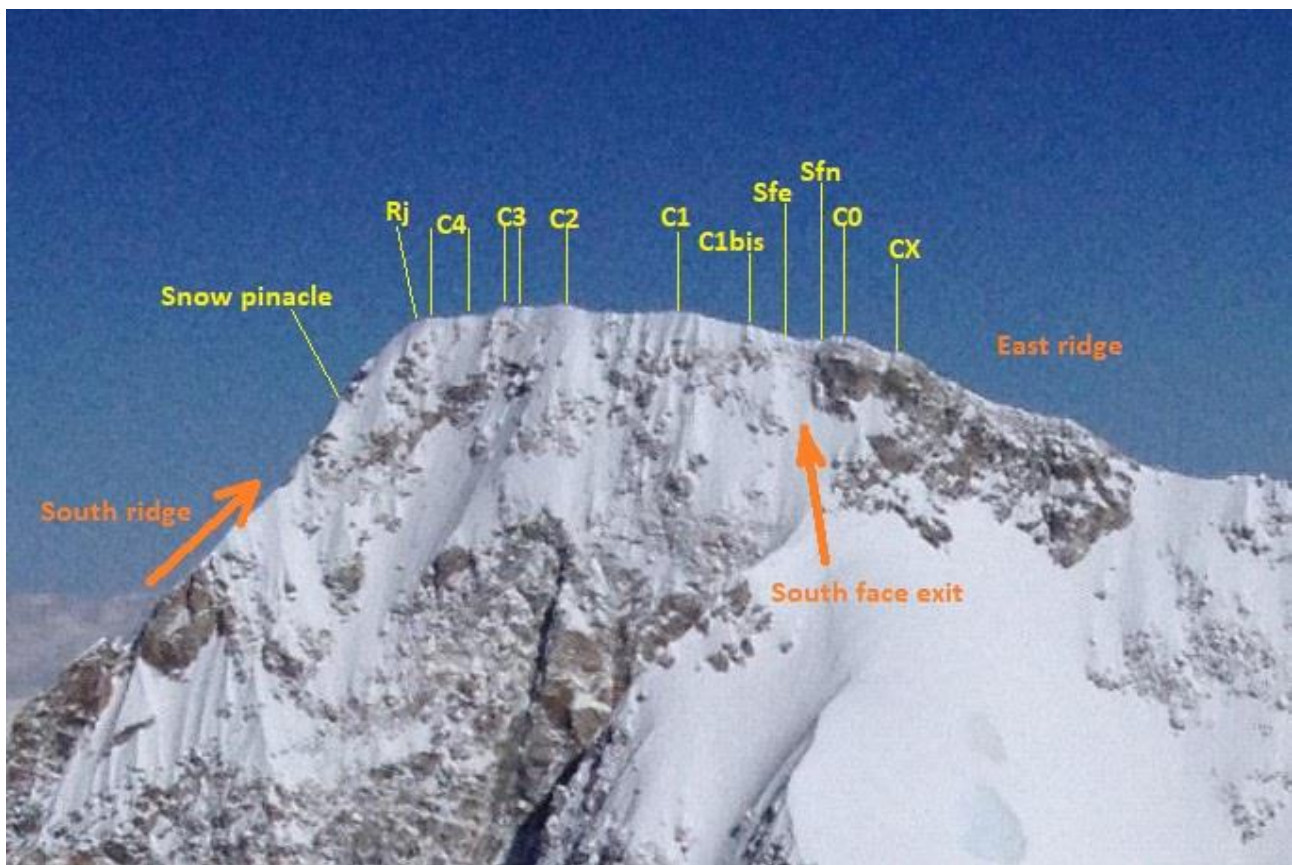
E/W : east, west.

Sfn : south face notch.

Sfe : south face exit.

Rj : ridges junction.

NW Sh : northwest shelf.



The summit ridge from south side. Credit: Hansjörg Auer.

Note that the exit of the NW face was done twice by the southwest ridge (Messner-Kammerlander in 1985/Nezerka-Martiš in 1988). The exit of the 2 routes of the south face (British route 1970/Steck route 2013) occurs by the same exit (Sfe) located between South face notch and C1 bis.

21/ At C0

Summary: views from C0 vicinity show a closer view of Annapurna Middle western footstep (with those 2 characteristic little rock pyramids marked as “d”, which in C0 location are more or less aligned with F and G rocks C0-X rocks field), since perspective of the E ridge plunges almost directly down to the col between Annapurna main and middle summits, only hidden by CX buttress.



Chhang Dawa Sherpa at C1, 2012, preparing summit flags. Indians can be seen on C0, CX hardly emerging below it, as C0-X rocks field including D, E, F and G.



Chhang Dawa Sherpa, 2012. A zoomed view from C1 towards C0 and CX, showing first details of rocks field (with F, G) below it.



Chhang Dawa Sherpa, 2012, during the ascent to C1 via the East Ridge. View shot below C0 (check previous picture for rocks comparison), showing a clear view of CX (check snowy summit details with previous picture for comparison). Nicest view collected so far of rocks field below C0-X.

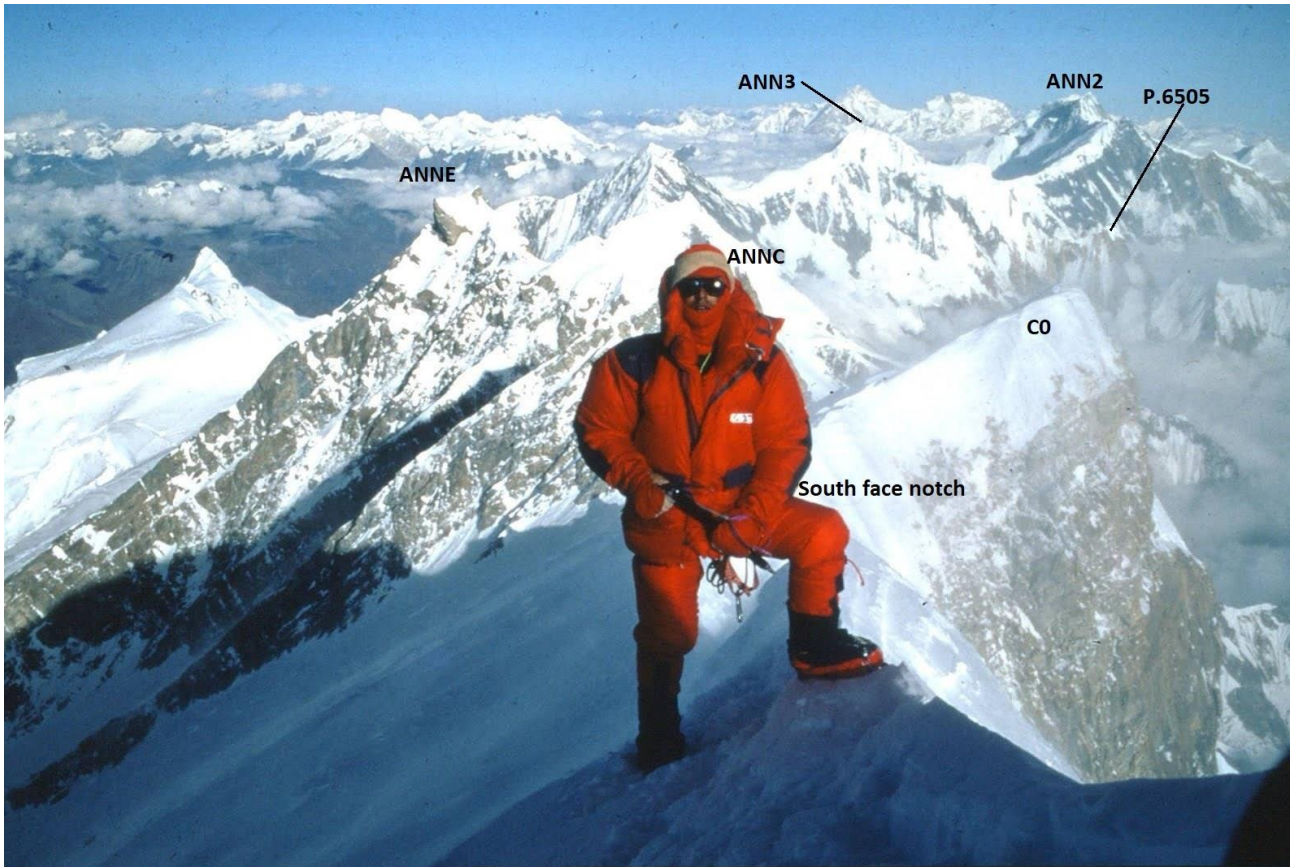


Koreans, 2011. The Kolon Busan team summited in very deteriorated conditions, likely missing the summit ridge to continue westwards. Rocks patterns comparison (from D to K with) previous picture plenty confirm their location.

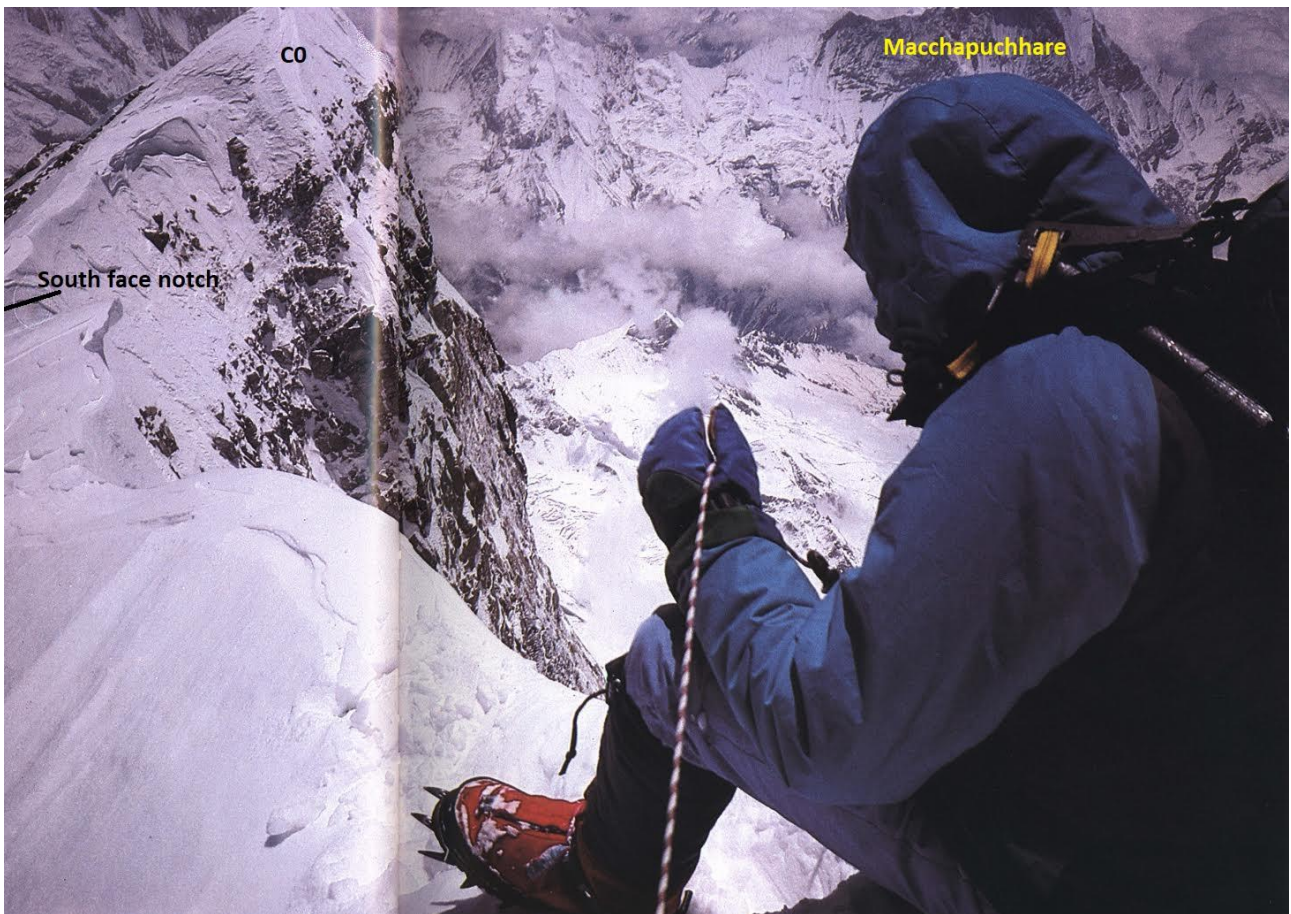
22/ Between C1 and C0

SUMMARY: as long as one can distinguish the eastern foresummit (C0) and its southwest face, it means climber hasn't pushed beyond C1 (hardly visible from C1 or below it on its east side, but still visible).

It happens mostly for people exiting from the south face, stopping shortly after it or below C1. Also for people coming up by the normal route (ending by East Ridge or gully to C1), tendentious thinking C1 to be the summit.



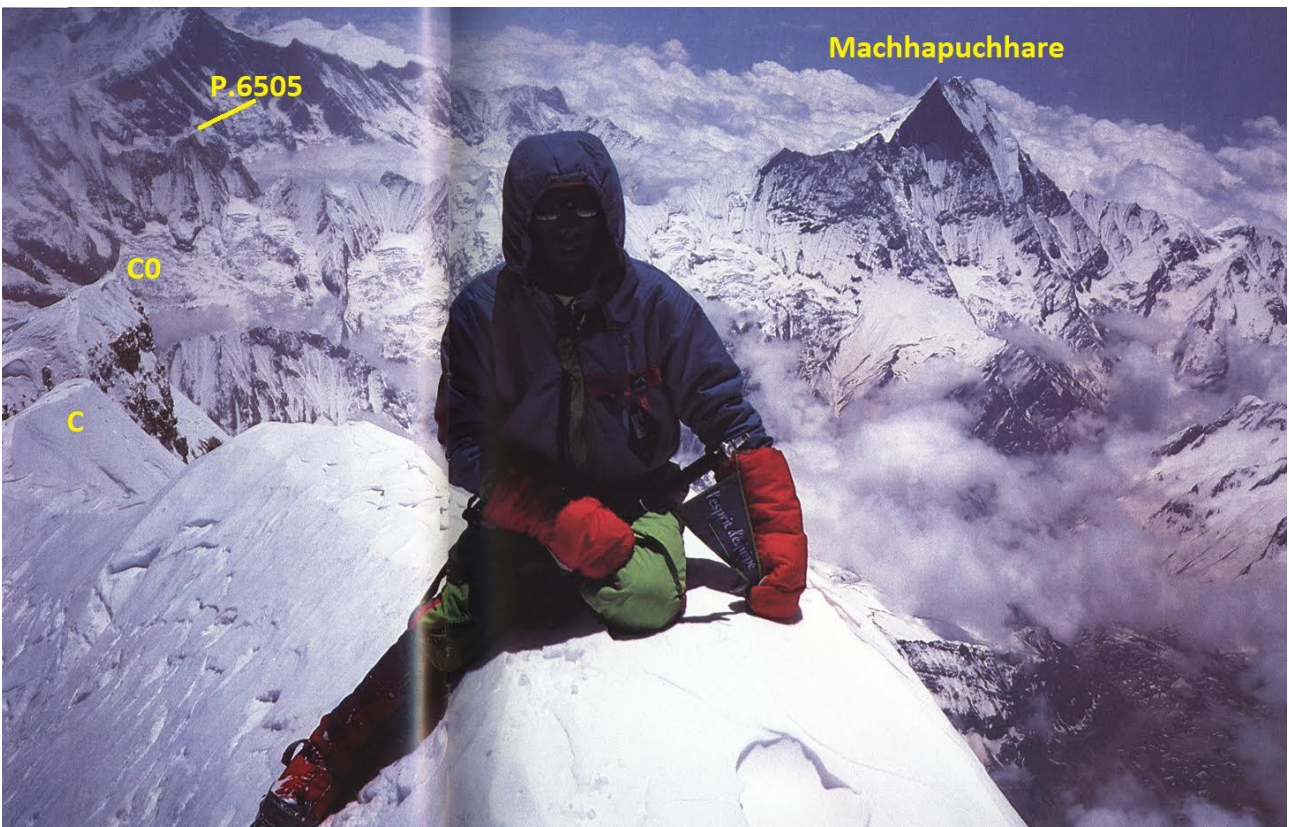
Gonçalo Velez, 1991, at the exit of the south face, **as confirmed in private interview** (had reached C prior to that picture take). Southwest side of C0 is plenty visible on the right side of the climber. South face notch stands straight below the climber. Similar position to Chamoux at south face exit (look at details of ridge coming down from Annapurna III to Machhapuchhare for comparison). Teams exiting from south face don't do it by the south face notch, as shown on next Chamoux picture and confirmed by Graziani/Benoist in 2013 (who by the way found old fixed ropes remnants in the exit).



Chamoux, 1988, south face exit. Teams begins its descent of the south face. Note that the south face notch lies further east, down to C0 (top hidden by the picture) on its west side (col hidden by the picture). C0 southwest rocky face is plenty visible.



Chamoux, 1988. South face notch well visible, C0 hidden by climbers, CX visible. Position located further westwards from the south face exit – the latter lying obviously where the bag can be seen in the background, on the ridge, left of the climbers legs.



Chamoux sitting on the ridge, 1988, C1 vicinity. C0 is quite visible, C also. South face notch and exit are hidden. Straight below it on the left lies the exit of Chamoux team (check with previous Chamoux picture).



頂上から東方を見る。アンナブルナ山群のガンガブルナ、Ⅲ、Ⅳ、Ⅱ峰の向こうにマナスル、P-29などを望む。

Japanese, 1987. View during descent from C1 vicinity towards C0 and C (climber down on its left), in similar position than 2 previous Chamoux pictures despite looking higher (and likely shot from the ridge skyline, not below it on north side). Note the parallel like 2 rock layers on the southwest side of C, which are not visible on previous pictures (as they were shot rather from the north side). C0 southwest side remains well visible behind.



Colibășanu, 2010. Similar location than Chamoux/Japanese/Rao (**Egocheaga confirmed in private interview to have stopped at C1**). Position here shows less bit of C0 southwest side than on Chamoux or Japanese, as the climbers rather stand on the north side. Hard to distinguish “C” bump above right of Colibășanu, when it's better seen on Japanese and Chamoux.



Colibășanu, 2010.



Colibășanu, 2010. a, b, c rocks are apparently roughly located below south face exit. d is located at the beginning of middle/central summit west ridge, as seen on previous pictures.



Rao/Chhang Dawa Sherpa, 2012 at/below C1, **as confirmed by pictures crosscheck**. Indians can be seen on the eastern foresummit (C0) in the background. A, b, c, d rocks still visible. Rocks below C0 also quite visible.



Marco Camandona, 2006, confirmed in private interview to have topped at C1, straight below the cornice (visible in the upper right corner). Camandona took a picture of C2 from that place and made this shot of C0 in the opposite sense. Note that C0 is hardly visible (azimuth on peak 6505m, lying on south ridge of ANN3) but still is showing a long “snowy crack”. Rocks field below C0-X well visible. 0, c and d visible, but not a and b.

23/ Between C2 and C1

Summary: one can easily locate C1 from west: most of time a very sculpted cornice overhanging on the north side. Also one cannot see any more C0 and its rocky southwest side, south face notch or south face exit: it's all hidden behind C1. Same for a,b,c rocks on the north side. There's in fact a "limit of visibility" at C1, even more when standing close to C1 on the ridge. The ridge also clearly "flattens" also in comparison with south face notch-C1 section.



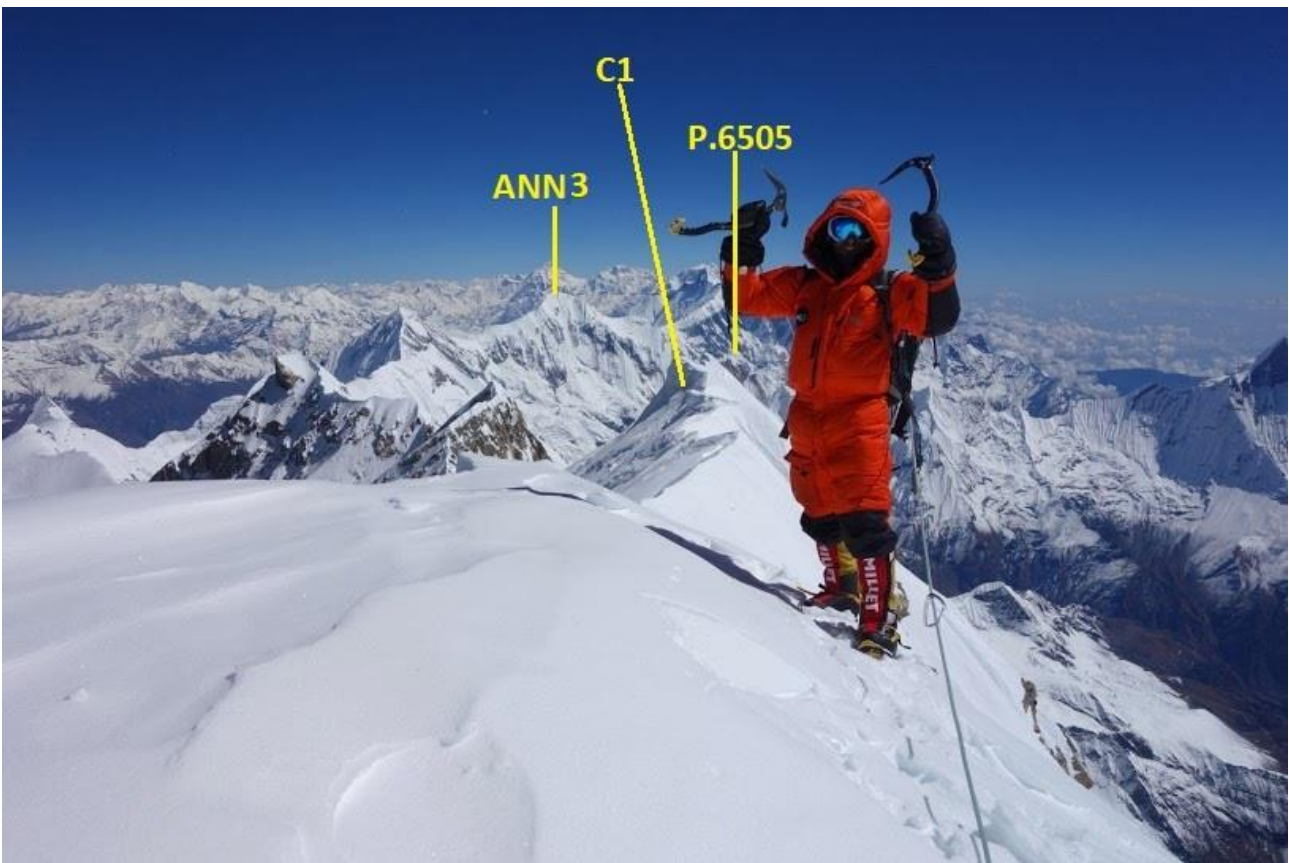
Takeuchi, 2004. Just shot after C1, as they had exited from the north side narrow gully to C1. C0, south face notch and exits or C1 bis all hidden.



Dujmovits, Kaltenbrunner, 2004. Further away after C1, close from C2? **Dujmovits confirmed in private interview to have passed C1 and continue towards C2 short below which they stopped.**



Nives Meroi and Romano Benet, 2017, at C2's north side. C2 lies right to Meroi behind her, ANN2 and ANN4 hardly emerging right of it.



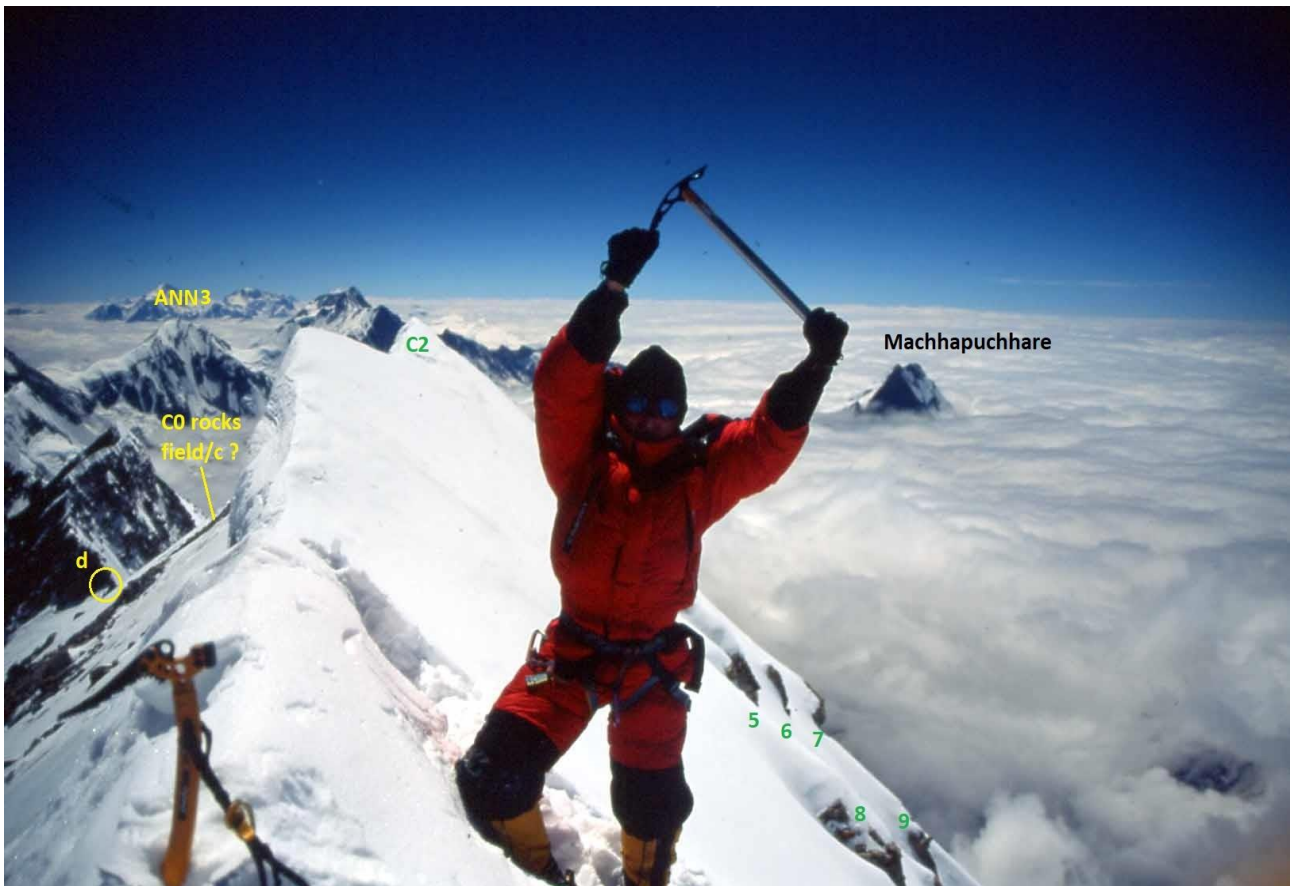
Benoist, 2013. Views from C2/C3-E vicinity, looking towards C1 (with a rare view of that ridge section's south side). Position further west than Viesturs and Dujmovits groups, if comparing C1 proximity. One still can't see anything from the south face exit/notch and C0 profile anymore. In private interview, Benoist explained him and Graziani had summited after using the classic exit from

the south face, contouring C1 by the north side then C2 by the south side to reach some point below C2-C3-E where Benoist stopped. Graziani pushed to C3-W vicinity to check if they had reached the maximum ridge height. Note that summit ridge is more or less aligned with Annapurna II.

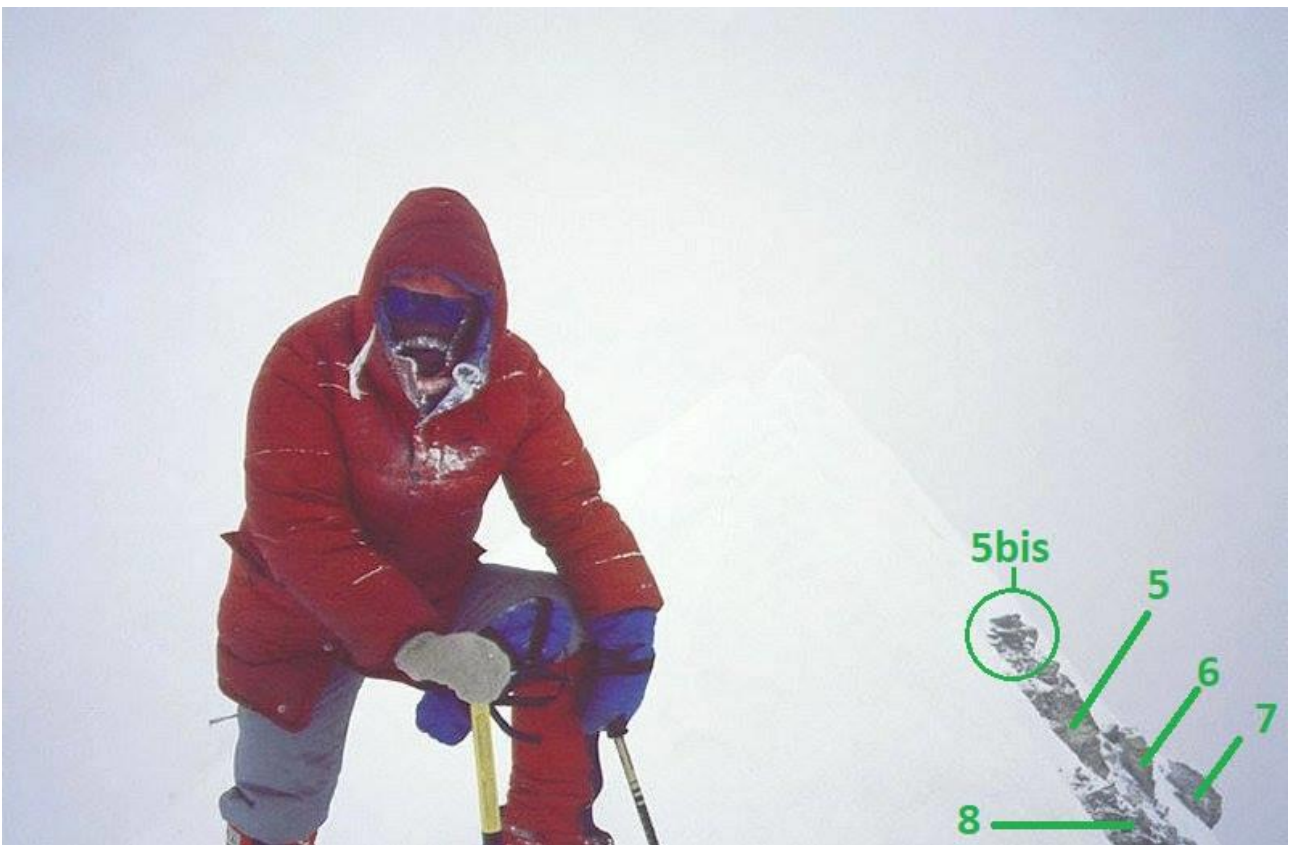
24/ Between C3 and C2

Summary: From C3 coming from normal route' French couloir, the views are often taken below from north side since the ridge can be quite sharpened along with conditions, in any way being very steep on south side at that stage. However it happens some climbers do manage to walk partially on it (Kukuczka 1986, Lafaille 2002, Jaroš 2012), showing nice views of both sides.

Note that it's generally very hard to see further than C2 from that section of the summit ridge, C1 being likely visible from north down to the summit ridge on some clichés (Henry Day, to be confirmed). In fact, C2 hides C1, being higher. C0, south face notch and exit are not visible. The main summit ridge is still more or less aligned with Annapurna II and IV. The best way to recognize C2 place is to recognize those 3 parallel like rocks on its south side (check the lack of recurrence of these rocks with Benoist picture showing south side of C2-C1 section). By "regression", one can locate Kukuczka, Lafaille and Jaroš more or less close from C3-E – whose location by the way remains vague due to a lack of upper south side of summit ridge close aerial views and westwards views from C2.



Lafaille, 2002. Between C3 and C2 in the background. Note the 3 characteristic subridges on the south side of C2, with 2 lower/closer ones. It's in fact the same 3 to be found next on next Kukuczka and Jaroš pictures. Due to the perspective of 5 and 8, it seems Kukuczka apparently went slightly less further than Lafaille towards C2 to make his pictures. Note here also the appearing of d and c or C0 rocks field.



Kukuczka, 1986. This picture was taken after Kukuczka and Hajzer had crossed the ridge from the French couloir towards east. They stopped here at C3 (same pattern than Lafaille, despite one can see the rock above 5 (5 bis) ; one can also notes that 8 seems closer to 5).



2012: Radek Jaroš. One can recognize the aforementioned rocks on the upper part of the south face of C2, despite rocks look further away. In particular one can recognize “5 bis” above 5, with its typical crack line splitting it. Note that Jaroš was also standing on the ridge at C3, likely closer from C3-W: tends to make the cornice (C2) looking higher than on Lafaille and Kukuczka pictures, or is it simply the ridge shape conditions? In fact there’s more background on the south side, with more rocks not visible on both Lafaille and Kukuczka. Nothing visible in the far background (a, c, b, d or C0 rocks field).



Henry Day, 1970. At C3, with C2 visible. Lower further away, overhanging on north side, might be C1.



This additional picture of Henry Day eastwards, compared with Lafaille (presently more from north and not hidden by C2 cornice), do not allow to distinguish C0-X rocks field at all (likely under the snow?) in the far low right corner background, C0 remaining invisible anyway. Means that getting closer from C3-W allows to discover more ground of north side of C0-C1 than from C2, C1 “north ridge” or rather likely ridge slight orientation affecting perspective ?



Luo Jing, 2016. C1 not visible, C3-E likely, rather than C2, lies left of the climber straight on the right of Annapurna II.

25/ Between ridges junction and C3-W

Summary: one can recognize the higher bump of C3-W eastwards, lying above C4 – most of time shaped into 2 distinguished long cornices. Sadly not many views from that perspective were collected so far.

31/ Between ridges junction and northwest shelf

Summary: the summit of Annapurna I doesn't lie at the junction of its 3 main ridges (east, southwest and northwest) but c.30 to 40m to the east of it. Ropes coming up the French couloir at the end of the normal route can sometimes be mistaken by the perspective and believe the top to lie on the right of the couloir, when it's the opposite. Climbers exiting by the southwest ridge reach the summit ridge by the northwest shelf (using the gully in the "head").

Sadly we couldn't get views from proper ridges junction towards W so far.

32/ Between C3-W and ridges junction

Summary: one can see an altitude drop with the whole C4 area, making C4-W always look higher than C4-E. There's clearly appearing on the north side of C4-W and ridges junction a large rock buttress with 2 "steps like" rocks further upon it, plus 2 blocks in front of it. This 3 rock groups lie above a larger striated rocky outcrop. On the south opposite side of C4-W, at same altitude below (like 10 to 15m), lies a characteristic "J" looking rock.

Some teams come by mistake to the northwest shelf or C4-W when pushing too much right on the upper part of the French couloir (looks higher there according to Mingma Gyalje Sherpa, and little easier technically), whereas those pushing straight to the left in fact of the aforementioned rock groups directly join the summit ridge between C4-E and C3-W.



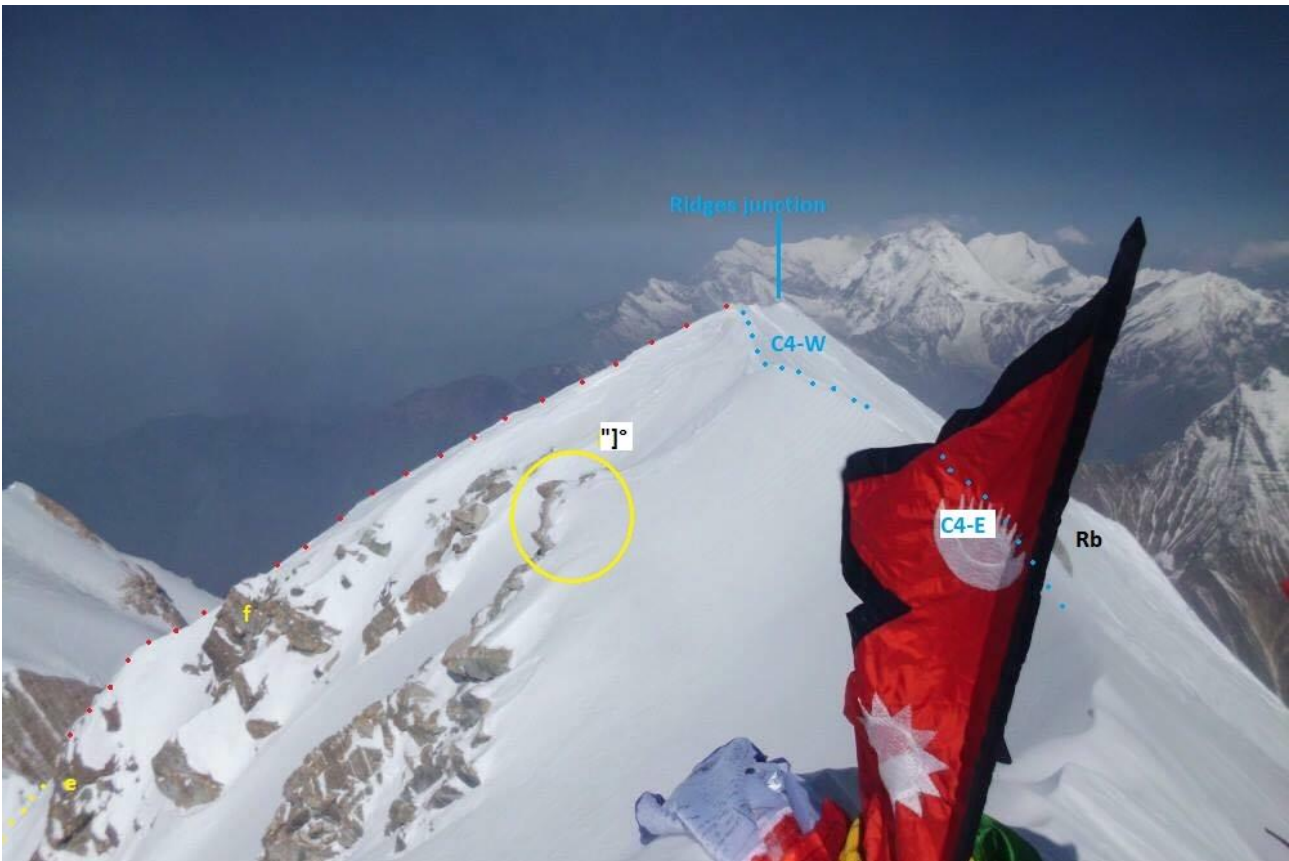
Kim Mi-Gon, 2016, at C3-W. One can recognize onto the right of his left leg, on south side of C4-W the same aforementioned "J" rock pattern.



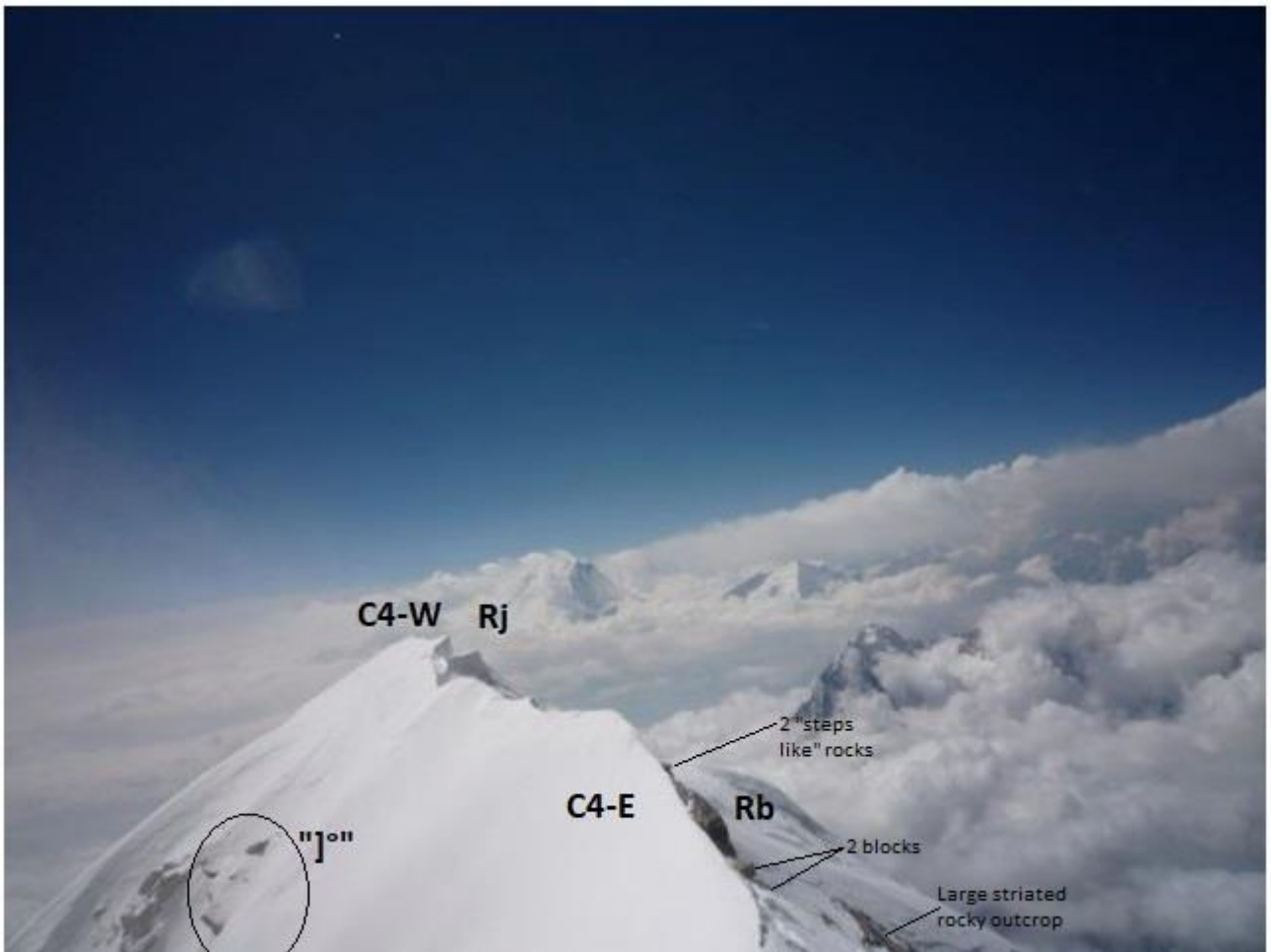
Kim Mi-Gon 2016. One can see on north side of the ridge the same rocks pattern than on Day's picture of 1970: massive rock buttress and "table like" rocks above it. Dhaulagiri I and II visible, plus south ridge beginning of Tukucho.



Henry Day, 1970, at C3-W. Brits likely had quite dry snow conditions back then? Offers here the view of the massive rock buttress lying below C4-W and ridges junction on north side, with these 2 characteristic “steps like” rocks lying above it.



Luo Jing, 2016, at C3-W. An interesting view of the south side of C4 cornices. In particular, note the ridge coming down to C4-W, which isn't to be confounded with the S ridge starting from Ridges junction (check with Graziani picture after and part 41/). Note the “J” below C4-W most eastern boundary ; it's in fact distinguished from the C4-W south ridge further west. Also note the rock buttress down to C4-W on north side, here mainly hidden by the Nepali flag.

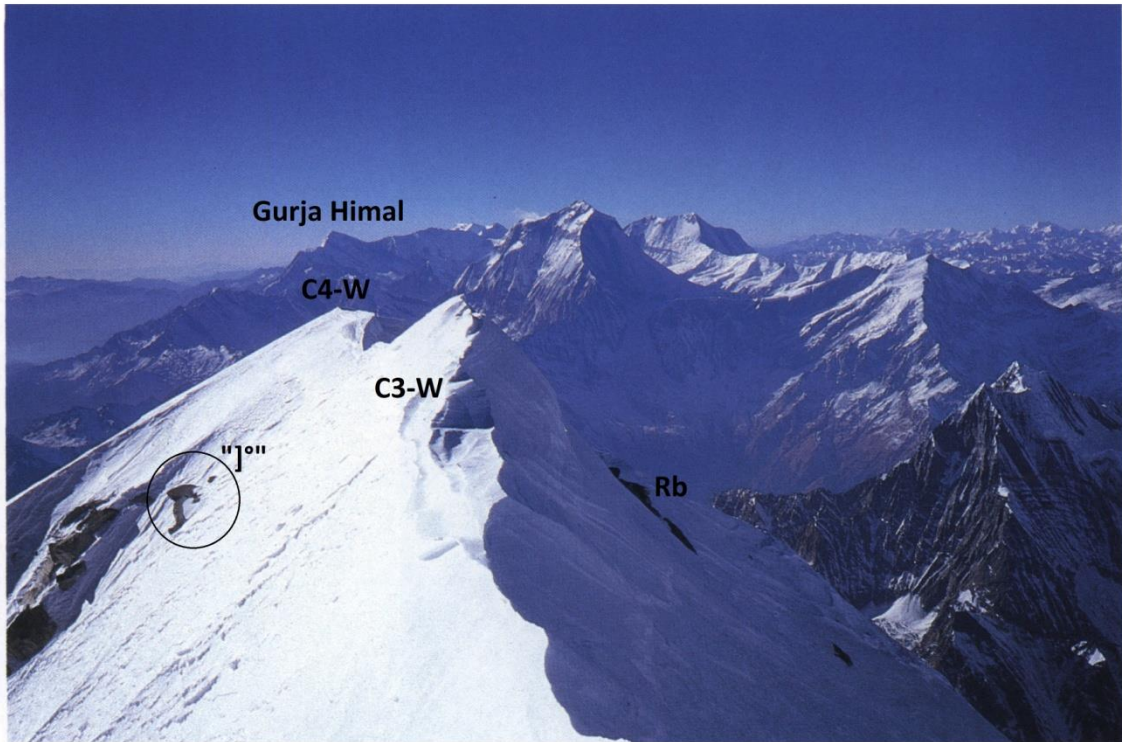


Kinga Baranowska, 2010, at C3-W. Note the rock buttress with “steps like” rocks above it are partially hidden here by C4-E. One can see 1 of the 2 blocks near Rb, plus the large striated rocky outcrop below. “J” rock below C4-W partially hidden due to snow conditions.

33/ Between C2 and C3

Summary: one cannot see the drop of C4 anymore (with C4-E) hidden by C3-W, the latter looking higher than C4-W. One also cannot see easily the rock buttress below C4 on north side, generally hidden by C3. However, C4 south side is still visible, in particular the “]°” rock pattern.

アンナブルナの頂上からのダウラギリ山群。ひと際高いのがダウラギリI峰(8167m)。I峰の正面に弓形に見える尾根が一九七八年秋に群馬岳連隊が初登攀した南東稜。



Japanese 1987, at C3-E. One can see the same characteristic “]°” rock down on the south side, immediately east of this tiny thin sub ridge, itself east from C4-W south ridge. Ridge from rock buttress to C4-W is partially hidden by C3-W.



Jean-Christophe Lafaille, 2002, at C3-E. Man standing on C3-W is Alberto Iñurategi. One can see really well the same “J” rock pattern and thin sub ridge down to C4-W on the south side. Rock buttress and “table like” rocks hidden on north side by C3-W. Still C4-W aligned with Gurja Himal.



Iñurrategi, 2002, walking from C3 towards C2. Same configuration: “J” visible but still nothing from north side hidden by C3.



Yannick Graziani, 2013, a view below C2-C3-E on south side towards west. One cannot see the Dhaulagiris but just Gurja Himal' beginning. Note the tracks of Graziani to C3-W, up right to him, where he came alone to check the height difference. Note in the background the characteristic snowy pinnacle located on the main south ridge coming down from ridges junction, with those 4 parallel layers below it. Straight above the

pinnacle, note that the snowy ridge isn't anymore the proper aforementioned south ridge but instead a separate south ridge coming down to C4-W (see part 41/). g is for "j". Be cautious that perspective from below the ridge change height impressions about cornices, C3-W looking as high as C4-W here.

34/ Between C1 and C2

Summary:

At a first glance, hard to distinguish C2 from C1 from that eastern direction. Most of times C1 looks like a mushroom (sometimes big, sometimes not) overhanging on north side, C2 most of times looking less overhanging (on north side also) and sculpted despite intrinsically as high. However, C2 can sometimes be even more sculpted than C1 on north side (for instance like in 1984 during Loretan-Joos traverse)! So better to always ask for the variant used by teams in the final stage of their climb towards summit ridge.

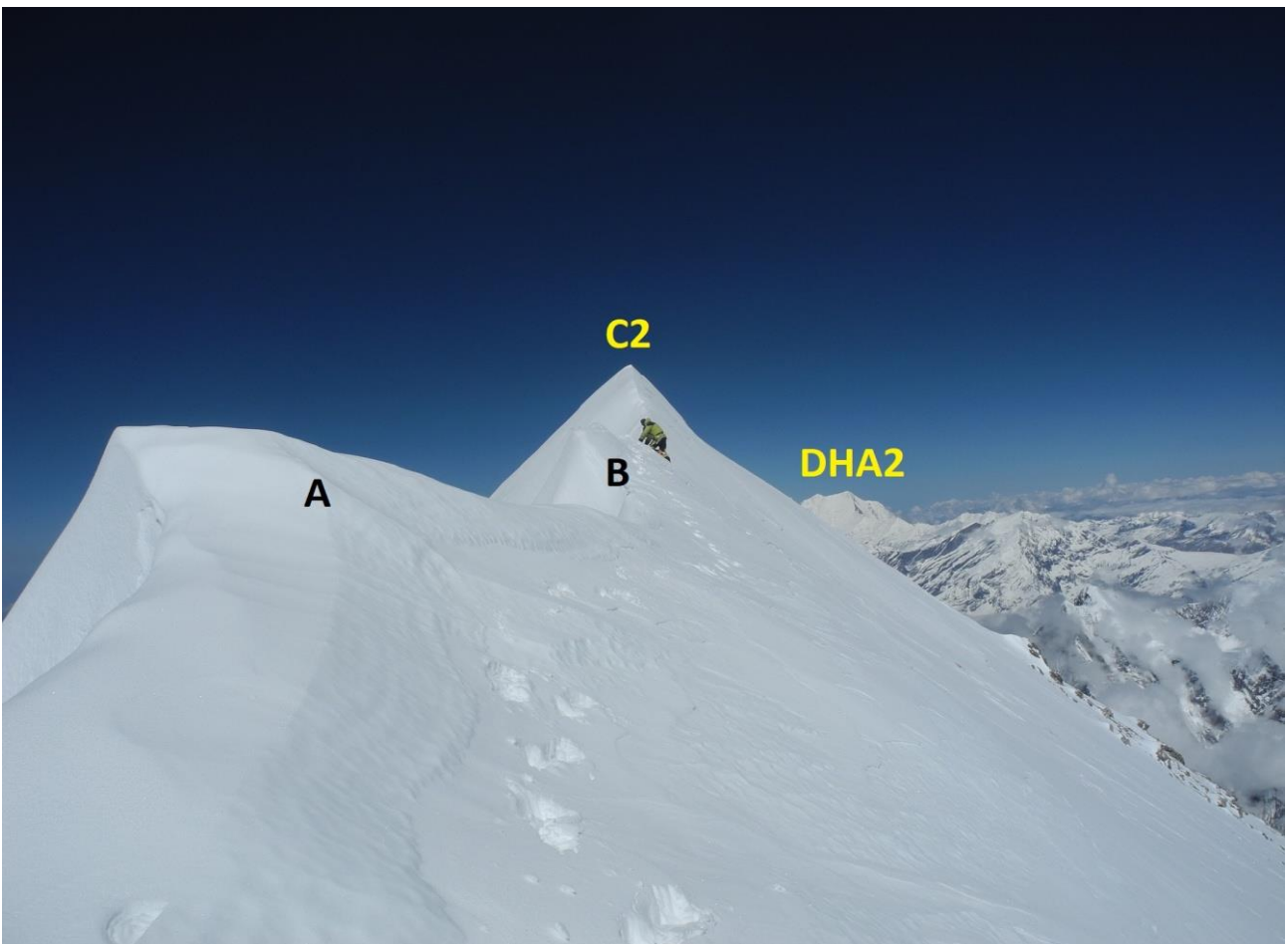
Second criterion lies in a snowy sub ridge on south side hold by a characteristic rock, which can be observed from C1 vicinity looking at C2.

One also cannot see C3 and C4 from here, including characteristic rocks patterns behind it. DHA1 hardly emerges from the ridge line, whereas from DHA2 included northwards everything is visible.

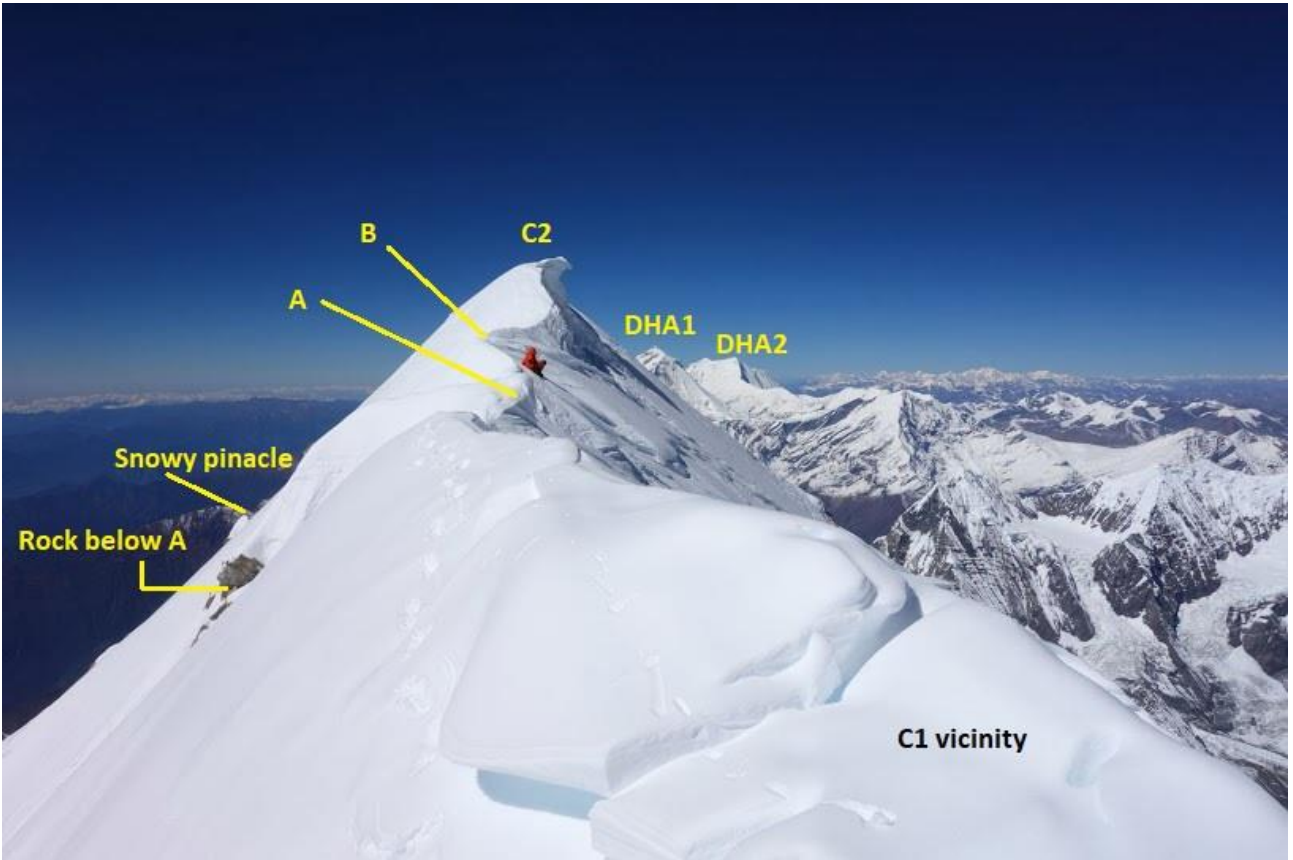
One can recognize the snowy pinnacle of the south ridge hardly emerging from C2 south ridge.



Veikka Gustafsson, 2005. With Ed Viesturs, the duet used gully to C1, traversed C2 until C3, then came back to C2 for a pictures session. Please note that rocks below on the N ridge are much lower than rock buttress, “steps like” rocks etc.



Nives Merio/Romano Benet, 2017. Benet doing the tracks towards C2, picture shot from C1 vicinity. DHA1 not visible, since picture is shot close from C2, the latter hiding more surrounding background landscape as climber gets close from it.



Graziani, 2013, a clear view of C2 from C1 vicinity, showing Graziani calling his mother for his 40th birthday! Dhaulagiri I and II, Tukuचे are visible, Gurja being hidden by C2. Note the rock below A on the south side. In the background hardly emerges the characteristic snowy pinnacle of the southwest ridge.



Alberto Zerain, 2017, from C1 vicinity. A similar view to Graziani’s showing Zerain and Co coming down from C2. Meroi and Zerain team crossed the ridge from C1 to C2 after using gully to C1 exit. Note the same block down to A in the left foreground (here a closer view than Graziani’s), then on the ridge skyline the snowy pinnacle on the south ridge. The rock above snowy pinnacle is “e” rock, lying down to C4-W (see 4.1/). One cannot see anything of C2, C3 or C4 from here. DHA1 partially visible and DHA2 mostly visible. Please eventually note that the rocks right to Zerain on the north ridge aren’t to be confounded with the ones below C4-W/ridges junction.

35/ Between south face exit and C1

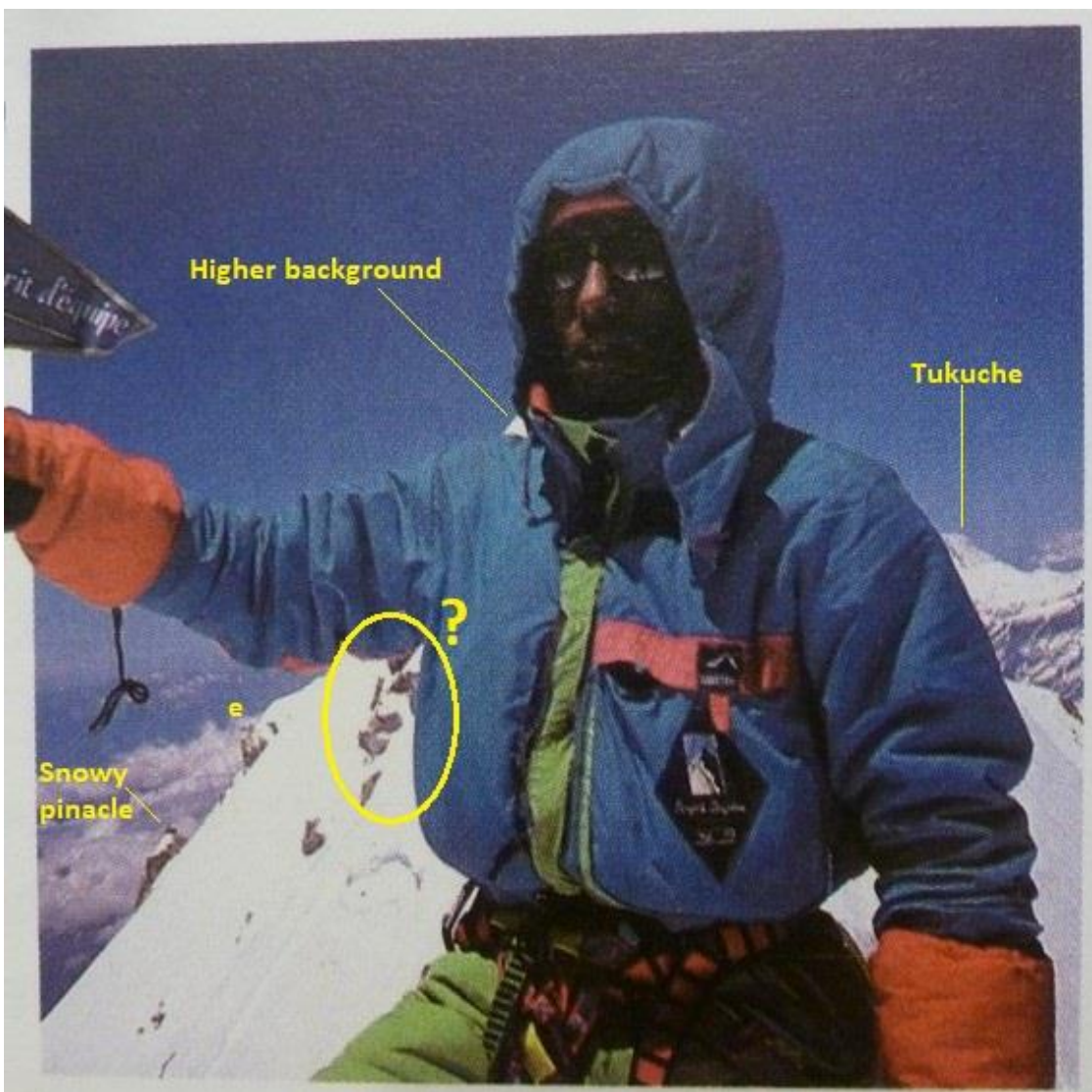
Summary:

The main criterion to distinguish C1 from C2 is that arrival from east to C1 shows a **steeper ground** than to C2 (height difference between C2 and C1 is c.7 meters for 70m in length, when it's c.20m between C1 and the south face notch for a 100m in length – based on DLR data), making arrival to C2 looking almost like a flat ridge in comparison.

Sadly we couldn't collect so far clear overview of that perspective.



Teruo Saegusa, 1987. According to the caption, “from that point reached at 14h48, the team would reach summit (at C3) 30min later at 15h17”. The Japanese had indeed exited out of the south face at “Sfe”, then would traverse the whole summit ridge towards C3 from there trough out C1.



Benoît Chamoux, 1988, at C1 vicinity.

Note the higher summit ridge continuing above Chamoux's right shoulder.

One can see on Chamoux right side the south ending of Tukuche peak, with in its own background Dhaulagiri II northeast ridge beginning.

Snowy pinnacle of the south ridge is also visible, with much likely the C4-W south ridge rocky prow above it (e).

Below Chamoux right armpit, one can see a bunch of rock which could be those below C2 fore bump (to be confirmed).

It's as if the perspective offers more opening view of the summit ridge south side here, likely due to a ridge overall orientation changing? For now we haven't found more views whether from C0 or C towards west.

Summary : hard to obtain much pictures in that perspective, since we couldn't access more pictures from the teams who summited to that point.



Indians, 2012, excerpt from their official video. C1 hardly emerges above C0 cornice, as plenty confirmed by Sherpa picture of the team below – confirming by the way Chhang Dawa atop of C1.



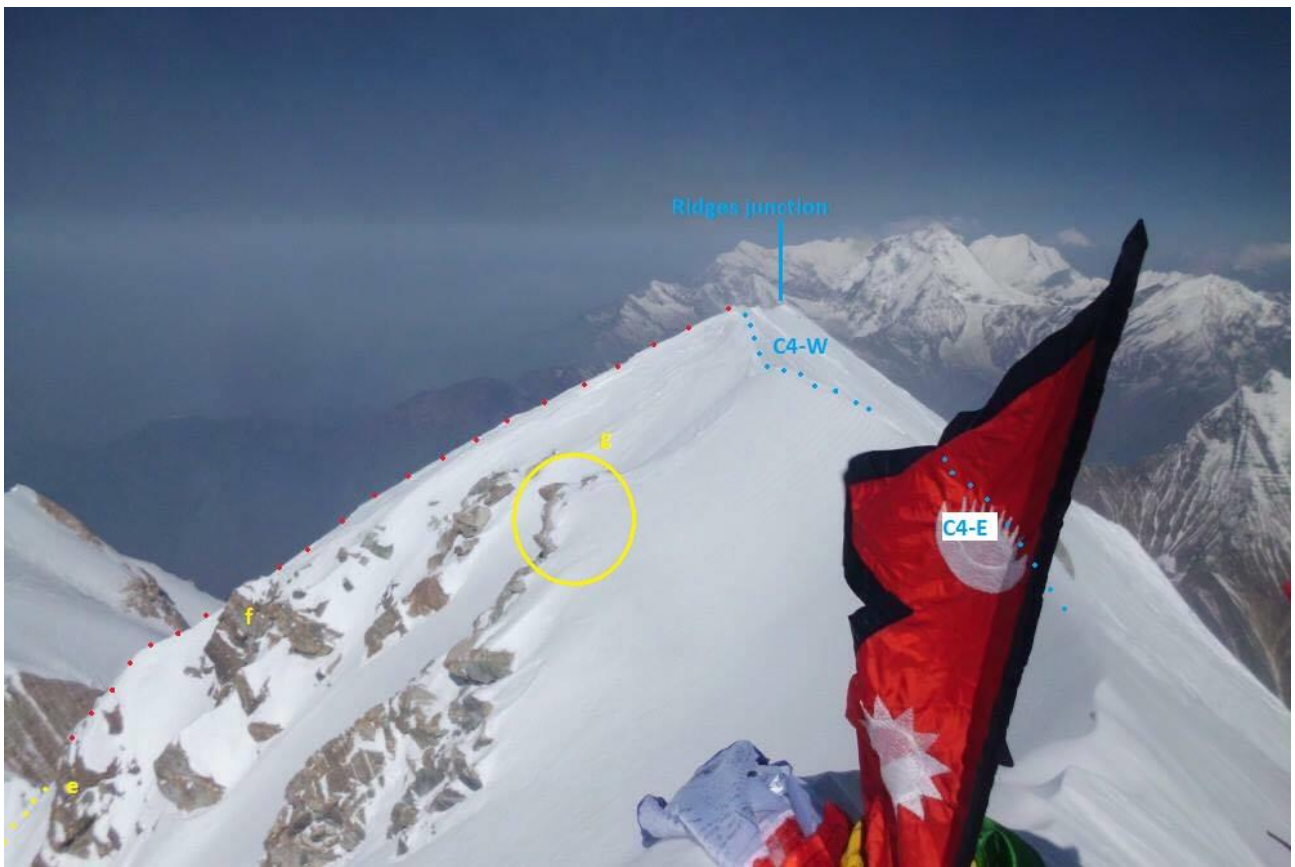
4/ Topographical detailing :

41/ About C4-W/ridges junction area

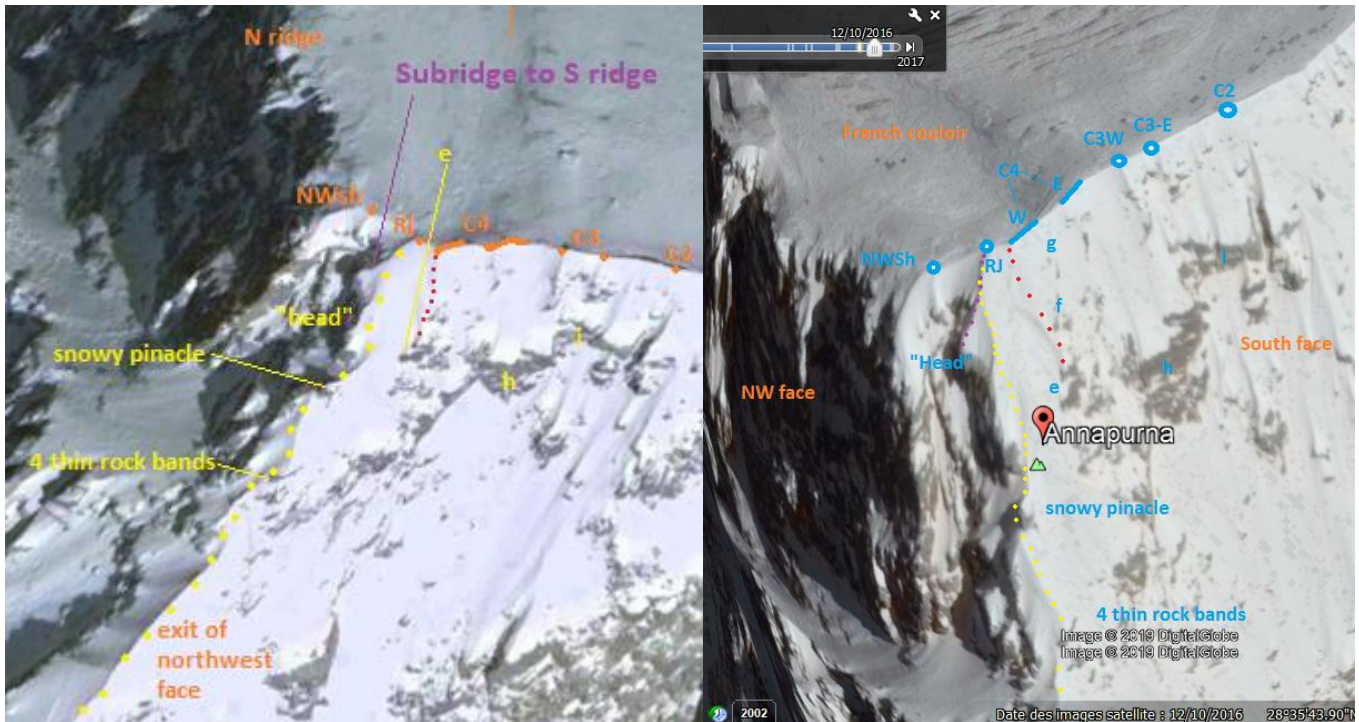
Perspectives of this area are quite mistaking, particularly considering its south side. From C3-W, one believes at first there's only 1 main south summit ridge. However a crosscheck between Luo Jing, Yannick Graziani and satellites pictures clearly show that there are 2 parallel like ridges, the ridges junction lying at the most western one of these.



Yannick Graziani resting below C3. In the background, the main south ridge (yellow dots) coming down from « ridges junction » disappears behind the closer south ridge coming down south from main C4-W.



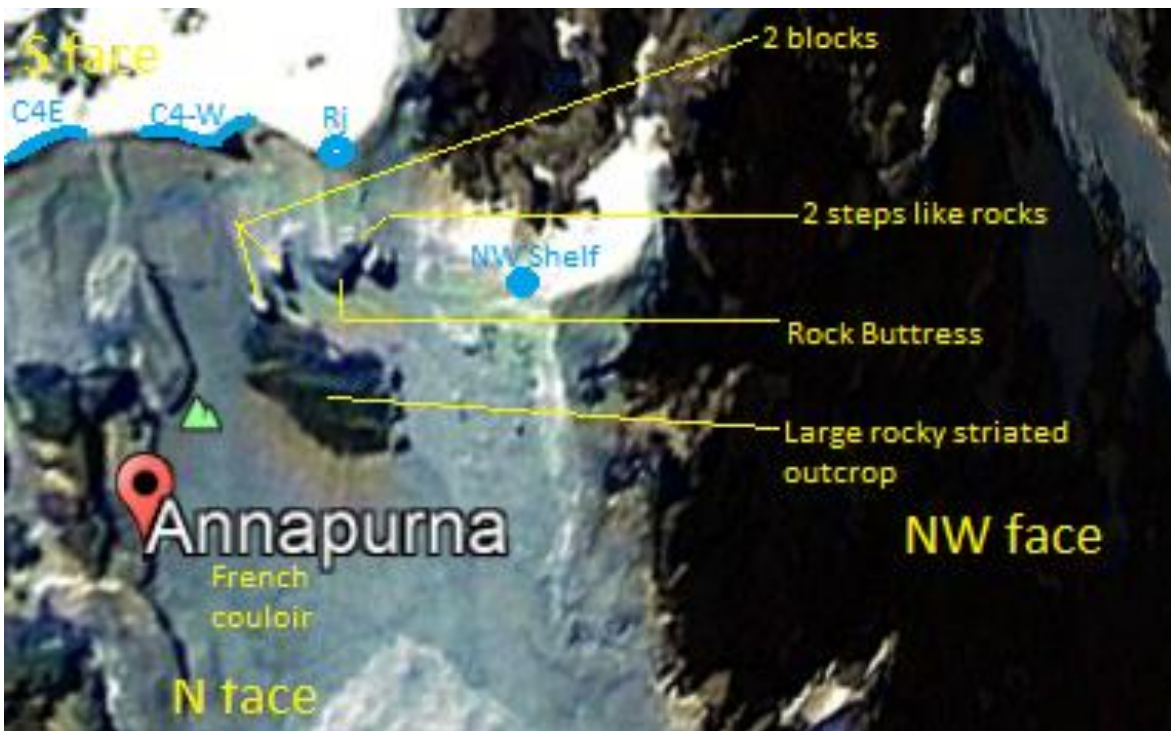
Luo Jing at C3-W. A slightly higher view than Graziani's. Check with Graziani's picture for comparison : same rocks patterns to be found in e and f and between it.



This Google Earth views from 2002 and 2016 show the 2 aforementioned ridges (red and yellow dots) plus the sub ridge (purple dots) shown in the summit video of Mingma Gyalje Sherpa, which has a common departure with main south ridge. Only g is hard to locate on these pictures, being much smaller than e, f and h, i. Haven't recollected pictures so far of the face/couloir (?) located between main south ridge and C4-W south subridge, which could be done with an aerial survey of the whole south part of the summit ridge.

42/ About rock groups below C4-W on north side

Perspectives from C3-W hardly allows to estimate below which point of the summit 2 blocks, rock buttress and 2 « steps like » rocks are located. Google Earth views allow to estimate this, like shown on next pictures : tt all lies down below C4-W (the latter including ridges junction).



Two pictures show particularly well the « articulation » between the large rocky striated outcrop and upper 3 rock groups.



Karničar brothers, 1995. The duet descended a few meters down the top to make their summit pictures, due to dangerous summit cornice condition. One can compare the perspective here with next picture, excerpt of a video by João Garcia shot c.10m below the top in 2010, where he also stayed after reaching C3-W to make various videos.



Note the similarity between « 2 blocks » shape on both pictures. 2 blocks appears well as 2 distinct blocks on Google Earth image, whereas 2 « steps like » blocks don't ! This all could be further and better confirmed with more detailed pictures of the area.

5/ In conclusion : for a tolerance summit zone on Annapurna I ?

It happens that most of the past teams whose data could be analyzed so far spread onto the whole ridge between C0 and northwest shelf, their summit place being mostly determined by the final variant they had taken. The present article doesn't intend to undervalue nor dismiss any past claims in any way : until now, a very few information would be available for climbers to know WHERE the strict topographic summit was lying. Only recent facilities provided by Internet could allow to compile enough historical of the available data to understand and reconstruct the topography of such complex summit zone.

For future climbers, the best advice to be sure reaching the summit of Annapurna I would be to traverse the whole summit ridge from C1 to C4, climbing up by the east ridge or gully to C1 and down by french couloir (or vice versa) ? However, history shows such traverse was never done (Lafaille, Meroi, Viesturs made partial ones...), climbers instead going down by the same ascent variant. For climbers using the normal route, the safest way to reach the top remains to take the French couloir, then exiting left atop of it.

If past ascents should definitely remain all accepted for the aforementioned reason, from now shouldn't a « tolerance zone » be established for future climbers, knowing the topographic present information available, so that these can choose their summit in full consciousness? Wouldn't it be appropriate for such a debate to be opened within mountaineering community, between topographical and mountaineering needs, rigor and tolerance principles ?

For keeping HD, necessary to develop tolerance zone to be able to cope with any teams summit claims. Any team which claims ANN1. Once in TZ will be counted, whatever elite or not.

Additional topographic details :

One can distinguish 3 main summit zones :

C2-C3 : 45m in length.

C1-Rj : 175m in length, altitude drop < 8m.

C0-NW shelf : 305m in length, altitude drop < 26,8m.

Despite DLR data shows C2 and C3 to be the strict topographical summit, the height differences are less than 8m between C2 and ridges junction/C1 - altitudes which can all by the way vary in height alongwith cornices shape (in which extent?). Interviews of some climbers who reached C, C1 or ridges junction for instance show so far that for them it seemed fully appropriate to stop at such points, further possibly higher bumps not seeming that tall enough to necessitate a further effort - what all sounds understandable knowing the treacherous perspectives up there. In that sense, it also has to be reminded that pictures perspective from the same place can change a lot alongwith cameras devices used.

6/Ascents details of the expeditions quoted in this study (Himalayan Database expedition ID noticed at the end)

On 20 May 1970 summited Henry Day and Gerald Owens at 11hAM by normal route and French couloir (ANN1-701-02).

On 3rd of February 1986 summited Jerzy Kukuczka and Artur Hajzer at 16h by the normal route and French couloir (ANN1-864-02).

On 20 december 1987 summited Noboru Yamada, Toshiyuki Kobayashi, Yasuhira Saito and Teruo Saegusa at 15:15. Climbed the British route on the South face with variant, first winter ascent of the south face (ANN1-874-03).

On 10 May 1988 summited Soro Dorotei at 9:30, Josef Rakoncaj at 10h, Stephen Boyer at 11:00 Benoît Chamoux, Nicolas Campredon at 11:30. Climbed the British route on the South face (ANN1-881-01).

On 23rd October 1991 summited Ingrid Baeyens, Mariusz Sprutta, Gonçalo Velez. Had climbed the British route on the South face (ANN1-913-05).

On 29 April 1995 summited Carlos Carsolio, Andre and Davorin Karničar at 8h25AM by normal route and French couloir (ANN1-951-01).

On 16 May 2002 summited Jean-Christophe Lafaille and Alberto Iñurrategi at 10hAM after ascent by the east ridge and exit by the French couloir (ANN1-021-04).

On 28 May 2004 summited Hirotaka Takeuchi, Ralf Dujmovits, Gerlinde Kaltenbrunner at 15h30. Climbed the normal route ending by gully to C1 then to C1-C2 area (ANN1-041-02).

On 12 May 2005 summited Edmund Viesturs, Veikka Gustafsson at 14:00 using normal route and gully to C1, stopping at C3. *“Near top went up a small gully to summit ridge. Ridge has numerous bumps and to be sure got to highest which was farther west ; when reached in and looked back realized it was highest”* (ANN1-051-02).

On 12 October 2006 summited Silvio Mondinelli and Pemba Rinji/Rinzi Sherpa at 12h, Marco Confortola at 12h40 and Marco Camandona at 13h. Had used the normal route with gully to C1 (ANN1-063-01), stopping at/below it.

On 27 April 2010 summited Horia Colibășanu, Martin Ramos, Jorge Egocheaga at 11h40 (east ridge to C1, go and back) ; João Garcia at 13h30 (with Pasaban team by French couloir) at C3-W ; Peter Hámor, Piotr Pustelnik at 13:45 (same as Garcia route, with Kinga Baranowska) (ANN1-101-08).

On 24 October 2013 summited Yannick Graziani and Stéphane Benoist at 11hAM after first proven ascent of Steck route on the south face (ANN1-133-02) to C3-E vicinity.

On 1st of May 2016 summited Kim Mi-Gon and 2 Sherpas at 7h53AM by normal route and French couloir (ANN1-161-04) at C3-W.

On 11 May 2017 summited Nives Meroni, Romano Benet, Alberto Zerain and Jonatan García Villa at 9h30 AM by normal route and gully to C1, followed by a traverse of the summit ridge to C2 (ANN1-171-01).

Acknowledgements :

8000ers.com team, Richard Salisbury.

Stéphane Benoist, Marco Camandona, Chhang Dawa Sherpa, Henri Day, Ralf Dujmovits, Jorge Egocheaga, Yannick Graziani, Peter Hámor, Ferran Latorre, Nives Meroi and Romano Benet, Edurne Pasaban, Henri Sigayret, Anton Skarja...

Claire Chapoutot and Michiko Nishijima for Japanese translations.