

ZERO SHADOW DAY

List of Indian towns for each date

<http://astron-soc.in/outreach/activities/sky-event-related/zero-shadow-day/>

Zero Shadow Day (ZSD) occurs when the Sun is directly overhead and hence casts no shadow for a vertical object placed on the ground. This can occur only for places whose latitude is between -23.5° to $+23.5^{\circ}$. ZSD occurs twice a year, once when the Sun is moving northwards (from 21 Dec to 21 Jun, or Uttarayan), and once when the Sun is moving southwards (from 21 Jun to 21 Dec, or Dakshinayan). The southern part of India, roughly below the latitude of Bhopal, will experience the ZSD. The states that can see this event are Andaman and Nicobar Islands, Kerala, Tamilnadu, Puducherry, Karnataka, Andhra Pradesh, Telengana, Goa, Maharashtra, Odisha, Daman & Diu, Dadra & Nagar Haveli, most of Gujarat and Chattisgarh and the southern parts of Madhya Pradesh, Jharkhand, West Bengal, Tripura and Mizoram.

The Zero Shadow Day for a given place is the day when the declination of the Sun is closest to the latitude of the place. These two quantities can become equal at any time of the day, of course, and not necessarily at noon. Hence, at noon, unless the Sun's declination happens to exactly coincide with the latitude, we will not get exactly zero shadow. However, the Sun moves around 0.25° every day in South India, and far slower as it moves north. Hence, this difference is not obvious. We recommend that you observe the shadow of vertical objects at noon for a couple of days before and after the ZSD of your place to see this small change.

A good way to find the ZSD for your place is to use the interactive map made by Alok Mandavgane, which can be found at <https://alokm.com/zsd.html> and is easy to use. We have collated the dates for almost all major towns from this map, which is presented below. State-wise maps and much more information can be found at <http://astron-soc.in/outreach/activities/sky-event-related/zero-shadow-day/>

This document has been created by the Public Outreach and Education Committee of the Astronomical Society of India.

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Dates	Places
6 Apr & 5 Sep	Indira Point
10 Apr & 1 sep	Kanyakumari, Nagercoil, Kudankulam, Katchal, Trinket Island
11 Apr & 31 Aug	Kovalam, Trivandrum, Kazhakoottam, Nedumangadu, Sathankulam, Tiruchendur
12 Apr & 30 Aug	Varkala, Ponnudai, Paravur, Kollam, Kottarakara, Punalur, Tenkasi, Tirunelveli, Thoothukudi,
13 Apr & 29 Aug	Kayankulam, Adoor, Thiruvalla, SankaranKoil, Kovilpatti, Rameshwaram, Ramanathapuram, Car Nicobar
14 Apr & 28 Aug	Alappuzha, Kottayam, Vaikom, Pala, Sabarimala, Cumbum, Rajapalayam, Sivakasi, Virudhunagar, Paramakudi
15 Apr & 27 Aug	Kochi, Vypin, Thodupuzha, Idukki, Munnar, Theni, Andipatti, Tirumangalam, Madurai, Sivaganga, Karaikudi
16 Apr & 26 Aug	Paravur, Aluvag, Chalakudy, Valparai, Kodaikanal, Dindigul, Pudukottai, Pattukottai, Vedaranyam
17 Apr & 25 Aug	Guruvayur, Ponnani, Thrissur, Ottapalam, Palakkad, Mettupalayam, Pollachi, Udumalpet, Palani, Trichy, Thanjavur, Thiruvarur, Nagapattinam, Little Andaman
18 Apr & 24 Aug	Kottakal, Malappuram, Coimbatore, Gudalur, Palladam, Tiruppur, Kangayam, Karur, Kumbakonam, Mayiladuthurai, Karaikal, Poompuhar
19 Apr & 23 Aug	Kozhikode, Koyilandy, Thamarassery, Ooty, Kotagiri, Avinashi, Erode, Tiruchengode, Namakkal, Sirkazhi, Chidambaram
20 Apr & 22 Aug	Vadakara, Mahe, Thalassery, Perambra, Wayanad, Mudumalai, Bhavani, Salem, Mettur, Kallakuruchi, Neyveli, Panruti, Cuddalore, Port Blair
21 Apr & 21 Aug	Kannur, Payyanur, Taliparamba, Dharmapuri, Sankarapuram, Villupuram, Pondicherry, Havelock Island
22 Apr & 20 Aug	Kanhangad, Kasargod, Madikeri, Mysore, Srirangapatna, Shivanasamudra, Chengam, Tiruvannamalai, Tindivanam, Long Island
23 Apr & 19 Aug	Uppala Gate, Puttur, Arakalagud, Krishnarajapete, Melkote, Mandya, Channapatna, Ramanagara, Attibele, Hosur, Krishnagiri, Tirupattur, Vaniyambadi, Kavalur, Ambur, Arani, Kanchipuram, Chengalpattu, Mahabalipuram, Kelambakkam
24 Apr & 18 Aug	Mangalore, Mooadbidri, Bantwal, Sakleshpur, Hassan, Shravanabelagola, Bidadi, Bengaluru, Dasarahalli, Bangarapet, Kolar, Gudiyattam, Vellore, Arcot, Arakkonam, Sriperumbudur, Tiruvallur, Avadi, Chennai, Interview Island, Sound Island
25 Apr & 17 Aug	Udupi, Brahmavar, Karkala, Sringeri, Kudremukha, Chickmagaluru, Halebeedu, Arsikere, Tiptur, Tumkur, Doddaballapura, Chickballapura, Chintamani, Chittoor, Thiruthani, Minjur, Pulicat, North Andaman
26 Apr & 16 Aug	Kundapura, Trasi, Thirthahalli, Kuppali, Kadur, Tarikere, Sira, Gauribidanur, Peddur, Madanapalle, Tirupati, Srikalahasti, Sriharikota
27 Apr & 15 Aug	Bhatkal, Muthala, Shivamogga, Channagiri, Hiriyur, Madakasira, Rayachoty
28 Apr & 14 Aug	Honnavar, Kumta, Jog Falls, Shikaripur, Challakere, Kadiri, Nellore
29 Apr & 13 Aug	Kumta, Gokarna Sirsi, Ranebennur, Davangere, Anantapur, Cuddapah, Ramathirtham
30 Apr & 12 Aug	Karwar, AgondBa, Haveri, Kudigi, Tadipatri. Jammalamadugu, Proddatur, Kavali
1 May & 11 Aug	Benaulim, Margao, Dandeli, Hubli, Hospet, Bellary, Guntakal, Gooty
2 May & 10 Aug	Panjim. Vasco, Anjuna, Dharwad, Gadag, Gangavathi, Nandyal, Ongole
3 May & 9 Aug	Sawantwadi, Belgaum, Sindhanur, Kurnool, Markapur, Chirala, Bapatla
4 May & 8 Aug	Malvan, Gokak, Bagalkot, Vinukonda, Chilakaluripet, Machilipatnam
5 May & 7 Aug	Devgad, Radhanagari, Mudhol, Raichur, Deosugur, Narasaraopet, Guntur, Mangalagiri, Gudivada

Dates	Places
6 May & 6 Aug	Ambolgad, Kolhapur, Ichalkaranji, Yadgir, Mahbubnagar, Vijayawada, Eluru, Bhimavaram, Tanuku
7 May & 5 Aug	Ratnagiri, Sangli, Miraj, Vijayapura, Nalgonda, Nuzividu, Tadepalligudam, Rajahmundry, Kakinada
8 May & 4 Aug	Jaigad, Karad, Afzalpur, Kalburgi, Suryapet, Khammam, Samarlakota
9 May & 3 Aug	Chiplun, Mandrup, Akkalkot, Hyderabad, Secunderabad, Kothagudam
10 May & 2 Aug	Satara, Pandharpur, Solapur, Basavakalyan, Sangareddy, Jangaon, Palwancha, Visakhapatnam
11 May & 1 Aug	Mahabaleshwar, Phaltan, Tuljapur, Medak, Warangal, Vizianagaram
12 May & 31 Jul	Mangaon, Baramati, Barshi, Osmanabad, Ausa, Nariapur, Malkangiri, Srikakulam
13 May & 30 Jul	Mulshi, Pune, Daund, Latur, Karimnagar, Pamunuru, Sukma, Salur, Bobili
14 May & 29 Jul	Alibaug, Lonavla, Talegaon Dabhade, Pimpri Chichwad, Dehu Road, Jamkhed, Ambajogai, Nizamabad, Korutla, Ramagundam, Palakonda
15 May & 28 Jul	Mumbai, Navi Mumbai, Karjat, Matheran, Rajgurunagar, Manchar, Ralegan-Siddhi, Beed, Gangakhed, Mancharial, Mandamarri, Dantewada, Jagdalpur, Jeypore
16 May & 27 Jul	Borivali, Thane, Dombivili, Kalyan, Bhiwandi, Badlapur, Narayangaon, Khodad, Ahmednagar, Parbhani, Nanded, Nirmal, Mamda, Dudme, Bastar, Nowrangpur, Rayagada, Taptapani, Brahmapur
17 May & 26 Jul	Nala Sopara, Virar, Asangaon, Basmat, Kouta, Aheri, Chhota Dongar, Mahulpatna, Pattapur, Ganjam
18 May & 25 Jul	Palghar, Kasara Budruk, Sangamner, Shirampur, Ambad, Hingoli, Adilabad, Mulchera, Koksara, Satapada
19 May & 24 Jul	Dahanu, Nashik, Kopargaon, Vaijapur, Aurangabad, Jalna, Pusad, Balharshah, Rowghat, Dharmagarh, Bhawanipatna, Bellaguntha, Puri
20 May & 23 Jul	Talasari, Takh, Mehkar, Washim, Wani, Chandrapur, Mul, Keskal, Nayagarh, Motari, Saharabedi
21 May & 22 Jul	Bilad, Silvassa, Khedgaon, Manmad, Kannad, Chikhli, Rohna, Wadki, Bhanupratappur, Kanker, Kusruparaha, Bhubaneswar, Paradeep
22 May & 21 Jul	Daman, Vapi, Malegaon, Chalisgaon, Buldana, Khopadi, Yavatmal, Armori, Charama, Saintala, Phulbani, Cuttack
23 May & 20 Jul	Diu, Valsad, Bhadgaon, Khamgaon, Akola, Wardha, Kusumkasa, Dhamtari, Balangir, Dhenkanal, Bharcchan
24 May & 19 Jul	Somnath, Jafarabad, Navsari, Amalsad, Dhule, Jamner, Shegaon, Nimbora, Wardha, Umred, Kurud, Nuapada, Angul, Bhuban, Jajpur
25 May & 18 Jul	Mangrol, Talala, Rajula, Mahuva, Vadoli, Sakri, Amalner, Jalgaon, Bhusawal, Telhara, Amravati, Rajnandgaon, Nawapara Nagar, Padmapur, Bhadrak
26 May & 17 Jul	Madhavpur, Datha, Surat, Bardoli, Vyara, Nardana, Chopda, Paratwada, Nagpur, Durg, Bhilai, Bhandara, DONGargarh, Raipur, Barpali, Markona
27 May & 16 Jul	Keshod, Savar Kundla, Alang, Nandurbar, Shirpur, Burhanpur, Tumsar, Gondia, Katapali, Chandipur
28 May & 15 Jul	Junagadh, Paltana, Ankleshwar, Shahada, Pandhurna, Tilda, Sambalpur, Balasore
29 May & 14 Jul	Porbandar, Upleta, Amreli, Bhavnagar, Bharuch, Sendhwa, Chichanda, Bhatapara, Jogal, Digha, Mousuni
30 May & 13 Jul	Ghumli, Jamkandorana, Rajpipla, Khargone, Khandwa, Betul, Balaghat, Raigarh, Jharsuguda, Banei, Contai, Pathar Pratima Island

Dates	Places
31 May & 12 Jul	Bhogat, Bhanvad, Gondal, Gadhada, Amod, Nasvadi, Barwani, Birsa, Kawardha, Champa, Joda, Baripada, Nandigram
1 Jun & 11 Jul	Bhatiya, Kamlapur, Sarangpur, Dabhoi, Kasrawad, Sanawad, Chhindwara, Seoni, Mungeli, Bilaspur, Sundargarh, Barbil, Manda, Beida, Haldia, Devasora South
2 Jun & 10 Jul	Dwarka, Rajkot, Dholera, Vadodara, Bodeli, Manawar, Sukhtara, Pandaria, Rourkela, Baharagora, Tamluk, Phura
3 Jun & 9 Jul	Motikhavdi, Dhandhuka, Borsad, Harda, Chhapara, Korna, Banki Mongra, Lailunga, Jorapokhar, Kharagpur, Medinipur, Debra, Baruipur, South Bungtlang, Kawichaw East
4 Jun & 8 Jul	Jamnagar, Petlad, Tutugutu, Chaibasa, Kokpara, Jhargram, Bagnan, Maheshtala, Mothbari, Siaha
5 Jun & 7 Jul	Dhrol, Wankaner, Thrangadh, Limbdi, Anand, Mhow, Itarsi, Lakhnadon, Mandla, Pathalgaon, Ghatshila, Howrah, Kolkata, Hasnabad, Chawngte P, Vaumbuk
6-10 Jun & 6-2 Jul	Gandhidam, Morbi, Surendranagar, Dhrangadhra, Ahmedabad, Nadiad, Godhra, Dahod, Indore, Dewas, Hoshangabad, Narsingpur, Guthurma, Kunkuri, Jamshedpur, Dhaniakhali, Kalyani, Barrackpore, Bomgain, Basirhat, Lunglei, Lungsen
11-21 Jun & 2 Jul-21 Jun	Kothara, Bhuj, Gandhinagar, Ratlam, Ujjain, Tarana, Bhopal, Jabalpur, Shahpura Chirimiri, Ambikapur, Surajpur, Ranchi, Balarampur, Purulia, Bankura, Burdwan, Hanskali, Thenzawl, Serchhip, Zokhawthar