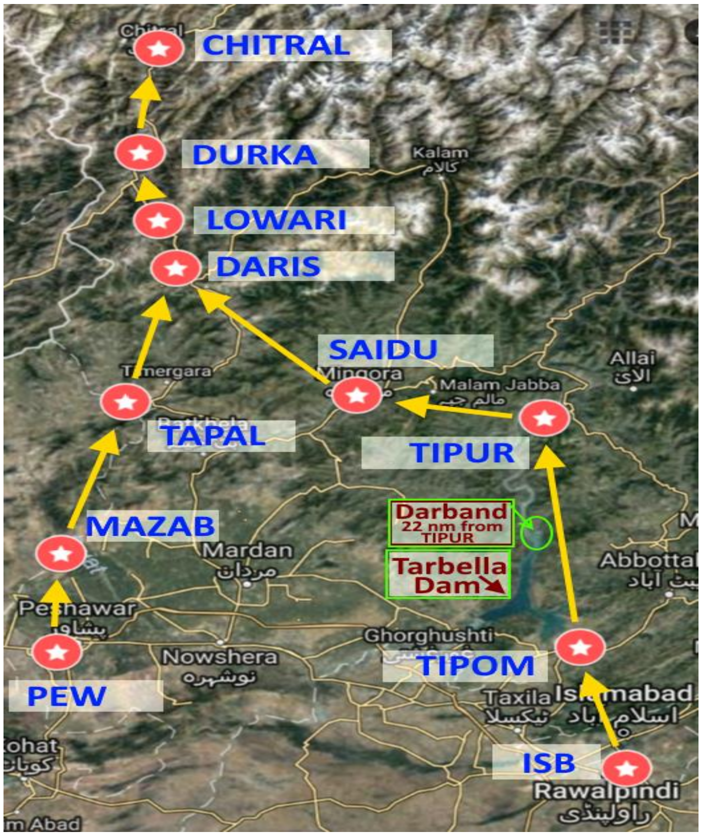
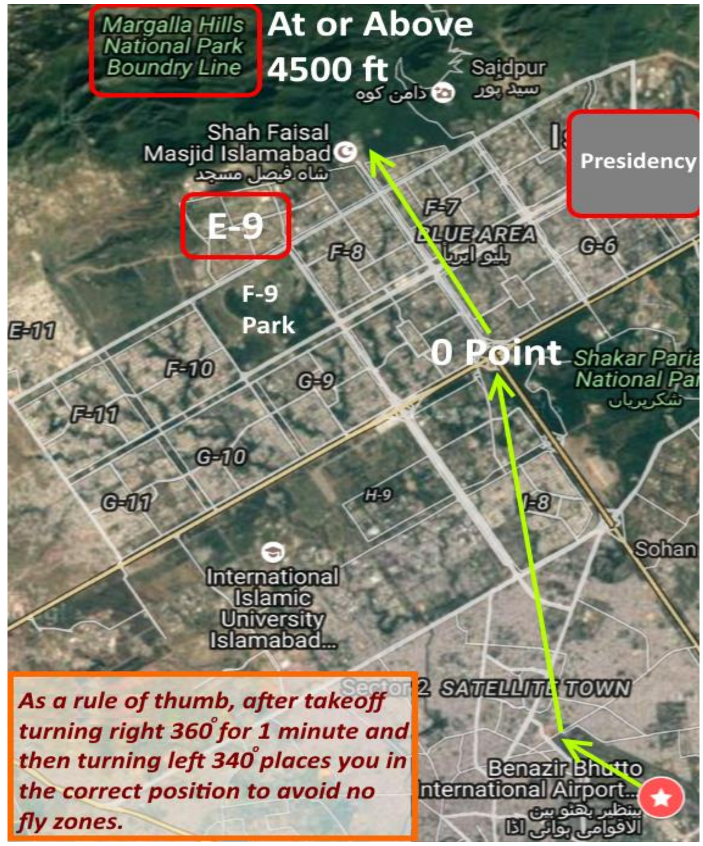
ATR – CHITRAL OPERATION

Last Updated: ***11th May 2017***

Contents

ROUTE:


CHITRAL
DURKA
LOWARI
DARIS
SAIDU
Mingora
TAPAL
Timergara
TIPUR
Malam Jabba
Kalam
Allai
MAZAB
Mardan
Darband
22 nm from TIPUR
Tarbella Dam
Abbottabad
Peshawar
PEW
Nowshera
Ghorghushti
TIPOM
Taxila
Islamabad
ISB
Rawalpindi
Kohat


Margalla Hills National Park Boundry Line
At or Above 4500 ft
Saidpur
Shah Faisal Masjid Islamabad
Presidency
E-9
F-7
BLUE AREA
F-8
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Shakar Parian National Park
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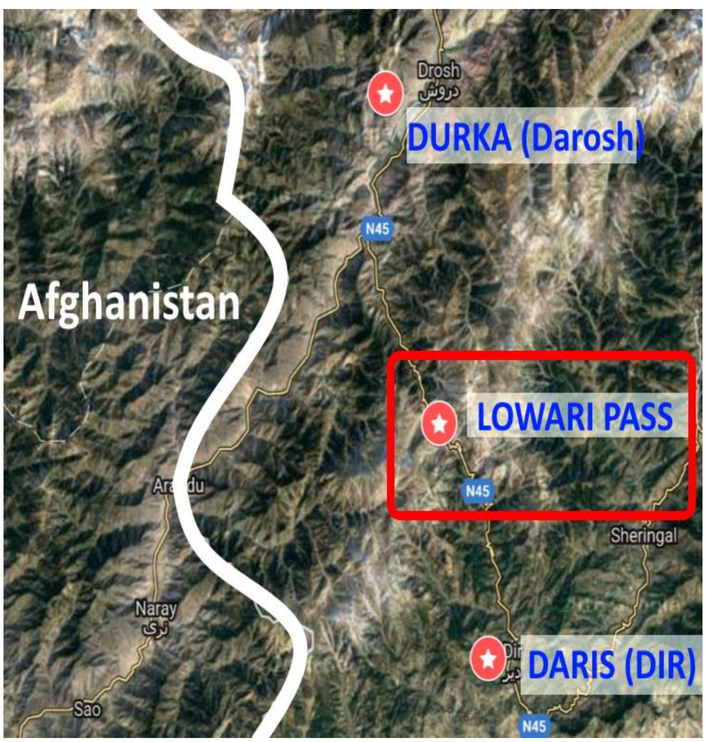
I-8
Sohan
International Islamic University Islamabad
SATELLITE TOWN
As a rule of thumb, after takeoff turning right 360° for 1 minute and then turning left 340° places you in the correct position to avoid no fly zones.
Benazir Bhutto International Airport


Drosh
DURKA (Darosh)
N45
Afghanistan
LOWARI PASS
N45
Sheringal
Naray
Sao
DARIS (DIR)
N45


CHITRAL
Chitral - Mastuj Rd
Chitral - Mastuj Rd
N45
Chitral
Attaliq Bazar
N45

GENERAL GUIDELINES:

- Cumulus cloud development encountered in summers is likely to intensify during the course of the day and the tops may rise very quickly. Triggering mechanism in this case being the orographic uplift (rising ground forcing the air upwards). Storms form when a general flow of moist unstable air passes over higher terrain, such as a ridge line or mountain range. Such storms often form in a line along the ground feature and are therefore more challenging to avoid than single cells.

- Stratified clouds in winters are likely to lower and settle on the mountain tops and the valley.

- Surface temperature during summers is known to increase rapidly after sunrise. Be careful in assessing the temperatures used for calculations of approach climb weights and TOGW for subsequent departures.

PRE REQUISITES:

- VFR Operation, with visual ground contact at all times.

- Operation above overcast layer of clouds over high terrain is not allowed.

- Do not depart if:

    - Destination visibility is less than or is anticipated to be less than 5 km on arrival.

    - Destination ceiling (overcast) is 6000 AGL or lower.

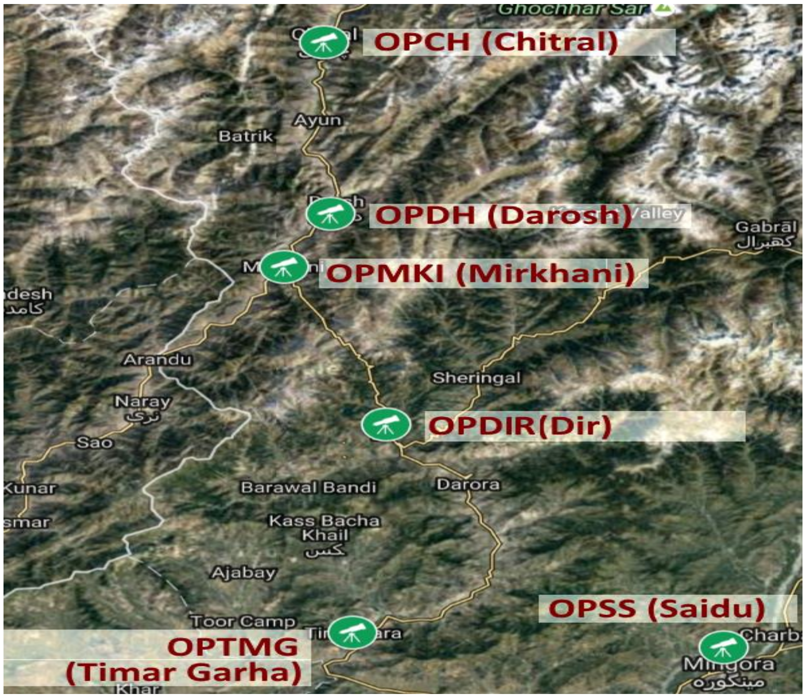
    - There is drizzle or rain at destination with hill tops not visible.

    - Wind Component is more than 15 knots for takeoff from runway 20.

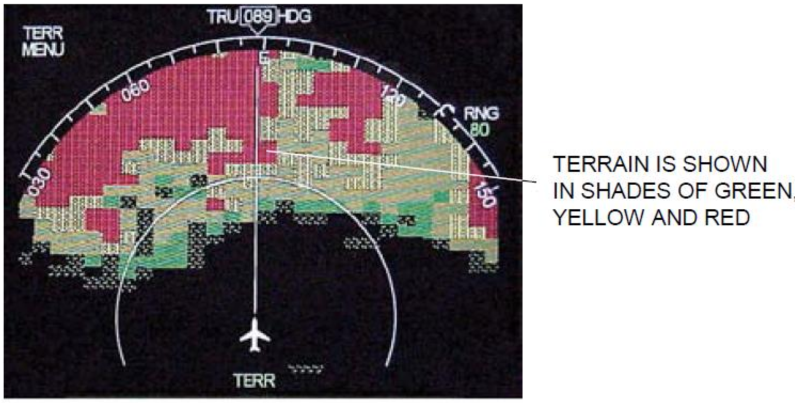
- HF radio serviceability is not mandatory since VHF contact is available throughout the flight.

- Weather for Chitral and Lowari should be obtained before departure. Pak Met Site (www.pmd.gov.pk/cp/mtr.asp).

WEATHER OBSERVATORIES:

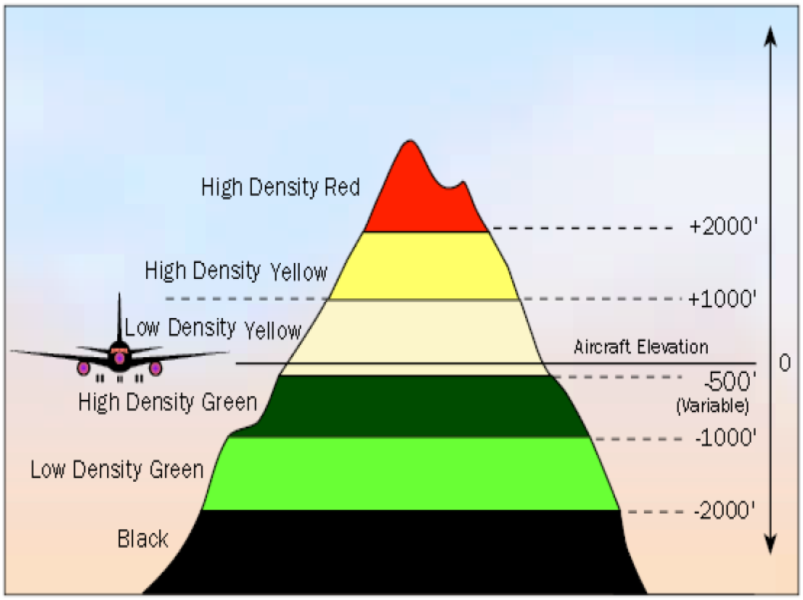


HONEYWELL EGPWS (MK V & MK VII)



- If no terrain data is available in the terrain database, then this area is displayed in a low-density magenta color.

- Terrain more than 2000 feet below the aircraft, or within 400 (vertical) feet of the nearest runway elevation, is not displayed (black color).



- The transition between green and yellow is below the aircraft in order to account for altimetry and/or terrain/obstacle height errors.

- Essentially, **any yellow or red painted terrain is at, or above the aircraft's altitude** and appropriate terrain clearance needs to be provided.

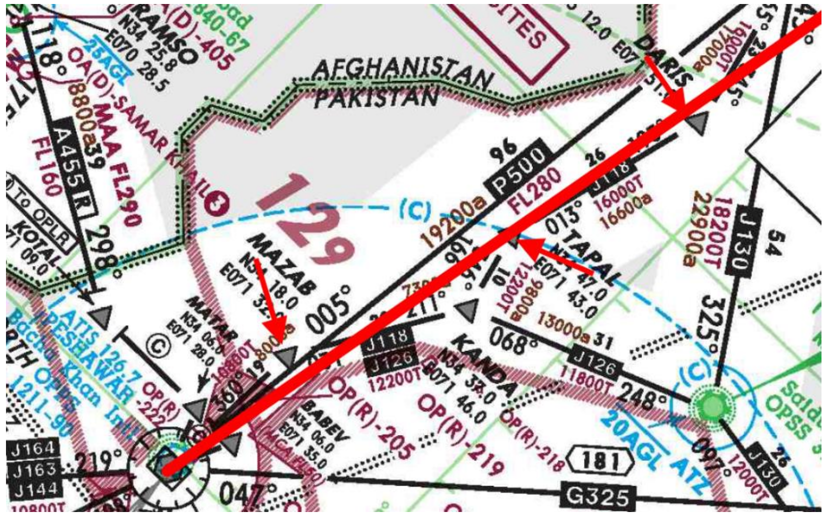
- Digital values representing elevation are based on the range selected (terrain in view). Bigger value is the highest terrain/obstacle elevation whereas smaller value is the elevation for the bottom of the lowest color band.

- The following table indicates the terrain awareness display colors and elevations:

Color	Indication
Solid Red	Terrain/Obstacle Threat Area – Warning.
Solid Yellow	Terrain/Obstacle Threat Area – Caution.
High Density Red Fill	Terrain/Obstacle that is more than 2000 feet above aircraft altitude.
High Density Yellow Fill	Terrain/Obstacle between 1000 and 2000 feet above aircraft altitude.
Low Density Yellow Fill	Terrain/Obstacle 500 (250 with gear down) feet below to 1000 feet above aircraft altitude.
Solid Green (Peaks Display)	Highest terrain not within 500 (250 with gear down) feet of aircraft altitude. May appear with dotted yellow terrain when the aircraft altitude is within 500 feet (250 feet with gear down) of terrain.
High Density Green Fill	Terrain/Obstacle 500 (250 with gear down) feet below to 1000 below aircraft altitude.
Low Density Green Fill	Terrain/Obstacle that is 1000 to 2000 feet below aircraft altitude.
Black	No significant Terrain/Obstacle.
Magenta Fill	Unknown terrain. No terrain data in the database

ISB / PEW – CJL:

- After position MAZAB monitor PS VOR radial 010 which should not be crossed to the left after position TEPAL.



- If Lowari is blocked, no attempt should be made to cross the ridge from the western side due to close proximity of Afghanistan border.

- Single engine ceiling must be derived before crossing the Lowari Pass which is the critical point on this route.

PRESSURIZATION FAILURE:

- BEFORE LOWARI:
  - Descend to 10,000 feet maintaining visual contact with ground.
  - Return to PEW.

- AFTER LOWARI:
  - Descend in valley to 10,000 feet maintaining visual contact with ground.
  - Land at CJL.

COMMUNICATION PROCEDURE:

- No. 2 VHF should be set on Northern Area Common Frequency 123.4 MHZ.

- No.1 VHF is to be set on 121.5 MHZ once released by Cherat Control.

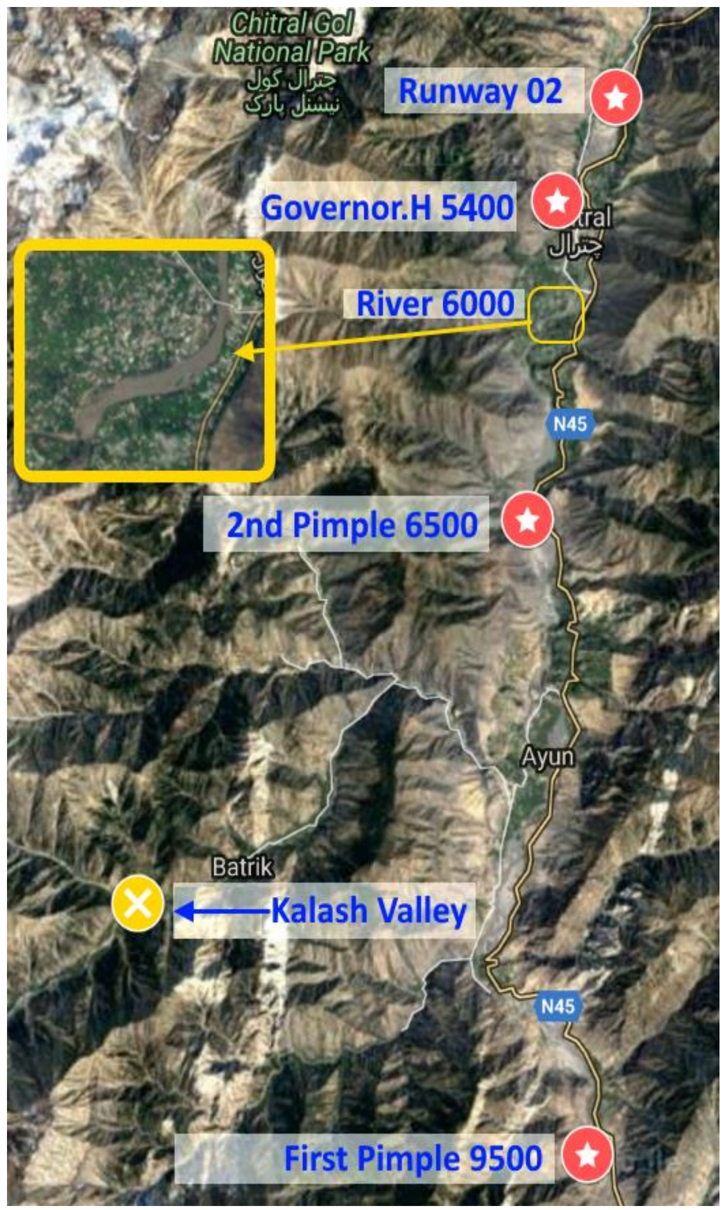
- If HF contact is not established with Chitral:
  - Maintain contact with Cherat.
  - Changeover after Lowari when in VHF contact with Chitral (122.50 MHz).

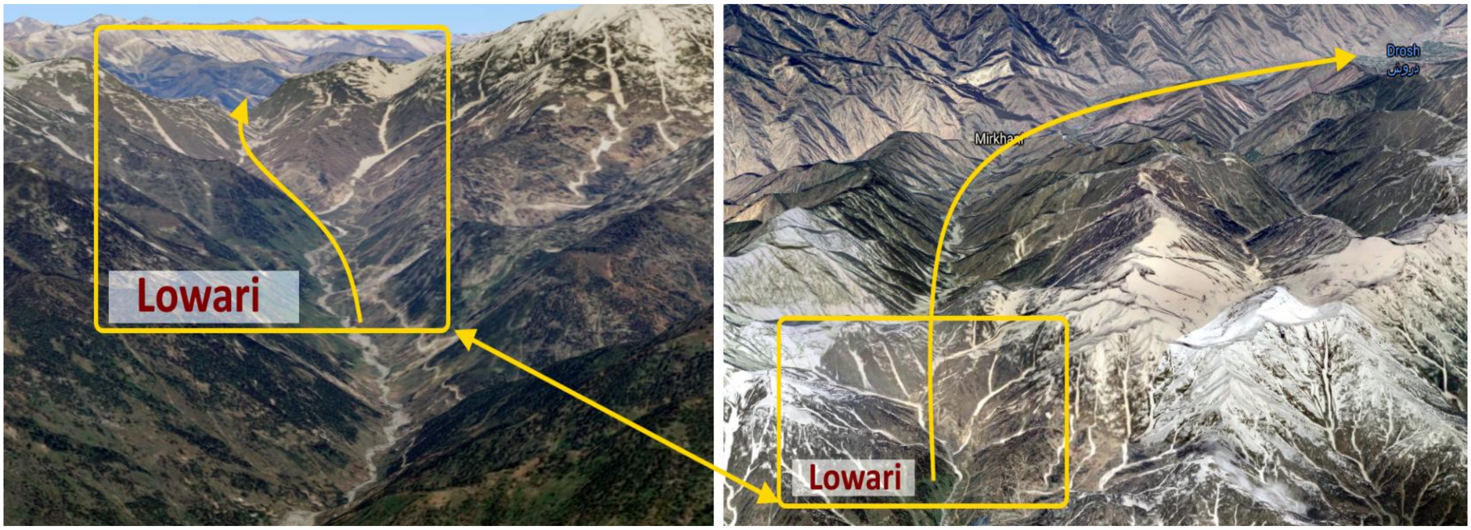
TERRAIN AROUND LOWARI PASS:

DESCENT PROFILE:

- After crossing Lowari, obtain latest Chitral weather. Assess the valley before commencing descent.
- Check Heights:

Land Marks	Speed (knots)	Height (feet)
Crossing Lowari	170	14,500
DURKA (Darosh)	170	11,500
First Pimple Hill	170	9,500
Abeam Kalash Valley	White Bug (Flaps 15)	Profile
Second Pimple Hill	White Bug (Flaps 15, Gears Down)	6,500
River	VmHB 25 (Flaps 25)	6,000
Governor House	VAPP (Flaps 35)	5,400




Lowari
Lowari
Drosh
دروش


First Pimple Hill


Chitral
چترال
Second Pimple Hill

- Approximate (rounded off) Gradients and Rate of Descent *(from 14,500 to corresponding check heights)*:

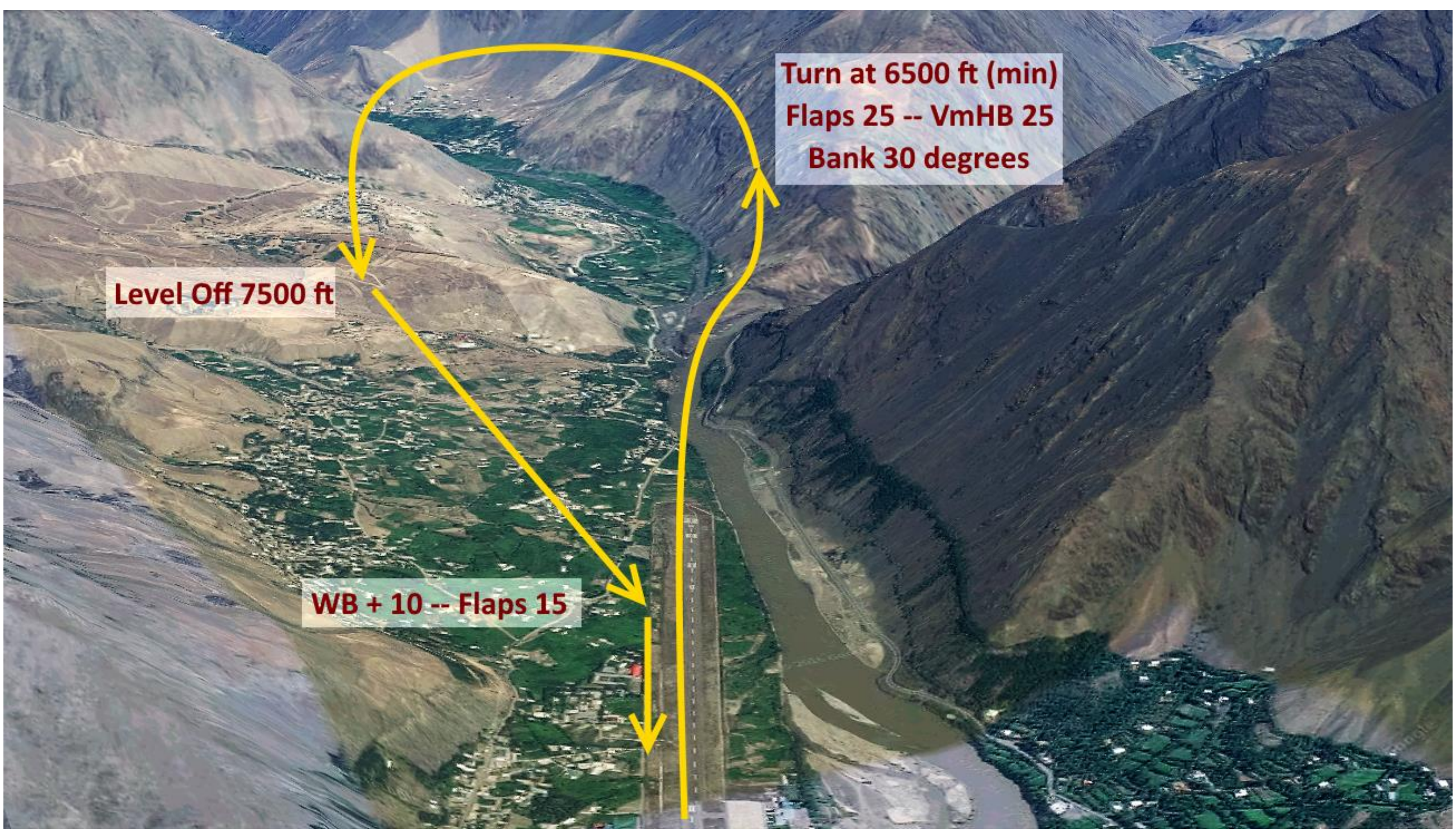
Markers	Gradient (degrees)	Ground Speed (Knots)	ROD (fpm)
LOWARI – DURKA	2.1	170	600
MIRKHANI – DURKA	3.7	170	1100
DURKA – First Pimple	4.2	170	1300
1st Pimple – 2nd Pimple	2.6	170 reducing to 135 between the points	700
2nd Pimple – River	1.4	135	400
River – Governor House	3.2	120	700
Governor House – RWY 02	3.5	110	700

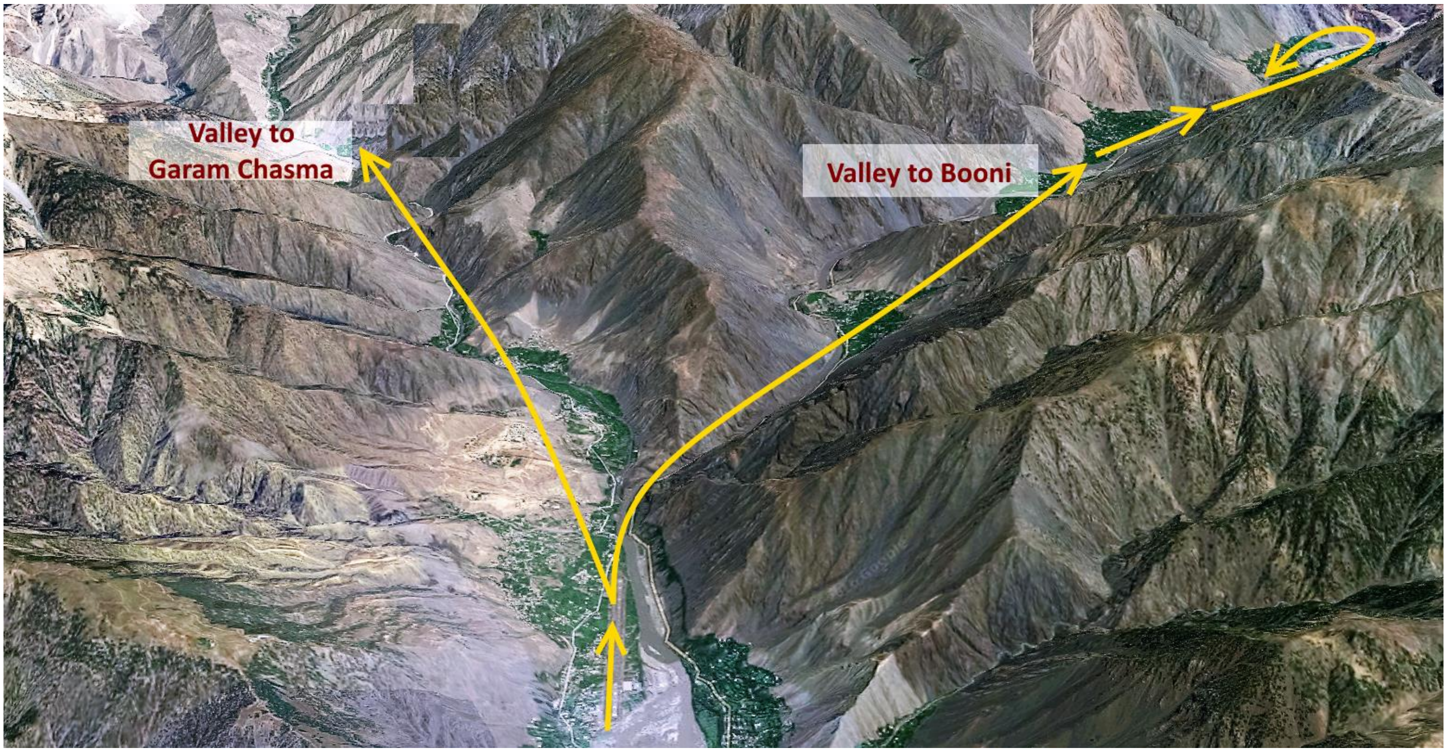
LANDING RUNWAY 02:

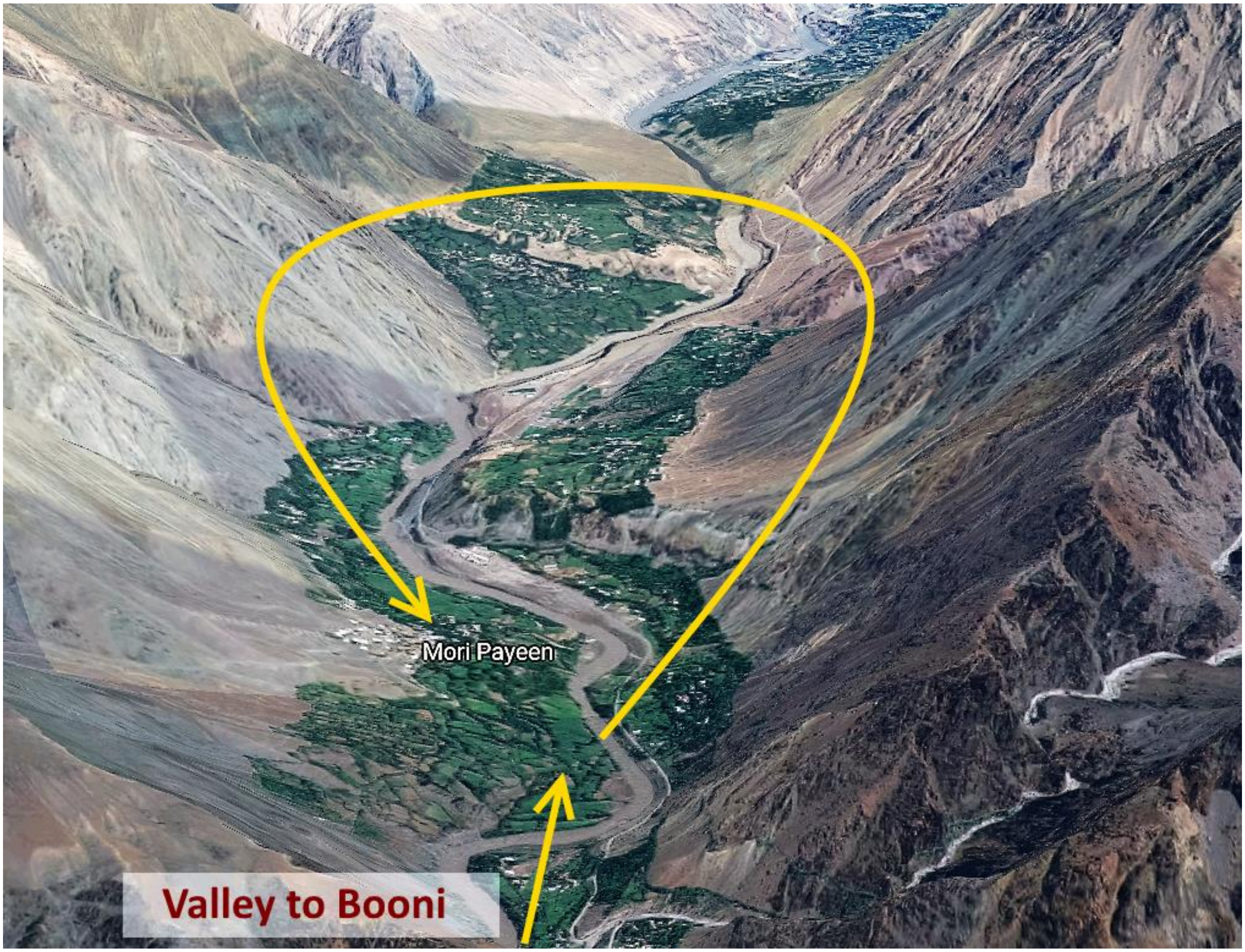
- Only Runway 02 is available for landing.
- Do not land if head wind is more than 15 knots, keeping in view the subsequent departure.
- OPCH / CJL:
    - Runway Direction 02 / 20
    - Runway Dimension: 5800 x 98 feet
    - Elevation 4920 feet
    - TWR: 122.5 / 121.8

GO AROUND RUNWAY 02:

- AVOID ANY GO AROUND BELOW 500 FEET AGL.
- In case a go around below 500 feet AGL becomes imminent, follow normal go around procedure except:
  - At 1000' AGL (acceleration altitude) maintain flaps 25 and speed VmHB 25.
  - Climbing throughout, drift to the right side of the valley and come close to the mountains on the right.
  - At 6500 feet indicated, initiate a left climbing turn maintaining VmHB25 and 30º bank.
  - Make a 180º turn and level off at 7500 feet.
  - Completing the turn, accelerate to white bug plus 10 and retract flaps to maintain flaps 15.
  - Abeam Kalash valley make a right turn and adjust for another approach.



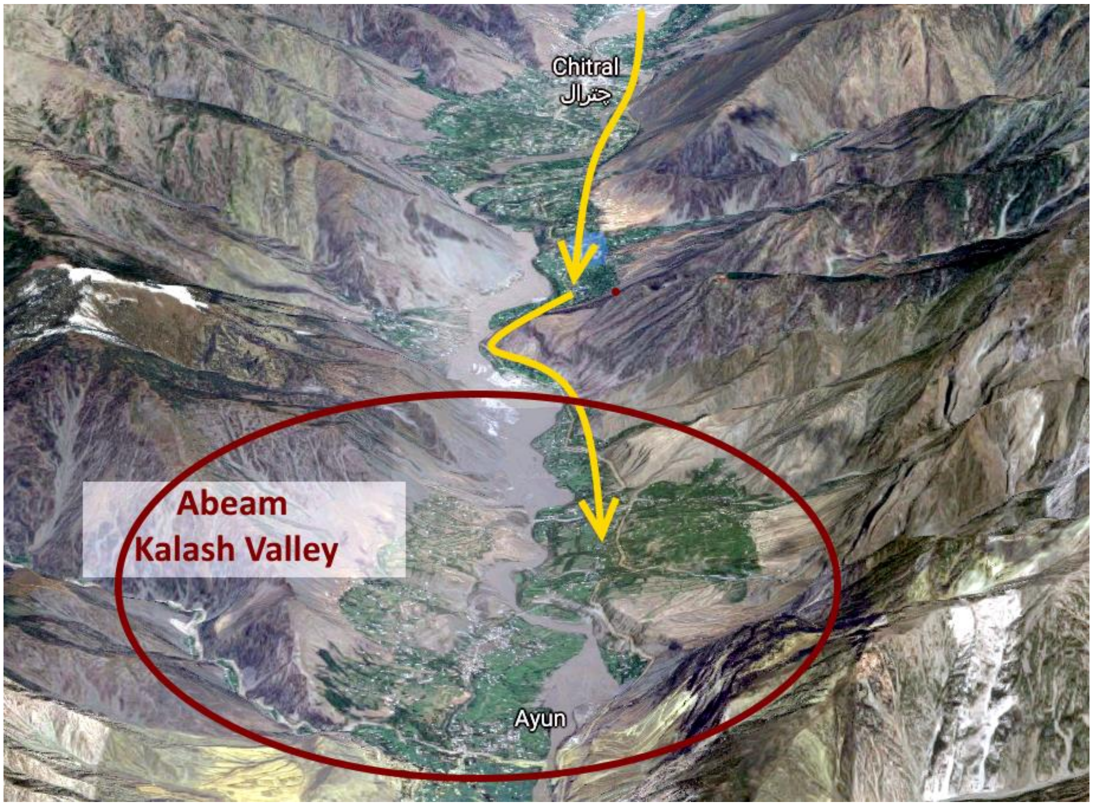

Valley to
Garam Chasma
Valley to Booni

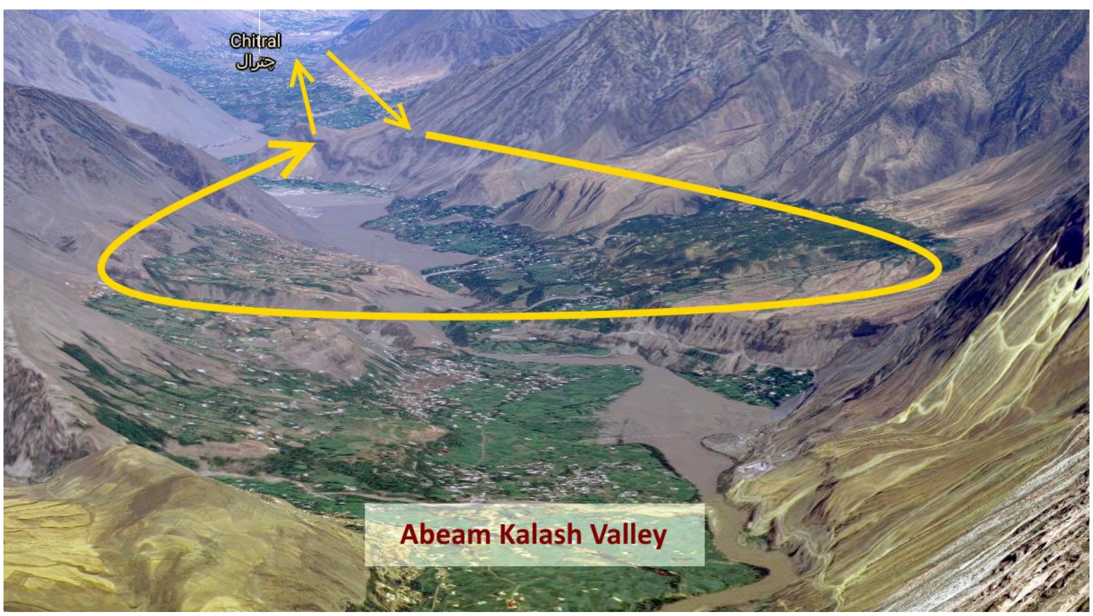

Mori Payeen
Valley to Booni

CJL – ISB / PEW:

- No attempt should be made to takeoff from R/W 20 if the surface wind results in a tailwind or headwind component of more than 15kts (in case a land back is required following an engine failure after takeoff).

- In case of becoming asymmetric after takeoff from runway 20:
  - Select gears up and drift to the left.
  - Keep climbing at white bug plus 10 and maintain flaps 15.
  - Abeam Kalash valley, make a right turn and position for another approach.





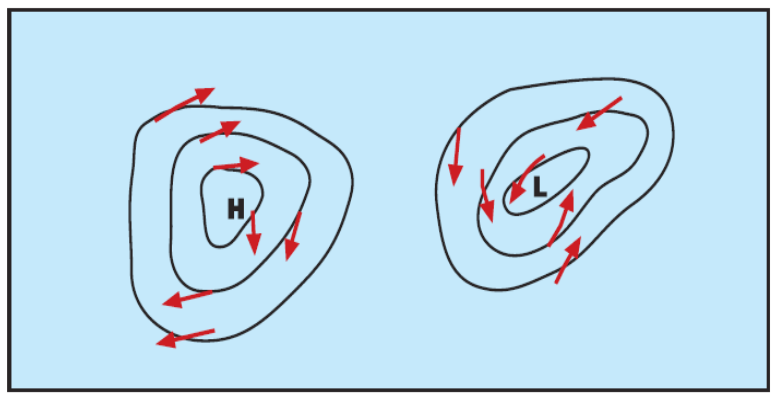
TOPOGRAPHICAL EFFECTS ON WIND ***(credit: navcanada.ca)***

(a) Lee Effects

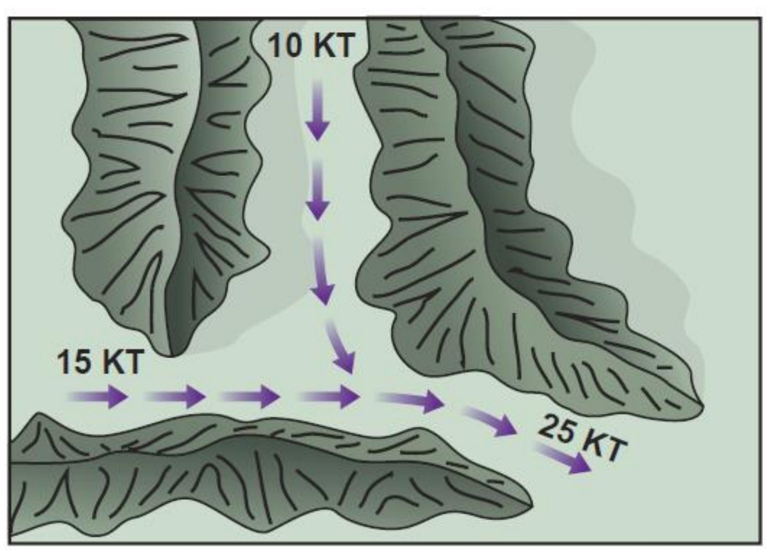
When the winds blow against a steep cliff or over rugged terrain, gusty turbulent winds result. Eddies often form downwind of the hills, which create stationary zones of stronger and lighter winds. These zones of strong winds are fairly predictable and usually persist as long as the wind direction and stability of the air stream do not change. The lighter winds, which occur in areas called wind shadows, can vary in speed and direction, particularly downwind of higher hills. In the lee of the hills, the wind is usually gusty and the wind direction is often completely opposite to the wind blowing over the top of the hills. Smaller reverse eddies may also be encountered close to the hills.

(b) Friction Effects

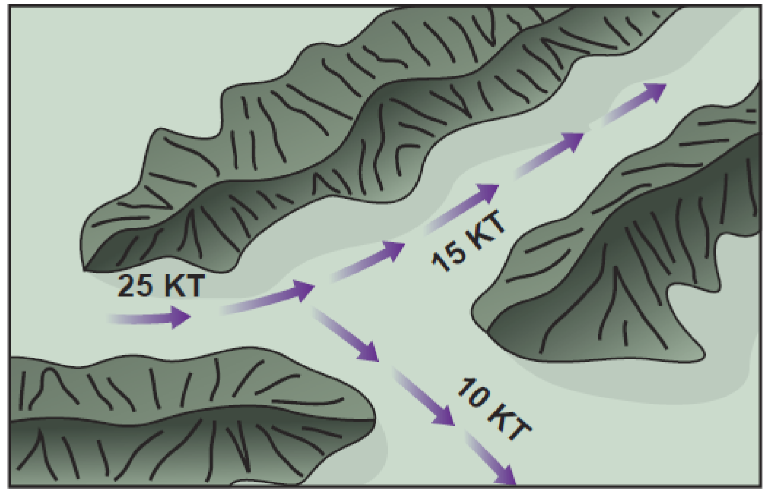
The winds that blow well above the surface of the earth are not strongly influenced by the presence of the earth itself. Closer to the earth, however, frictional effects decrease the speed of the air movement and back the wind (turns the wind direction counter-clockwise) towards the lower pressure. For example, in the northern hemisphere, a southerly wind becomes more southeasterly when blowing over rougher ground. There can be a significant reduction in the wind speed over a rough terrain when compared to the wind produced by the same pressure gradient over a relatively smooth prairie.



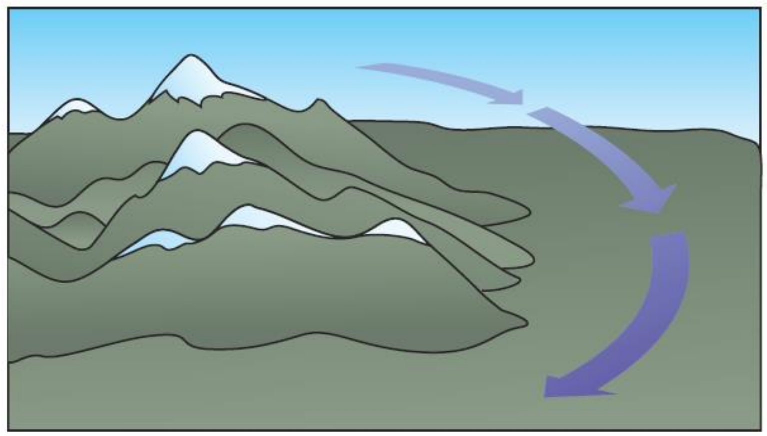
(c) Converging Winds When two or more winds flow together or converge, a stronger wind is created. Similar effects can be noted where two or more valleys come together.



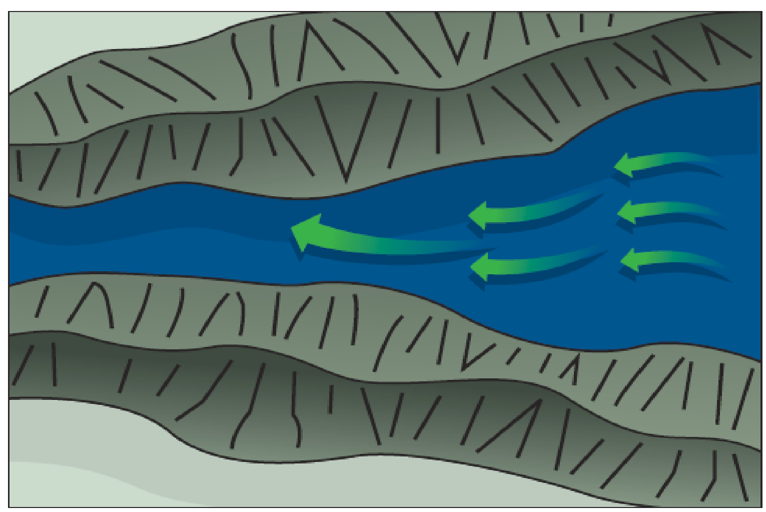
(d) Diverging Winds A divergence of the air stream occurs when a single air stream splits into two or more streams. Each will have a lower speed than the parent air stream.



(e) Corner Winds When the prevailing wind encounters a headland, there is a tendency for the wind to curl around the feature. This change in direction, if done abruptly, can result in turbulence.

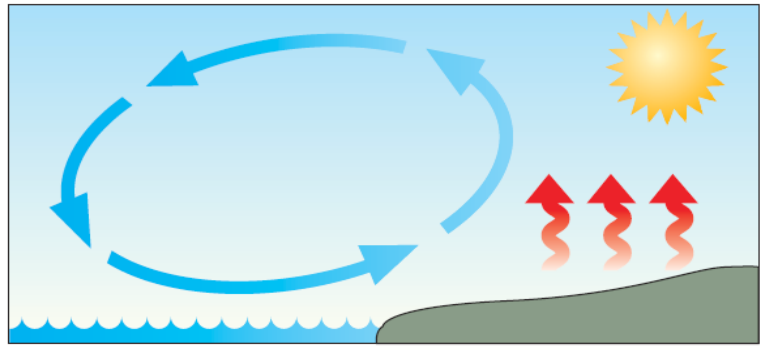


(f) Funnelled or Gap Winds When winds are forced to flow through a narrow opening or gap, such as an inlet or narrow section of a pass, the wind speed will increase and may even double in strength. This effect is similar to pinching a water hose and is called funnelling.

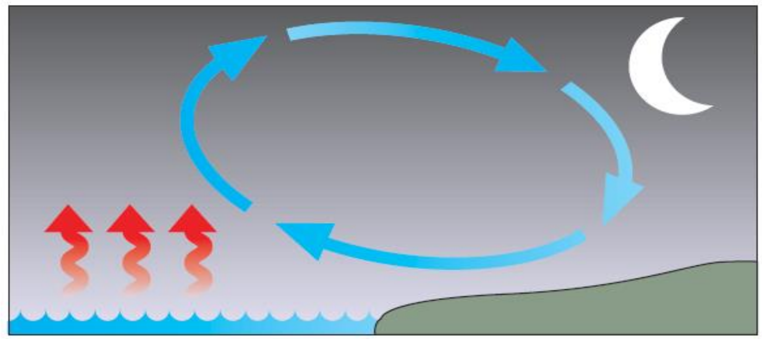


(g) Channelled Winds The topography can also change the direction of the winds by forcing the flow along the direction of a pass or valley. This is referred to as channelling.

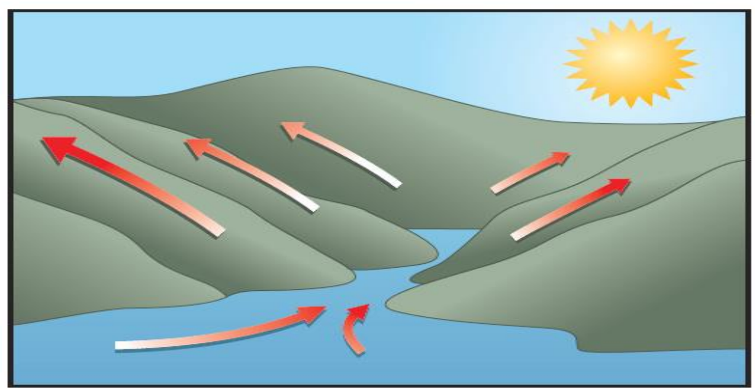
(h) Sea and Land Breezes Sea and land breezes are only observed under light wind conditions and depend on temperature differences between adjoining regions. A sea breeze occurs when the air over the land is heated more rapidly than the air over the adjacent water surface. As a result, the warmer air rises and the relatively cool air from the water flows onshore to replace it. By late afternoon, the time of maximum heating, the sea breeze circulation may be 1,500 to 3,000 feet deep, have obtained speeds of 10 to 15 knots and extend as far as 50 nautical miles inland.



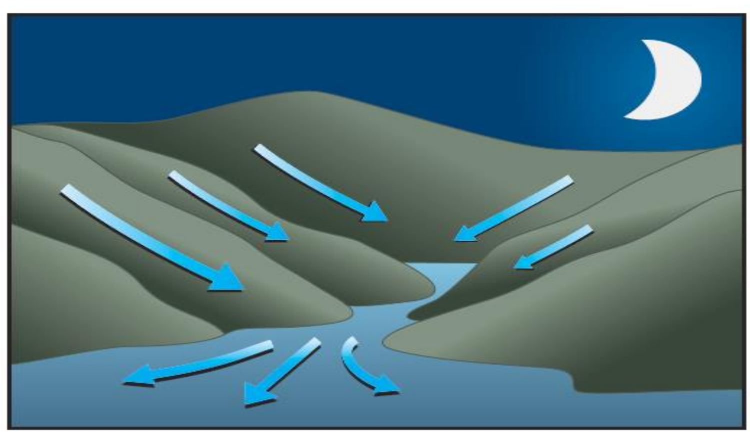
During the evening the sea breeze subsides. At night, as the land cools, a land breeze develops in the opposite direction and flows from the land out over the water. It is generally not as strong as the sea breeze, but at times it can be quite gusty. Both land and sea breezes can be influenced by channelling and funnelling resulting in almost frontal-like conditions, with sudden wind shifts and gusty winds that may reach up to 50 knots.



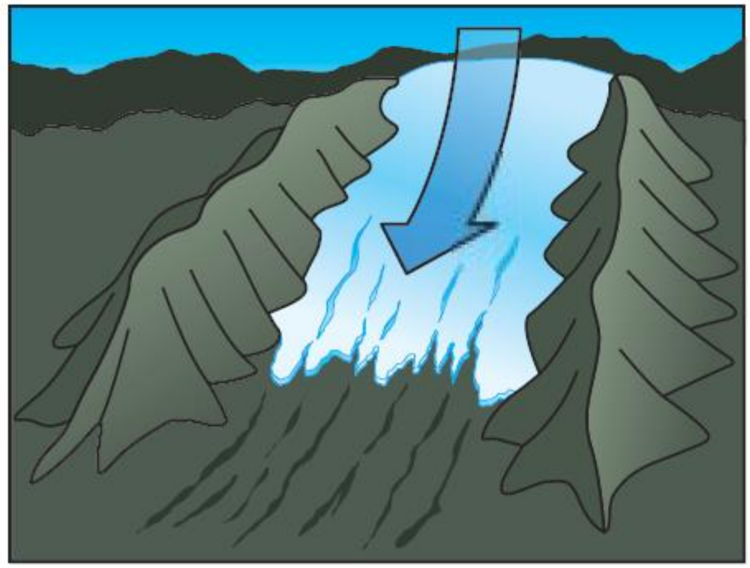
(i) Anabatic and Katabatic Winds During the day, the sides of the valleys become warmer than the valley bottoms since they are better exposed to the sun. As a result, the winds blow up the slope. These daytime, upslope winds are called anabatic winds. Gently sloped valley sides, especially those facing south, are more efficiently heated than those of a steep, narrow valley. As a result, valley breezes will be stronger in the wider valleys. An anabatic wind, if extended to sufficient height, will produce cloud. In addition, such a wind offers additional lift to aircraft.



At night, the air cools over the mountain slopes and sinks to the valley floor. If the valley floor is sloping, the winds will move along the valley towards lower ground. The cool night winds are called drainage winds, or katabatic winds, and are often quite gusty and usually stronger than anabatic winds. Some valley airports have windsocks situated at various locations along their runways to show the changeable conditions due to the katabatic flow.



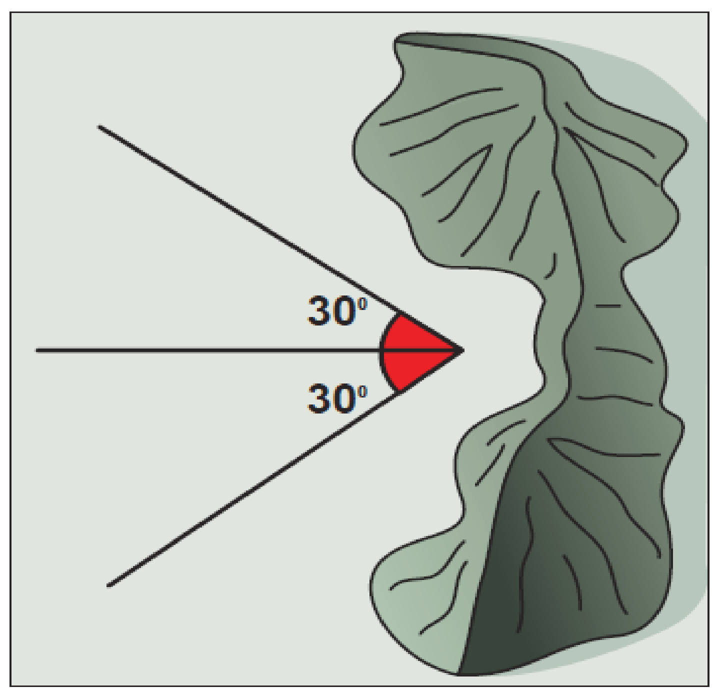
(j) Glacier Winds Under extreme cooling conditions, such as an underlying ice cover, the katabatic winds can develop to hazardous proportions. As the ice is providing the cooling, a shallow wind of 80 knots or more can form and will persist during the day and night. In some locations the katabatic flow "pulsates" with the cold air building up to some critical value before being released to rush downslope.



It is important to recognize that combinations of these effects can operate at any given time. Katabatic winds are easily funnelled resulting in winds of unexpected directions and strengths in narrow passes. Around glaciers in the summer, wind fields can be chaotic. Katabatic winds from the top of the glacier struggle for dominance with localized convection, or anabatic winds, induced by heated rock slopes below the ice. Many sightseeing pilots prefer to avoid glaciated areas during the afternoon hours.

Lee Waves When air flows across a mountain or hill, it is disturbed the same way as water flowing over a rock. The air initially is displaced upwards across the mountain, dips sharply on the lee side, then rises and falls in a series of waves downstream. These waves are called "mountain waves" or "lee waves" and are most notable for their turbulence. They can develop on the lee side of the mountains of Ellesmere Island and the mountain along the east side of Baffin Island.

The Formation of Lee Waves The development of lee waves requires that several conditions be met:



(a) the wind direction must be within 30 degrees of perpendicular to the mountain or hill. The greater the height of the mountain and the sharper the drop off to the lee side, the more extensive the induced oscillations.

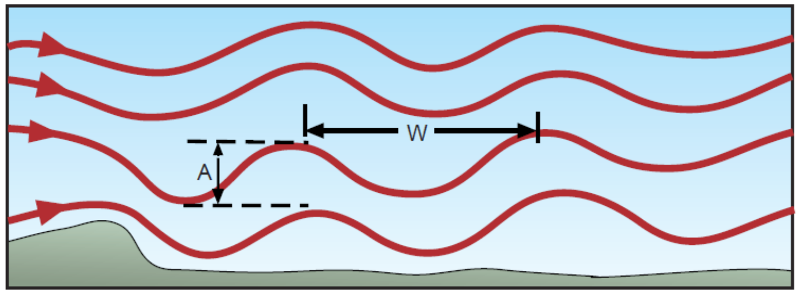
(b) wind speed should exceed 15 knots for small hills and 30 knots for mountain ridges. A jet stream with its associated strong winds below the jet axis is an ideal situation.

(c) the wind direction should be constant while increasing in speed with height throughout the troposphere.

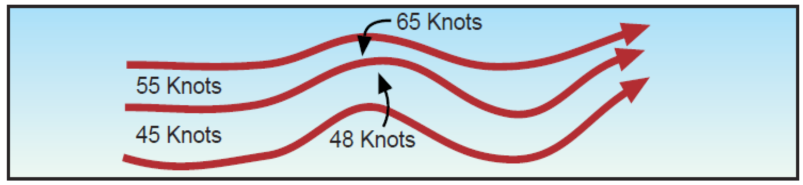
(c) the air should be stable near the mountain peaks but less stable below. The unstable layer encourages the air to ascend and the stable layer encourages the development of a downstream wave pattern.

While all these conditions can be met at any time of the year, winter wind speeds are generally stronger resulting in more dangerous lee waves.

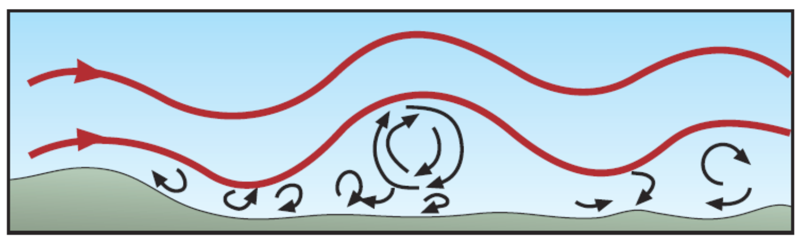
Characteristics of Lee Waves Once a lee wave pattern has been established, it follows several basic rules:



- Stronger the wind, the longer the wavelength. The typical wavelength (W) is about 6 miles but can vary from as short as 3 miles to as long as 15 miles.
- Position of the individual wave crests will remain nearly stationary with the wind blowing through them as long as the mean wind speed remains nearly constant.



- Individual wave amplitude (A) can exceed 3,000 feet.
- Layer of lee waves often extends from just below the tops of the mountains to 4,000 to 6,000 feet above the tops but can extend higher.
- Induced vertical currents within the wave can reach values of 4,500 feet per minute.
- Wind speed is stronger through the wave crest and slower through the wave trough.
- Wave closest to the obstruction will be the strongest with the waves further downstream getting progressively weaker.



- A large eddy called a "rotor" may form below each wave crest.
- Mountain ranges downstream may amplify or nullify induced wave patterns.
- **Downdrafts are frequently found on the downwind side of the obstruction**. These downdrafts typically reach **values of 2,000 feet per minute but downdrafts up to 5,000 feet per minute have been reported**. The strongest downdraft is usually found at a height near the top of the summit and **could force an aircraft into the ground**.

Clouds Associated with Lee Waves Lee waves involve lift and, if sufficient moisture is available, characteristic clouds will form. The signature clouds may be absent, however, due to the air being too dry or the cloud being embedded within other clouds and not visible. It is essential to realize, nevertheless, that the absence of lee wave clouds does not mean that there are no lee waves present.

(a) Cap cloud A cloud often forms over the peak of the mountain range and remains stationary. Frequently, it may have an almost "waterfall" appearance on the leeward side of the mountain. This effect is caused by subsidence and often signifies a strong downdraft just to the lee of the mountaintop.

(b) Lenticular clouds A lens shaped cloud may be found at the crest of each wave. These clouds may be separated vertically with several thousand feet between each cloud or may form so close together they resemble a "stack of plates." When air flows through the crest it is often laminar, making the cloud smooth in appearance. On occasion, when the shear results in turbulence, the lenticular cloud will take on a ragged and wind torn appearance.

Lenticular cloud at Resolute credit: David Schmidt

(c) Rotor cloud A rotor cloud may form in association with the rotor. It will appear as a long line of stratocumulus, a few miles downwind and parallel to the ridge. Its base will be normally below the peak of the ridge, but its top can extend above it. The turbulence associated with a rotor cloud is severe within and near the rotor cloud.